HABITAT MITIGATION AND MONITORING PLAN

SUNRISE POWERLINK

CORPS FILE NUMBER 2007-00704-SAS

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List of Acronyms

AA(s)	Assessment Area(s)
ABDSP	Anza Borrego Desert State Park
APN	Assessor Parcel Number
BBG	Barefoot Banded Gecko
BLM	Bureau of Land Management
BMPs	Best Management Practices
Cal-IPC	California Invasive Plant Council
Corps	U.S. Army Corps of Engineers
CDFG	California Department of Fish and Game
CRAM	California Rapid Assessment Method
CWA	Clean Water Act
CWMW	California Wetlands Monitoring Workgroup
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
GIS	Geographic Information System
HMP	Habitat Management Plan
HMMP	Habitat Mitigation and Monitoring Plan
kV	kilovolt
LSAA	Lake and Streambed Alteration Agreement
MHPA	Multi-habitat Planning Area
MP	Mileposts
MSCP	Multiple Species Conservation Plan
NGVD	National Geodetic Vertical Datum
OHV	Off-highway Vehicle
OHWM	Ordinary High Water Mark
PAR	Property Analysis Record
PBS	Peninsular Bighorn Sheep
PCN	Pre-Construction Notification
PEM	Palustrine Emergent Wetlands
PJD	Preliminary Jurisdictional Determination
PMR	Project Modification Report
ROW	Right-of-Way
SCCWRP	Southern California Coastal Water Research Project
SDG&E	San Diego Gas and Electric
SRPL	Sunrise Powerlink
SVRA	State Vehicular Recreation Area
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TOB	Top of Bank
TSAP	Tower Staging Area Pad
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WOS	Waters of the State
WOUS	Waters of the United States

1.0 INTRODUCTION AND PURPOSE

San Diego Gas and Electric (SDG&E) is constructing a new 500/230 kilovolt (kV) electric transmission line that would traverse approximately 120 miles between the El Centro area of Imperial County and southwestern San Diego County, in southern California (Figure 1). Construction of this transmission line, along with associated roads, facilities, and maintenance areas, will result in impacts to areas under the jurisdiction of the U.S. Army Corps of Engineers (Corps), the State Water Resources Control Board (SWRCB), and the California Department of Fish and Game (CDFG). State and federal regulations require mitigation for impacts to "waters of the United States" (WOUS) and "waters of the State" (WOS). This Habitat Mitigation and Monitoring Plan (HMMP) describes how the mitigation will be accomplished, including preservation, restoration and enhancement activities, monitoring and performance criteria, and long-term management of mitigation areas. This HMMP is prepared and formatted to meet the permit conditions of the Corps of Engineers (Clean Water Act Section 404), the State Water Resources Control Board (Clean Water Act Section 401), and the Department of Fish and Game (Fish and Game Code 1602).

1.1 Responsible Parties

SDG&E is responsible for implementing mitigation for the Sunrise Powerlink (SRPL) Project. WRA, Inc. is the applicant's authorized agent and preparer of this HMMP for mitigation to WOUS and WOS.

Primary contact information for these parties is below:

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San Diego, California 92123-1548
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Authorized Agent:
WRA, Inc.
2169-G East Francisco Blvd.
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Contact: Michael Josselyn, PhD, PWS
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SDG&E will be responsible for implementing the project mitigation through completion of the initial monitoring period. Long-term management of the mitigation properties will be the responsibility of the respective land managers (e.g., Bureau of Land Management [BLM], County of San Diego, U.S. Forest Service [USFS], or non-profit or conservation land management organization). The description of the long-term management for these mitigation areas, the restrictions to be placed on the areas, and the financial commitments are summarized here and described fully within the Habitat Management Plans (HMP) prepared by Sunrise Powerlink (SDG&E 2010a) for each of the mitigation sites.



Figure 1. Project Area Location Map

Sunrise Powerlink
San Diego/Imperial County, California

0 5 10 20 Miles

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Map Date: June 2010
Map By: Derek Chan
Base Source: ESRI
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1.2 Document Overview and Purpose

The purpose of this document is to describe the mitigation, monitoring, and management for permanent and temporary project impacts to streams (ephemeral, intermittent, and perennial) and desert dry washes (desert ephemeral streams with unique patterns of flow within braided systems) within "single and complete projects" associated with the construction, operation, and maintenance of the Sunrise Powerlink. In addition, restoration of temporary impacts to streams, wetlands, and desert dry washes within the construction footprint is described as part of the Restoration Plan for Temporary Impacts to Waters (Appendix A).

The intention of this document is to follow the regulation set forth in the 2008 Clean Water Act (CWA) Section 404 Final Compensatory Mitigation Rule. As such, language and requirements may differ from that of the 2004 Los Angeles District Final Mitigation Guidelines and Monitoring Requirements. In addition, we provide information requested by the Los Angeles District Corps office and the State Water Resources Control Board related to the functional assessment of the impact and mitigation sites using the California Rapid Assessment Method (CRAM).

Mitigation for the impacts associated with "single and complete projects" will be implemented at five mitigation sites. Four of these sites are located along the Sunrise Powerlink project alignment, and one is located in the desert area north of the alignment (see Figure 2). These locations are also part of an overall mitigation program addressing a variety of habitat and special status species requirements for the Sunrise Powerlink. The mitigation sites that are proposed to address impacts to WOUS and WOS are:

- Desert Cahuilla Property
- Suckle Property
- Long Potrero Property
- Lightner Property
- Chocolate Canyon

The mitigation, monitoring, and management activities described in this HMMP are intended to meet the permit requirements of the Corps, CDFG, and SWRCB, as well as the Corps of Engineers regulatory requirements for preparation of mitigation plans set forth in 33 CFR 332.4(c). The regulatory requirements contained in 33 CFR 332.4(c), as issued by the Corps in 2008, generally encompass the requirements of mitigation and monitoring plans for all of the resource agencies. We have included additional information described in the 2004 Los Angeles District final Mitigation Guidelines and Monitoring Requirements and information required in the forthcoming mitigation quidelines, as feasible. The 2008 regulations require an HMMP to include:

- *Mitigation Objectives, including resource type, amounts, and methods of compensation (see Section 4.0 and Section 5.0)*
- *Site Selection, including key factors for providing mitigation at a site (see Section 3.0)*
- *Site Protection Instrument (see Section 7.2)*
- *Baseline Information, including ecological characteristics of impacted and mitigation sites (see Section 2.3.2 for impacted sites, Section 3.0 for mitigation sites)*
- *Determination of Credits, including a description of how the mitigation will provide compensatory mitigation for impacts (see Section 4.0)*
- *Mitigation Work Plan, including detailed descriptions of the work to be performed in implementing mitigation (see Section 5.0)*

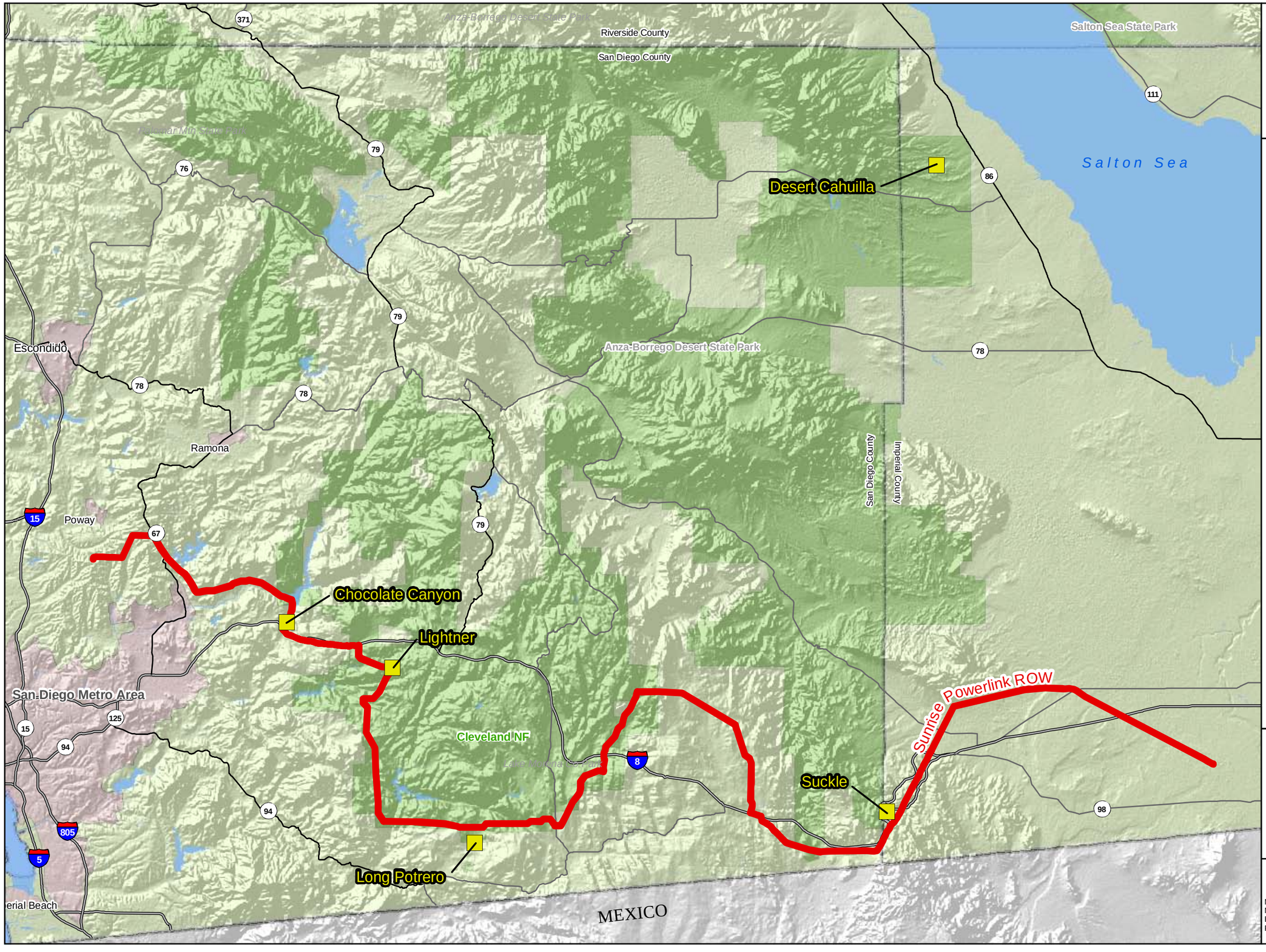
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Sunrise Powerlink

San Diego/Imperial County, California

Figure 2.

Overview of Mitigation Area Locations



Legend

Mitigation Area

N
W E
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0 5 10
Miles

Map Date: June 2010
Map By: Derek Chan
Base Source: ESRI
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- *Maintenance Plan, including maintenance activities to ensure continued viability of the mitigation site (see Sections 6.5 and 7.0)*
- *Ecologically based Performance Standards (see Section 6.6)*
- *Monitoring Requirements and Methods (see Section 6.0)*
- *Long-term Management Plan, including long-term financing mechanisms (see Section 7.0 and to be provided in greater detail within Habitat Mitigation Plans to be prepared separately)*
- *Adaptive Management Plan (see Sections 6.5 and 7.0)*
- *Financial Assurances to ensure project mitigation will be effectively implemented and maintained (see Sections 6.7 and 7.5)*

Project impacts were described in the Pre-Construction Notification (PCN) prepared for the Corps, as part of the Lake and Streambed Alteration Agreement (LSAA) Notification Package prepared for the CDFG, as part of the Water Quality Certification Application prepared for the SWRCB, and as modified by subsequent submittals. All permit application documents contain a complete project description. Project modifications have been made throughout the permit process to further reduce environmental impacts, including those to streams, wetlands, and desert dry washes.

2.0 PROJECT DESCRIPTION

The Sunrise Powerlink Transmission Project will traverse approximately 120 miles between the El Centro area of Imperial County and southwestern San Diego County, in southern California. The proposed Right-of-Way (ROW) has been assigned mileposts (MP), which range from the Imperial Valley Substation (MP 0) to the Sycamore Canyon Substation (MP 118). The Project is described in five separate links according to the following mileposts: Link 1 (MP 0 to MP 52.5), Link 2 (MP 52.5 to MP 90.0), Link 3 (Suncrest Substation), Link 4 (MP 92.8 to MP 99.0), and Link 5 (MP 90.0 to 92.8 and MP 99.0 to MP 118). The project description and impact summaries below are based on the project permit application packages, the Project Modification Report (PMR), and subsequent engineering design changes made at the request of the Corps to maximize avoidance and minimization of impacts to WOUS and WOS.

2.1 Summary of Delineated Wetlands and Waters

The Preliminary Jurisdictional Determination Report (WRA, Inc. 2010) for the project was approved by the Corps in March 2010. The submittal to the Corps included supplemental information on impacts to the WOS. Table 1 provides a summary of the jurisdictional areas for both WOUS and WOS along the project alignment as submitted in the Preliminary Jurisdictional Determination (PJD) and revised in July 2010. The delineated areas consist of ephemeral streams (including desert dry washes) and wetlands.

Table 1. Summary of All Delineated Jurisdictional Features on Sunrise Powerlink Project.

Habitat Type	Size (acres)		Length (linear feet)	Number of Features
	Waters of the U.S.	Waters of the State[1]		
Wetlands:				
Palustrine Emergent Wetlands (PEM)	115.65	115.65	N/A	38
Total Wetlands	**115.65 acres**	**115.65 acres**		**38**
Streams and Desert Dry Washes:				
Perennial Streams	0.16	0.31	1,379.50	3
Intermittent Streams	2.93	5.21	23,261.29	33
Ephemeral Streams/Desert dry washes	386.80	436.18	526,851.79	1,002
Total Streams and Desert Dry Washes	**389.89 acres**	**441.70 acres**	**551,492.58 feet**	**1,038**

[1]Waters of the State are inclusive of Waters of the U.S., and include the area within the Ordinary High Water Mark (the extent of federal jurisdiction) as well as the area to the top of bank, or edge of riparian vegetation (whichever is further).

2.2 Summary of Project Activities Associated with Nationwide Permit 12 Crossings

Table 2 below summarizes permanent and temporary project activities. Complete descriptions of these activities can be found in the project permit applications.

Table 2. Summary of Project Activities

Project Component	Impact Type		Description
	Perm[1]	Temp[2]	
Structure Footings	X		Concrete foundations (ground-anchors) for structures
Structure Pad Area	X		100 ft x 100 ft area at each power transmission structure containing the structure footings
Work Area		X	200 ft x 200 ft or 200 ft x 400 ft areas encompassing a structure pad area
Maintenance Area	X		75 ft x 35 ft area established adjacent to the tower for maintenance after construction
Stringing Area (Pull Sites)		X	Work area for the equipment and activities required for stringing power lines; size varies by site.
Tower Staging Area Pad (TSAP)	X		100-ft diameter area for helicopter landing zone or equipment loading zone for helicopters
Guard Structure		X	Structures to protect roads crossed by conductors during construction only
New Access Road	X	X	Roads constructed as part of Project to provide access to power facilities for construction; permanent access roads will

Table 2. Summary of Project Activities

Project Component	Impact Type		Description
	Perm[1]	Temp[2]	
			remain after construction for maintenance and temporary access roads will be regraded and restored to pre-existing conditions
Construction Yard		X	Areas for equipment storage, helicopter access and operations, field offices, and other facilities; site specific mapping.
Other Grading	X		Grading not encompassed by other components and required for safety and erosion control
Suncrest Substation Area	X		Substation facility

[1] An impact is categorized as "permanent" if the affected area will not be restored to pre-construction conditions.
[2] An impact is categorized "temporary" if the area can and will be restored to pre-construction conditions as described in Appendix A of this document. Most temporary impacts will be restored within 6 months.

2.3 Summary of Project Impacts

Within the "single and complete projects" proposed for the Sunrise Powerlink, temporary and permanent impacts to WOS and WOUS would occur as summarized in Table 3.

Table 3. Summary of Impacted Jurisdictional Features with Single and Complete Crossings (as updated August 2010)

Habitat Type	Impact Size (acres)			Length (linear feet)	Number of Features
		Waters of the U.S.	Waters of the State[1]		
Wetlands	Permanent	0.078	0.078	--	2
	Temporary	--	--	--	--
Perennial Streams	Permanent	0.007	0.018	26	1
	Temporary	--	--	--	--
Intermittent Streams	Permanent	0.094	0.103	1,916	5
	Temporary	0.003	0.006	158	2
Ephemeral Streams	Permanent	0.50	0.83	7,871	99
	Temporary	0.37	0.58	8,282	79
Desert Dry Washes	Permanent	2.39	2.47	--	76
	Temporary	6.78	7.10	--	104
Total Impacts	**Permanent**	**3.069**	**3.499**	**9,813**	**183**
	Temporary	**7.153**	**7.686**	**8,440**	**185**

[1]Waters of the State are inclusive of waters of the U.S., and include the area within the Ordinary High Water Mark (the extent of federal jurisdiction) as well as the area to the top of bank, or drip line of riparian vegetation (whichever is further).

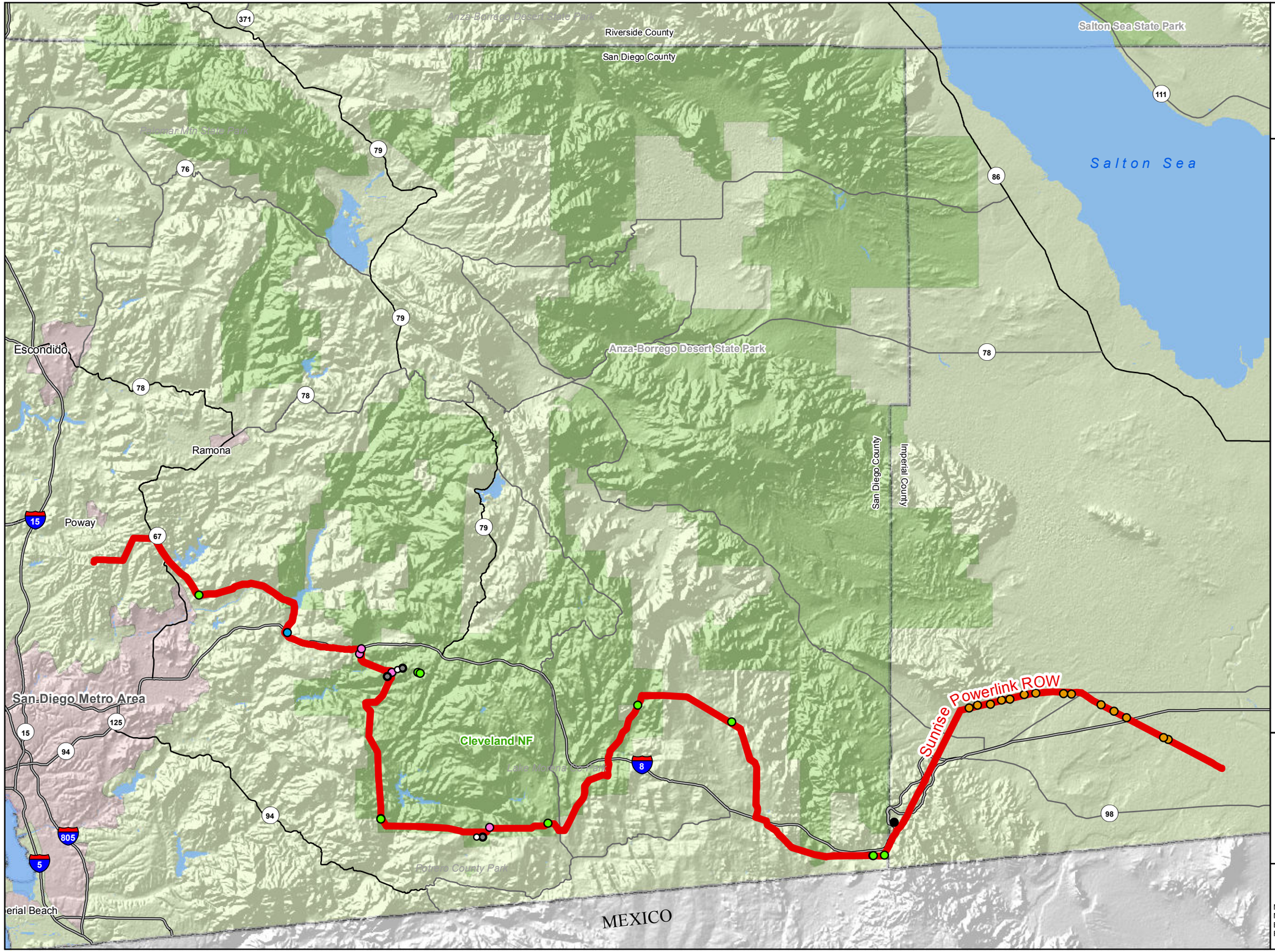
2.4 Baseline Condition of Impacted Streams within the ROW

In June 2010, WRA conducted an assessment of a representative sample of impact sites using the California Rapid Assessment Method (CRAM). This assessment provides scores which quantify the condition and functional capacity of impacted streams along the Sunrise Powerlink ROW. CRAM evaluation locations are shown in Figure 3. The methodology was applied with guidance and training from the Southern California Coastal Water Research Project (SCCWRP), one of the organizations involved in the development of CRAM, to ensure that the unique stream habitats along the ROW were adequately assessed using CRAM. Subsequently, CRAM was applied to the mitigation sites in September 2010.

CRAM was applied to a subset of 30 impact sites selected as representative of total SRPL impacts to streams and wetlands, out of 183 total impact areas along the ROW. Using the four stream categories outlined in Section 1.2, 25 impact sites were randomly selected for CRAM assessment from the desert dry wash and mountain ephemeral categories (14 desert dry wash and 11 mountain ephemeral), and all impacted intermittent and perennial streams were non-randomly targeted (four intermittent streams and one perennial stream). While it was possible to specifically assess all impacts to intermittent and perennial streams along the ROW, it was necessary to establish a statistically representative sampling design for the remaining impacts, all of which are within the desert dry wash and mountain ephemeral categories. A probabilistic sampling approach was therefore used, in which a randomly sampled subset of 25 sites was chosen to represent the range of conditions present within the overall population of desert dry wash and mountain ephemeral impact sites. Desert dry wash and mountain ephemeral streams are discussed separately in this report to highlight differences, but implications for the 175 sites represented by the probabilistic sampling approach require that these two categories be considered together as one (Section 2.5).

All 30 streams were assessed using the CRAM Riverine Wetland Module (Collins *et al.* 2008, 2008b). Therefore, with regards to CRAM, we refer to these streams as “riverine wetlands” throughout our text. SCCWRP staff audited a representative sample of CRAM analyses for the SRPL project to ensure that procedures were properly applied and that the scores obtained were within the acceptable error range of scores obtained by SCCWRP for the same sites. The scores were corrected based on the results of the audit.

Combined average scores for the 30 stream impact sites assessed are provided in Table 4, along with the Statewide Calibration Average [as reported on the CRAM website (http://www.cramwetlands.org/; 2010)] used by the developers of CRAM to test and select the most appropriate methods of calculating, scaling, and weighting scores for CRAM metrics, attributes, and AAs. Results of the assessment are summarized below. All CRAM scores from individual sites and a more detailed explanation of assessment methods and background are presented in Appendix B.



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Figure 3.

Stream and Wetland Impact and Mitigation Sites Assessed Using CRAM

Legend

- Sunrise Powerlink ROW

CRAM of Mitigation Sites

- Desert Dry Wash
- Intermittent
- Wetlands
- Perennial

CRAM of Impacted Sites

- Desert Dry Wash
- Ephemeral
- Intermittent
- Perennial

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Map By: Derek Chan
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Table 4. Combined Average CRAM Scores for Impact Sites within the Sunrise Powerlink ROW

CRAM Index and Attributes	Mean	SE	SD	Median	Maximum	Minimum	Statewide Calibration Average for Riverine Wetlands
Overall Index Score	72.3%	1	7	71.2%	87.8%	62.0%	77
Landscape Context	93.4%	2	9	93.3%	100.0%	55.8%	85
Hydrology	88.6%	2	11	91.7%	100.0%	58.3%	85
Physical Structure	47.5%	2	12	50.0%	87.5%	25.0%	69
Biotic Structure	59.7%	4	20	54.2%	97.2%	33.3%	69

As outlined in Section 1.2, streams within the Sunrise Powerlink ROW are discussed in four categories based on geomorphological and hydrological characteristics, including desert dry wash, mountain ephemeral streams, intermittent streams, and perennial streams.

> *Desert dry washes* as described in this report are ephemeral streams typically characterized by low-gradient channels on sandy soil, often having multiple or "braided" channels. Most desert dry washes were "non-confined" systems according to the CRAM definition, wherein the width of the valley floor across which the system can migrate without encountering a hillside, terrace, or other feature that is likely to prevent further migration is at least twice the average bankfull width of the channel (Collins *et al.* 2008). These streams were mostly located in areas of low-elevation, fairly level terrain, having sparse amounts of typical desert vegetation and an arid climate. Varieties of Sonoran scrub vegetation were present at most desert sites, and in many cases no vegetation was present. Seventy-six desert dry wash impact sites are located within the ROW, all along the eastern end of the ROW.

Mountain ephemeral streams were distinguished from desert dry washes by having a higher gradient and often being "confined" to a single narrow channel within a gully or ravine where the channel has little or no possibility to migrate. Mountain ephemeral streams typically had vegetation adapted for less extreme conditions than deserts, such as chaparral or oak and sage scrubs. Ninety-nine mountain ephemeral stream impact sites are located within the western 3/4 of the ROW. Intermittent and perennial streams within the Sunrise Powerlink ROW were distinguished from other streams solely by their hydrology with intermittent streams having flow for at least a month following rainfall and perennial streams for at least three months. The one perennial stream and four intermittent stream impact sites are located in the western half of the ROW.

As stated below (Section 2.5), impacts to vegetated wetlands delineated using the Corps of Engineers three-parameter approach ("Corps wetlands," Appendix B) will only occur along the fringes of streams at two sites within the Sunrise Powerlink ROW. According to CRAM methodology, since this situation entails a flow-through system with a distinct inlet and outlet, the Corps wetlands are considered a component of a riverine wetland (Collins *et al.* 2008), and therefore the methodology for riverine wetlands was used for CRAM assessments of these systems. Both of the Corps wetland impact sites were assessed using CRAM methodology for riverine wetlands within intermittent streams. For the purposes of CRAM data analysis, these sites along with their inclusive area of Corps wetlands were considered to be intermittent streams. The overall average scores for each stream type are shown in Table 5.

Table 5. CRAM Scores for Four Riverine Wetland Categories within the ROW

Stream Category	Number of AAs	Overall Index Score	Landscape Context	Hydrology	Physical Structure	Biotic Structure
Desert Dry Wash	14	67.7	94.3	90.5	42.9	43.1
Mountain Ephemeral	11	73.5	95.9	85.6	46.6	65.9
Intermittent	4	83.5	94.3	91.7	56.3	91.7
Perennial	1	81.0	55.8	83.3	87.5	97.2
Corps Wetlands[1]	-	-	-	-	-	-

Attribute descriptions below are based on guidance provided in the CRAM User's Manual (Collins *et al.* 2008).

2.4.1 Buffer and Landscape Context

For the purposes of CRAM, a buffer is a zone of transition between the immediate margins of a riverine wetland[2] or riparian area and its surrounding environment that is likely to help protect the riverine wetland from anthropogenic stress. Buffers can protect wetlands by filtering pollutants, providing refuge for wetland wildlife, acting as barriers to disturbance by people and pets, and reducing the risk of invasion by non-native plants and animals. Metrics used to rate Assessment Areas (AAs) with respect to buffer and landscape context include 1) Landscape Connectivity, and 2) Buffer. For riverine wetlands, landscape connectivity is assessed as the continuity of the riparian corridor over a distance of about 500m upstream and 500m downstream of the AA (Collins et al. 2008). This metric is assessed differently for non-riverine wetland types. The Buffer metric is further divided into three submetrics, including 2a) Percent of AA With Buffer, 2b) Average Buffer Width, and 2c) Buffer Condition.

Due to the path of the Sunrise Powerlink ROW through fairly remote areas, all categories of impacted streams scored highly on the Buffer and Landscape Context Attribute. While the Statewide calibration average for this attribute is 85%, the average attribute score for the streams assessed within the ROW was 93.4%. Notably, every site assessed scored an "A" for Percent of AA with Buffer, and with one exception each, all sites scored an "A" for Landscape Connectivity and Average Buffer Width.

2.4.1.1 Desert Dry Washes

Desert dry washes had an average score of 94.3% for Buffer and Landscape Connectivity. All AAs scored an "A" for Landscape Connectivity, Percent of AA with Buffer, and Average Buffer Width, reflecting the fact that these sites are generally located in remote areas some distance from development. The scores for Buffer Condition ranged from "A" to "C" and averaged 9.4, or just above a "B." Of the three AAs that received a "C" for buffer condition, all were impacted by off-highway vehicle (OHV) use. OHV use was a sign of a moderate level of human visitation, and was also seen to cause soil disturbance which likely promotes invasion by nonnative vegetation. In most cases, AAs that received a "B" had moderate invasion by nonnative species and soil disturbance caused by the presence of nearby access roads.

[1] Corps wetlands occur at only two impact sites along the SRPL ROW. Both were assessed using CRAM; however, the data is included with intermittent streams as explained in Section 2.5.

[2] Riverine wetland is defined as any ephemeral, intermittent, or perennial stream.

2.4.1.2 Mountain Ephemeral Streams

Mountain ephemeral streams scored 95.9% for Buffer and Landscape Connectivity. This score is the highest for this attribute among the other stream categories, and with a difference of nearly 11 percentage points, can be considered significantly better than the statewide calibration average of 85.0%. All AAs scored an "A" for Landscape Connectivity, Percent of AA with Buffer, and Average Buffer Width. All mountain ephemeral streams scored an "A" or "B" on Buffer Condition, with an average score of 10.1. Invasion by non-native, invasive plant species and minor soil disturbance from nearby access roads contributed to the lower scores for Buffer Condition.

2.4.1.3 Intermittent Streams

Intermittent streams scored a 94.3% for Buffer and Landscape Connectivity. All intermittent streams received an "A" for Landscape Connectivity and Percent of AA with Buffer. One AA scored a "B" for Average Buffer Width due to its location near a major highway; however, all other AAs received an "A" for this metric. The scores for Buffer Condition ranged from "A" to "C" and averaged 9.8, or just above a "B." Similar to mountain ephemeral streams, invasion by non-native, invasive plant species and minor soil disturbance from nearby access roads contributed to the lower scores for Buffer Condition.

2.4.1.4 Perennial Stream

The perennial stream assessed using CRAM scored a 55.8% for Buffer and Landscape Connectivity. It received an "A" for the Percent of AA with Buffer and Average Buffer Width submetrics. It scored a "B" on the Buffer Condition submetric due to the close proximity of two rural residences, paved roads, and the percent cover of non-native, invasive vegetation. The perennial stream scored a "D" on the Landscape Connectivity metric because the stream passes through a 198-meter-long culvert upstream of the AA, effectively eliminating the riparian corridor in this area. No other areas of non-buffer were observed downstream for 500 meters.

2.4.2 Hydrology

Hydrology includes the sources, quantities, and movement of water in the stream, plus the quantities, transport, and fate of water-borne materials, particularly sediments. The hydrology of a riverine wetland directly affects many physical processes including nutrient cycling, sediment trapping, and pollution filtration. In CRAM, the hydrology of the AA is assessed using three metrics: 1) Water Source, 2) Hydroperiod, and 3) Hydrologic Connectivity.

Streams assessed using CRAM within the Sunrise Powerlink ROW had high scores for hydrology, as would be expected in relatively undisturbed streams in a remote setting. All combined categories of assessed streams received an overall score of 88.6% for the Hydrology attribute, while the Statewide Calibration Average for this attribute is 85%.

2.4.2.1 Desert Dry Washes

Desert dry washes had an average score of 90.5% for the Hydrology attribute. Desert dry washes were generally located in remote areas that naturally lack water during the dry season and few channels were entrenched according to CRAM criteria. None of the AAs appear to receive any artificial hydrologic input; therefore, each scored an "A" for Water Source. Channel stability was generally high, with an average score of 10.5, an intermediate score between "A" and "B". Hydrologic Connectivity for desert dry washes had an average score of 10.1, but

included two scores of "C" and one score of "D". The AAs that received these low scores appeared to be in a natural state and were not "entrenched" due to human activities, suggesting that these low scores were due to limitations in the current CRAM scoring system within arid ephemeral systems (Section 2.4.5).

2.4.2.2 Mountain Ephemeral Streams

Mountain ephemeral streams received an average score of 85.6% for the Hydrology attribute. All mountain ephemeral stream AAs within the ROW naturally lack water during the dry season; therefore, each scored a 12 (an "A") for Water Source. Channel stability was generally high, with an average score of 10.1, an intermediate score between "A" and "B." Only one mountain ephemeral stream, stream 54-S-10, showed signs of severe degradation and received a "C" for this metric. Degradation within this stream was apparently a result of poor maintenance and flow control on an access road running parallel to and sometimes overlapping the stream. About 1/3 of these mountain ephemeral streams were determined to be entrenched; the remainder had at least fair access to the adjacent floodplains, and Hydrologic Connectivity scores varied between "A" and "D" with an average score of 8.7, or a just below a "B".

2.4.2.3 Intermittent Streams

Intermittent streams received an average score of 91.7% for the Hydrology attribute. All intermittent stream AAs within the ROW naturally lack water during the dry season; therefore, each scored a 12 (an "A") for Water Source. One of the four intermittent streams showed signs of mild aggradation or degradation and received a "B" for the Channel Stability metric; the remaining three each scored 12, or an "A", and intermittent streams averaged 11.3 for this metric. In addition, three streams had high entrenchment ratios and one was very entrenched. The average score for Hydrologic Connectivity was 9.8, or just above a "B".

2.4.2.4 Perennial Stream

The perennial stream assessed using CRAM scored a 83.3% overall score for Hydrology. Though the stream was confined, its channel had a broad flood prone width, which resulted in a high entrenchment ratio and an "A" score for Hydrologic Connectivity. Minimal evidence of aggradation and degradation were observed; the channel appeared to be approaching equilibrium and scored an "B" for Channel Stability. The score for Water Source was reduced to a "B" because several 24-inch stormwater drain pipes were observed upstream of the AA and appear to contribute a limited amount of flow to the stream's hydrologic input.

2.4.3 Physical Structure

Physical structure is defined as the local physical, chemical, or biological features that provide or support habitat for biota. CRAM assumes that the capability of a riverine wetland to support characteristic native flora and fauna is positively correlated to physical structural complexity. The two metrics used to evaluate the physical structure of the AA are 1) Structural Patch Richness and 2) Topographic Complexity.

The majority of streams within the ROW which were assessed using CRAM were ephemeral systems with generally low physical complexity, and they received low scores for the Physical Structure attribute. The statewide average score for this attribute was 69.0%, whereas the average score for streams within the ROW was 47.5%. Only the perennial stream received an

"A" for Structural Patch Richness; the remaining scores ranged from a "B" to a "D". Most streams were given a "C" for Topographic Complexity, although three received a "B" and one received a "D".

2.4.3.1 Desert Dry Washes

Desert dry washes assessed using CRAM scored the lowest of the four stream categories, with an average score of 42.9%. This score is likely a reflection of the relatively flat and sparsely vegetated landscape. The Structural Patch Richness scores were particularly low, averaging 4.3, or intermediate between a "C" and a "D". These streams were typically characterized by braided low flow channels within a larger floodplain, which were often bounded by low banks, and each of the desert dry washes assessed scored a 6, or a "C", for Topographic Complexity.

2.4.3.2 Mountain Ephemeral Streams

Mountain ephemeral streams assessed using CRAM scored higher than desert dry washes for the Physical Structure attribute, but not as high as intermittent and perennial streams. The average score for mountain ephemeral streams was 46.6%, and this score is likely the result of low flow and/or short intervals of water flow that are characteristic of these streams. Scores for Structural Patch Richness ranged from "B" to "D", with an average score of 4.9, or below a "C". Two mountain ephemeral streams scored a "B" for Topographic Complexity, and one stream, stream 54-S-10, scored a "D" due to its highly degraded channel. The average score for Topographic Complexity was 6.3, or just above a "C".

2.4.3.3 Intermittent Streams

The four intermittent streams assessed using CRAM scored higher than the average score for streams assessed along the ROW, but they scored lower than the statewide average. Intermittent streams scored an average of 56.3% for the Physical Structure attribute, and unlike the ephemeral streams and dry washes, they scored higher in Structural Patch Richness than in Topographic Complexity. Half of the intermittent streams received a "B" and half received a "C" for Structural Patch Richness, which resulted in an average score of 7.5 for this metric. Each of these streams received a "C" for Topographic Complexity, which is an average score of 6.0.

2.4.3.4 Perennial Stream

The perennial stream assessed using CRAM scored an 87.8% overall score for Physical Structure. It appears that the consistent volume of water conveyed by this stream, along with its diverse and well-developed riparian canopy, have resulted in a high Physical Structure score. This was the only stream in the ROW which received an "A" for Structural Patch Richness, and it was one of only three streams to score as high as a "B" for topographic complexity.

2.4.4 Biotic Structure

The biotic structure of a riverine wetland includes all of the organic matter that contributes to its material construct or architecture. Plants strongly influence the quantity, quality, and spatial distribution of water and sediments within riverine wetlands, greatly influence water movement through riverine wetlands, and provide the main source of primary nutrition for water-dependent wildlife. CRAM uses three metrics to rate biotic structure: 1) Plant Community, 2) Horizontal Interspersion and Zonation, and 3) Vertical Biotic Structure. The Plant Community metric is divided into three submetrics: 1a) Number of Plant Layers, 1b) Number of Co-Dominant Species, and 1c) Percent Invasion.

Similar to results for the Physical Structure attribute, CRAM scores for streams within the ROW were again lower than the statewide average for the Biotic Structure attribute. These results, however, are clearly low due to the low scores of the desert dry washes; every other stream category scored higher than the statewide average, whereas desert dry wash scores were substantially lower. The overall average across all stream categories for the Biotic Structure attribute was 59.7%.

2.4.4.1 Desert Dry Washes

Within desert areas of the SRPL ROW, mapped vegetation types at assessed streams included Sonoran desert creosote scrub, Sonoran mixed woody scrub, and unvegetated areas including both desert pavement and badlands. As explained in Sections 2.4 and 2.4.5, desert dry washes occur in arid climates and are characterized by unvegetated or sparsely vegetated habitat, which may result in a low score for the Biotic Structure attribute. The average desert dry wash score for Biotic Structure was 43.1%, more than 25% lower than the statewide average for all riverine systems. There were typically only one to two plant layers, with the exception of one desert dry wash, and the Number of Co-dominant Species was generally low. Percent Invasion scores, however, were higher than in any other category, averaging 10.5 (between an “A” and a “B”). The vegetation community, when present, was sparse and resulted in a low average score for Horizonal Interspersion of 4.9, or just below a “C”. Vertical Biotic Structure was also very low due to the nature of the vegetation community, receiving an average score of 3.2, or just above a “D”.

2.4.4.2 Mountain Ephemeral Streams

Four types of chaparral dominated the vegetation at most mountain ephemeral stream AAs, although coast live oak (*Quercus agrifolia*) woodland, Diegan coastal sage scrub, and big sagebrush scrub were also present. In some areas of chaparral, wildfires within recent years had drastically changed the size and composition of the vegetation, often resulting in heavy cover of low deerweed (*Lotus scoparius*) shrubs in areas where taller shrubs of oak (*Quercus spp*.), manzanita (*Arctostaphylos spp*.), and chamise (*Adenostoma fasciculatum*) would likely have been the dominant species. As assessed using CRAM, mountain ephemeral streams scored just above the statewide average, receiving 65.9% for the Biotic Structure attribute. Metrics for Number of Plant Layers and Percent Invasion scored 9.3, and Number of Co-dominant Species scored 7.6. Mountain ephemeral streams did not tend to support more than moderate overlap of plant layers or diversity of plant communities; therefore, the average score for Horizontal Interspersion was 7.9, below a “B”, and Vertical Biotic Structure scored an average of 7.1, just above a “C”.

2.4.4.3 Intermittent Streams

Intermittent streams assessed within the Sunrise Powerlink ROW were vegetated by coast live oak woodland, southern coast live oak riparian forest, or northern mixed chaparral. Scores for intermittent and perennial streams were substantially higher for the Biotic Structure attribute due to the high diversity and density of vegetation supported by these systems. Intermittent streams had an average Biotic Structure score of 91.7%. Each of the intermittent streams assessed had at least four plant layers and at least nine co-dominant species. Percent invasion was generally low, with AAs supporting less than 30% invasive species. Horizontal Interspersion and Vertical Biotic Structure each had an average score of 11.3, or just below an “A”, which reflects the complexity of vegetation communities supported by these systems.

2.4.4.4 Perennial Stream

The only perennial stream within the Sunrise Powerlink ROW is located in an area of coast live oak woodland, and the stream supported a diverse riparian canopy and patches of emergent fringe wetlands. Four layers and 15 co-dominant species were represented in the vegetation community surrounding the stream, so this stream received an "A" for Number of Plant Layers and Number of Co-dominants. Of the co-dominant species, 20% were non-native, which reduced the score for Percent Invasion to a "B". The number of vegetation communities and the overlap of plant layers resulted in an "A" score for both Horizontal Interspersion and Vertical Biotic Structure. This stream received a high overall Biotic Structure score of 97.2%.

2.4.5 Summary of Existing Conditions at Stream Impact Sites

CRAM scores for existing conditions at stream impact sites within the SRPL ROW show a range of variability associated with the stream category being assessed. As described in the CRAM Technical Bulletin (CWMW 2009), seasonal wetlands and headwater streams often have naturally lower complexity [than higher-order streams or perennial wetlands] and may inherently produce lower scores under the current CRAM methodology. Or, as described in the CRAM User's Manual (Collins *et al*. 2008), there may be a limit to the applicability of CRAM in low order (i.e., headwater) streams in very arid environments that tend not to support species-rich plant communities with complex horizontal and vertical structure. CRAM scores within the ROW were consistent with these ideas, and desert dry washes had the lowest overall scores, followed by mountain ephemeral, intermittent, and perennial streams.

All intermittent and perennial stream scores were within 10% of each other, ranging from 80.4% to 87.8%, and thus were not significantly different from one another using the CRAM range of error of 10 percentage points (Appendix B). These streams scored highly compared to the statewide calibration average of 77%, suggesting that they are in good condition relative to other sites assessed during the development of the CRAM procedure. As described in Section 2.4, the setting of these streams in relatively remote, undisturbed areas usually accounted for the high scores.

2.4.5.1 Mountain Ephemeral Streams and Desert Dry Washes

Conditions at mountain ephemeral stream and desert dry wash impact sites within the SRPL ROW are statistically represented by the CRAM scores from 25 randomly selected sites (Section 2.4). A cumulative frequency distribution of these CRAM scores can be used to predict with some confidence the percentage of mountain ephemeral stream and desert dry wash impact sites that will receive overall CRAM scores within the range observed in the sample subset (Figure 4). Scores within this sample set ranged from 62.0% to 83.4%, indicating significantly different conditions between the highest and lowest-scoring streams. Mountain ephemeral stream scores ranged from 63.6% to 83.4%, while desert dry wash scores ranged from 62.0% to 72.7%. Thus, significant variability was seen in mountain ephemeral stream scores, but not in desert dry wash scores, and the highest-performing mountain ephemeral stream scored significantly better than the highest-performing desert dry wash. Combined average scores also showed mountain ephemeral streams scoring slightly higher (Table 5); there is considerable overlap between scores for the two categories. While these scores are somewhat low compared to the statewide calibration average and the intermittent and perennial streams within the ROW, the lower scores can largely be attributed to lower complexity as described in Section 2.4.5.

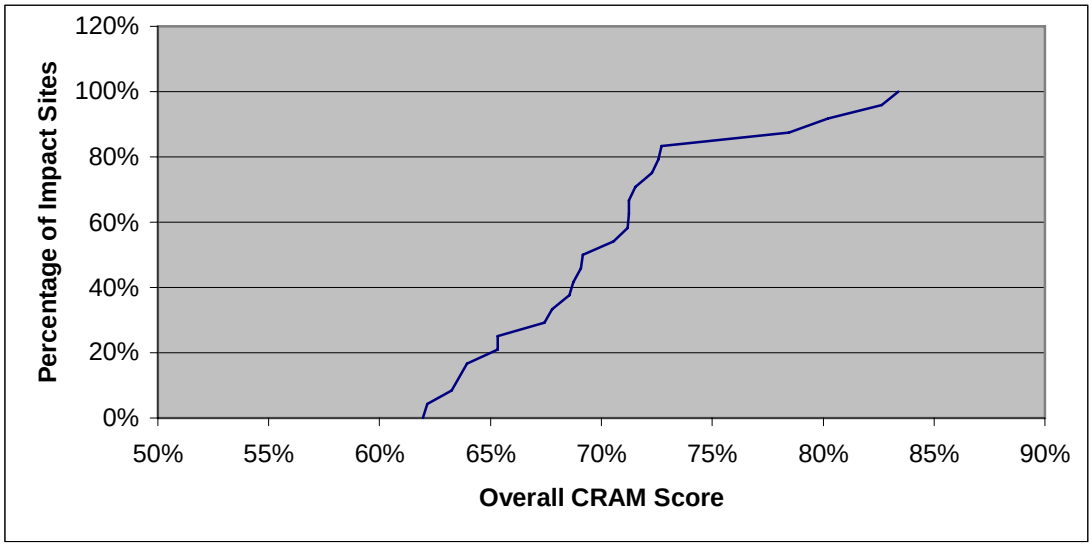


Figure 4. Cumulative Frequency Distribution of Existing CRAM Scores for All Mountain Ephemeral Stream and Desert Dry Wash Impact Sites within the SRPL ROW.

Table 6 compares mean scores for desert dry washes at impact sites to mean scores from a similar study conducted in 2010 for a solar generation project in the Imperial Valley (SCCWRP 2010). This study, undertaken by SCCWRP, examined 84 AAs within an area of the Yuha (Sonoran) Desert at the extreme eastern end of the Sunrise Powerlink ROW. The 84 streams assessed for this study were all comparable to streams categorized as desert dry washes within this HMMP. As seen in Table 6, scores are very similar. Thus, while the scores for desert dry washes for the Sunrise Powerlink are low compared to statewide calibration averages (Table 4), these scores are consistent with condition scores of nearby arid washes that were assessed with CRAM.

Table 6. Comparison of CRAM Scores for Desert Dry Washes within the Sunrise Powerlink ROW and at a Nearby Site.

CRAM Index and Attributes	Mean Scores from Sunrise Powerlink ROW	Mean Scores from a Nearby Site (SCCWRP 2010)
Overall Index Score	68	68
Buffer and Landscape Context	94	95
Hydrology	91	91
Physical Structure	43	41
Biotic Structure	43	46

2.5 Baseline Condition of Impacted Corps Wetlands within the ROW

Impacts to vegetated wetlands delineated using the Corps of Engineers three-parameter approach ("Corps wetlands," Appendix B) will only occur along the fringes of streams at two impact sites within the Sunrise Powerlink ROW. According to CRAM methodology, since this situation entails a flow-through system with a distinct inlet and outlet, the Corps wetlands are considered a component of a riverine wetland (Collins *et al.* 2008), and therefore the methodology for riverine wetlands must be used for CRAM assessments of these systems. In turn, these CRAM scores should be compared to other CRAM scores of the same wetland type, in this case riverine wetlands.

Both of the project impacted wetlands occur within intermittent streams (i.e., they are streams that contain Corps wetlands). These intermittent streams, 112-S-2 and 111-S-9, received scores similar to average scores for all intermittent streams within the ROW (Table B-1; Appendix B), and were similar to the Statewide CRAM calibration scores for riverine wetlands.

2.6 Direct and Indirect Impacts to Streams within the ROW

Using existing project plans and data collected at stream AAs within the SRPL ROW, it is possible to project how CRAM scores may be influenced by the proposed project. These projected scores are based on conditions anticipated approximately 1 to 2 years after project implementation (i.e. the projection is not intended to predict conditions immediately after construction, nor conditions in the longer term such as 5 to 10 years or more).

The projected CRAM assessment was based on observations of existing anthropogenic impacts near the SRPL ROW and observations at other construction sites, and assumes that impact minimization and mitigation measures contained in the FEIR/EIR will be followed. CRAM practitioners and restoration ecologists involved in producing the Sunrise Powerlink HMMP have conducted fieldwork at many sites from Southern to Northern California and are familiar with the impacts associated with construction activity and ground disturbance, particularly with regard to soils, vegetation, and hydrology of stream and wetland features. Survey work conducted near Southern California power transmission line corridors from 2008 to 2010 allowed field crews to inspect many miles of existing access roads, stream crossings, and transmission towers similar to those that will be installed during the SRPL project, and this experience informed many of the assumptions involved in producing CRAM projections.

In many cases, the impacts for the Sunrise Powerlink project involve installation of an access road or stream crossing, improvements to an existing road or stream crossing, or a construction area or tower footing in close proximity to a stream. Proposed areas of impact that overlap streams within the Sunrise Powerlink ROW are in most cases considerably smaller than the required CRAM AA, which must cover at least 100 meters of the stream being assessed, and thus have limited effect on the CRAM score. An exception is the proposed Suncrest Substation on the Lightner property near Alpine, which would fill 1,782 linear feet of intermittent stream 109-S-1.

2.6.1 Buffer and Landscape Context

Implementation of the Sunrise Powerlink project is likely to have minimal negative effects on the Buffer and Landscape Context attribute of the AA. Since the project is linear and extends many miles, many stream features are crossed; however, the impacts on individual streams are relatively small-scale in most cases.

Unpaved access roads that will follow the Sunrise Powerlink ROW would not be considered a break in AA buffer, nor would the path of the transmission lines. This is based on the facts that the roads are narrow, infrequently used, and generally not hazardous to wildlife, while the area under the power lines will remain as natural habitat. Therefore, at most of the assessment sites, the CRAM scores for the Landscape Connectivity metric and the Percent of AA with Buffer and Average Buffer Width submetrics would not change.

Depending on the nature of work near the AA and its distance from the AA, AAs that scored an “A” for the existing Buffer Condition submetric were often dropped to a “B” in the projected assessment. This was to account for the fact that the project would, in most cases, increase the amount of soil disturbance in the buffer area. Assessment Areas that received a “C” for existing

Buffer Condition were not dropped by one letter grade in the projected assessment, since the barren or disturbed soil and intense human visitation necessary to score a "D" are not anticipated to be a result of the project at any impact site buffer area.

2.6.1.1 Desert Dry Washes

All desert dry washes received an "A" for Landscape Connectivity, Percent of AA with Buffer, and Average Buffer Width. The average score for Buffer Condition in desert dry washes dropped from 9.4 to 8.4 due to proposed construction activities near the AAs and field observations of the impacts that such activity can have on the surroundings in a desert environment. The Buffer and Landscape Connectivity attribute score for these streams dropped from a 94.3% to a 91.7%.

2.6.1.2 Mountain Ephemeral Streams

Similar to desert dry washes, the average Buffer Condition score for mountain ephemeral streams dropped from 10.1 to 8.7 due to proposed construction activities near the AA, while the remaining metrics were unchanged. The Buffer and Landscape Connectivity attribute score for these streams dropped from a 95.9% to a 92.6%.

2.6.1.3 Intermittent Streams

In the case of stream 109-S-1, scores for the Buffer and Landscape Context attribute decreased because the fill area for the proposed substation overlaps more than half of the AA, causing the attribute score to drop from 100% to 46%. The proposed substation will be dedicated to anthropogenic uses, and it is therefore not considered to be buffer for stream 109-S-1. However, since the AA is located at the edge of the impact area, it adjoins an area of natural habitat that is still considered to be buffer. This area of buffer received moderate scores for the buffer submetrics.

Of the remaining three intermittent streams within the ROW, only one had a score that changed, due to Buffer Condition being lowered from an "A" to a "B" to account for construction activity nearby. The Buffer and Landscape Connectivity attribute score for all four intermittent streams dropped from a 94.3% to an 80.1%.

2.6.1.4 Perennial Stream

Buffer and Landscape Context scores for the impacted perennial stream within the Sunrise Powerlink ROW did not change between existing and projected conditions. Impacts to the already degraded buffer were not considered substantial enough to change the CRAM score for this metric.

2.6.2 Hydrology

Many stream impact sites for the Sunrise Powerlink project are likely to have minor indicators of aggradation or degradation, as scored under the CRAM Channel Stability Metric. In some cases the aggradation or degradation may not be of a sufficient magnitude to cause a change in the CRAM score. To score an "A" according to the CRAM procedure, there must be little evidence of aggradation or degradation; a score of "B" has "some" aggradation and degradation, while a "C" is assigned to streams with "severe" aggradation or degradation based on a list of common field indicators. Work conducted at some sites of the Sunrise Powerlink

project has the potential to cause "severe" aggradation or degradation if required measures are not followed to prevent soil erosion as outlined in the project's Stormwater Pollution Prevention Plan.

Based on observations near existing access roads along the SRPL ROW and in similar arid habitats, construction in close proximity to streams can result in a minor amount of aggradation or degradation. To account for this, most streams that received an "A" for existing Channel Stability were reduced to a "B" in the projected assessment unless there was evidence that the work would have little impact on the stream. In particular, if the proposed work area had hardly any overlap of the stream or its watershed, it was considered to have little impact. Only one score of "C" and one score of "D" were assigned in the projected assessment, as the severe aggradation/degradation or artificial channel necessary to merit these scores are not anticipated if preventive measures are employed. The score of "C" was due to existing conditions at AA 54-S-10, while the score of "D" was assigned for AA 109-S-1, where most of the stream will be converted to a culvert or other man-made subterranean channel.

2.6.2.1 Desert Dry Washes

Within dry desert washes assessed along the SRPL ROW, scores for the Channel Stability metric were the only scores for the Hydrology attribute that changed. As described above, these scores were sometimes lowered if construction activity was planned near a previously undisturbed stream. Desert dry washes dropped from an average of 10.5 to 9.0 for channel stability, and from 90.5% to 86.3% for the Hydrology attribute.

2.6.2.2 Mountain Ephemeral Streams

Similar to desert dry washes, the Channel Stability metric was the only component of the Hydrology attribute that decreased for mountain ephemeral streams. These streams dropped from an average of 10.1 to 8.7 for channel stability, and from 85.6% to 81.8% for the Hydrology attribute.

2.6.2.3 Intermittent Streams

Stream 109-S-1, impacted by the Suncrest Substation, dropped two letter grades for every Hydrology metric, resulting in a drop in attribute score from 92% to 42%. The remaining three intermittent streams each dropped one letter grade for the Channel Stability metric while other hydrology metrics were unchanged. Overall, Intermittent streams dropped from an attribute score of 91.7% to 72.9%.

2.6.2.4 Perennial Stream

Hydrology scores for the one impacted perennial stream within the SRPL ROW did not change between existing and projected conditions, since work proposed for this area is not anticipated to impact the CRAM AA.

2.6.3 Physical Structure

With one exception, Physical Structure CRAM scores for AAs under projected future conditions are not expected to be different from the scores for existing conditions. Stream 109-S-1 will be substantially modified throughout most of the AA. Only three patch types are anticipated to occur in the remaining portion of the stream following construction, giving this metric a score of "D" under future conditions compared to the score of "B" under existing conditions.

2.6.3.1 Desert Dry Washes

No changes in Physical Structure scores for assessed desert dry wash impact sites are anticipated to result from the SRPL project.

2.6.3.2 Mountain Ephemeral Streams

No changes in Physical Structure scores for assessed mountain ephemeral stream impact sites are anticipated to result from the SRPL project.

2.6.3.3 Intermittent Streams

Stream 109-S-1, impacted by the Suncrest Substation, dropped to a "D" for both Physical Structure metrics due to the fact that the proposed work calls for this stream to be culverted and its surroundings filled with soil throughout most of the existing AA. The attribute score for this AA dropped from a 63% to a 25%. Physical Structure scores for the remaining three intermittent streams were unchanged. Overall, the Physical Structure score for intermittent streams dropped from a 56.3% to a 46.9%.

2.6.3.4 Perennial Stream

Physical Structure scores for the one impacted perennial stream within the SRPL ROW did not change between existing and projected conditions, since work proposed for this area is not anticipated to impact the AA.

2.6.4 Biotic Structure

With the exception of one stream site, scores for the Biotic Structure attribute are not anticipated to change under projected future conditions. As explained in Section 2.6, the area of impact that overlaps CRAM AAs was usually limited, and thus project implementation will rarely cause enough damage within an individual AA to affect the CRAM scores for the Biotic Structure attribute.

Project implementation has the potential to increase the prevalence of invasive weeds in construction sites; however, the Weed Control Plan outlines measures to control invasive weeds. Based on pre-construction surveys within the impact areas, this document identifies twenty invasive weed species observed at impact sites and outlines plans to reduce the prevalence and spread of these species while also preventing the possibility that additional invasive species may inadvertently be brought to work sites by equipment or personnel. The invasive species identified for control in the weed management plan are also the species most likely to appear in CRAM AAs and result in a lower percent Invasion submetric score. Soil disturbance is known to promote the spread of many of these species, but the weed management plan outlines steps to prevent this from happening within the impact areas. However, all CRAM AAs overlap a portion of the work area as well as a portion of the surrounding area that will not be impacted. In many cases, invasive vegetation that is currently present within a CRAM AA may still be present after project implementation, since much of the AA may not be located within an impact area and may not receive the same effort of weed removal. Thus, it was assumed that the Percent Invasion score for each AA would neither increase nor decrease under projected future conditions.

2.6.4.1 Desert Dry Washes

No changes in Biotic Structure scores for assessed desert dry wash impact sites are anticipated to result from the SRPL project.

2.6.4.2 Mountain Ephemeral Streams

No changes in Biotic Structure scores for assessed mountain ephemeral stream impact sites are anticipated to result from the SRPL project.

2.6.4.3 Intermittent Streams

Stream 109-S-1, impacted by the Suncrest Substation, dropped to one letter grade (from an "A" to a "B") for the Number of Plant Layers, Number of Co-dominant Species, and Horizontal Interspersion/Zonation submetrics and metrics. The remaining submetric and metric for this site, for the Biotic Structure attribute, remained an "A". These high scores were attained because the Biotic Structure attributes are based on the portion of the AA that is vegetated, and do not reflect such situations as, in this case, having over half of the vegetation removed and converted to a large fill area. The portion of the vegetation that remains after construction should still be in relatively good health. Thus, the attribute score for this site dropped from a 97% to an 83%.

The remaining three intermittent streams had no changes in their scores for Biotic Structure. Thus, the overall Biotic Structure attribute score for intermittent streams dropped only from a 91.7% to an 88.2%.

2.6.4.4 Perennial Stream

Biotic Structure scores for the one impacted perennial stream within the SRPL ROW did not change between existing and projected conditions, since work proposed for this area is not anticipated to impact the AA.

2.6.5 Summary of Projected Future Conditions at Stream Impact Sites

Stream impacts resulting from the Sunrise Powerlink project are likely to have be minimal impact to CRAM scores. Out of 30 AAs, the projected scores for 11 sites were unchanged from their scores for existing conditions, including the one perennial stream impact site within the ROW. Combining all stream types, the CRAM score for sampled riverine wetlands along the SRPL ROW is expected to decrease by an average of three percentage points due to project implementation, with the majority of individual impacts resulting from aggradation/degradation of stream channels and degradation of stream buffer areas. Examining impacts by stream category, both mountain ephemeral streams and desert dry washes decreased by less than two percentage points, while intermittent stream scores decreased by 11.6 percentage points. This decline in CRAM score was due to the only AA that received a substantially lower projected score under future conditions than what currently exists, with a decrease of 39 percentage points. This AA, located at stream 109-S-1, is situated at the proposed location for the Suncrest Substation and received a decrease in projected score for almost every CRAM metric and submetric. Average CRAM scores comparing existing conditions with projected post-project conditions are presented in Table 7.

Table 7. Average Existing and Projected Scores for All Assessed Impact Sites

	Desert Dry Wash				Mountain Ephemeral				Intermittent				Perennial			
CRAM Projection	**Original Avg. Scores**	**Projected Average Scores**	**Impact delta**	**Percent Decrease**	**Original Avg. Scores**	**Projected Average Scores**	**Impact delta**	**Percent Decrease**	**Original Avg. Scores**	**Projected Average Scores**	**Impact delta**	**Percent Decrease**	**Original Avg. Scores**	**Projected Average Scores**	**Impact delta**	**Percent Decrease**
Buffer and Landscape Connectivity																
Landscape Connectivity	12.0	12.0	0.0	0.0%	12.0	12.0	0.0	0.0%	12.0	9.8	2.3	18.8%	3.0	3.0	0.0	0.0%
% of AA with Buffer	12.0	12.0	0.0	0.0%	12.0	12.0	0.0	0.0%	12.0	10.5	1.5	12.5%	12.0	12.0	0.0	0.0%
Average Buffer Width	12.0	12.0	0.0	0.0%	12.0	12.0	0.0	0.0%	11.3	10.5	0.8	6.7%	12.0	12.0	0.0	0.0%
Buffer Condition	9.4	8.4	1.1	11.4%	10.1	8.7	1.4	13.5%	9.8	8.3	1.5	15.4%	9.0	9.0	0.0	0.0%
Raw Score	22.6	22.0	0.6	2.8%	23.0	22.2	0.8	3.3%	22.6	19.1	3.6	15.8%	13.4	13.4	0.0	0.0%
Final Score	94.3	91.7	2.6	2.8%	95.9	92.6	3.2	3.3%	94.3	79.4	14.9	15.8%	55.8	55.8	0.0	0.0%
Hydrology																
Water Source	12.0	12.0	0.0	0.0%	12.0	12.0	0.0	0.0%	12.0	10.5	1.5	12.5%	9.0	9.0	0.0	0.0%
Hydroperiod/Channel Stability	10.5	9.0	1.5	14.3%	10.1	8.7	1.4	13.5%	11.3	7.5	3.8	33.3%	9.0	9.0	0.0	0.0%
Hydrologic Connectivity	10.1	10.1	0.0	0.0%	8.7	8.7	0.0	0.0%	9.8	8.3	1.5	15.4%	12.0	12.0	0.0	0.0%
Raw Score	32.6	31.1	1.5	4.6%	30.8	29.5	1.4	4.4%	33.0	26.3	6.8	20.5%	30.0	30.0	0.0	0.0%
Final Score	90.5	86.3	4.2	4.6%	85.6	81.8	3.8	4.4%	91.7	72.9	18.8	20.5%	83.3	83.3	0.0	0.0%
Physical Structure																
Structural Patch Richness	4.3	4.3	0.0	0.0%	4.9	4.9	0.0	0.0%	7.5	6.0	1.5	20.0%	12.0	12.0	0.0	0.0%
Topographic Complexity	6.0	6.0	0.0	0.0%	6.3	6.3	0.0	0.0%	6.0	5.3	0.8	12.5%	9.0	9.0	0.0	0.0%
Raw Score	10.3	10.3	0.0	0.0%	11.2	11.2	0.0	0.0%	13.5	11.3	2.3	16.7%	21.0	21.0	0.0	0.0%
Final Score	42.9	42.9	0.0	0.0%	46.6	46.6	0.0	0.0%	56.3	46.9	9.4	16.7%	87.5	87.5	0.0	0.0%
Biotic Structure																
PC: No. of plant layers	6.2	6.2	0.0	0.0%	9.3	9.3	0.0	0.0%	12.0	11.3	0.8	6.3%	12.0	12.0	0.0	0.0%
PC: No. of co-dominants	5.4	5.4	0.0	0.0%	7.6	7.6	0.0	0.0%	10.5	9.8	0.8	7.1%	12.0	12.0	0.0	0.0%
PC: Percent Invasion	10.5	10.5	0.0	0.0%	9.3	9.3	0.0	0.0%	9.0	9.0	0.0	0.0%	9.0	9.0	0.0	0.0%
Horizontal Interspersion/Zonation	4.9	4.9	0.0	0.0%	7.9	7.9	0.0	0.0%	11.3	10.5	0.8	6.7%	12.0	12.0	0.0	0.0%
Vertical Biotic Structure	3.2	3.2	0.0	0.0%	7.1	7.1	0.0	0.0%	11.3	11.3	0.0	0.0%	12.0	12.0	0.0	0.0%
Raw Score	15.5	15.5	0.0	0.0%	23.7	23.7	0.0	0.0%	33.0	31.8	1.3	3.8%	35.0	35.0	0.0	0.0%
Final Score	43.1	43.1	0.0	0.0%	65.9	65.9	0.0	0.0%	91.7	88.2	3.5	3.8%	97.2	97.2	0.0	0.0%
Overalll AA Score	67.7	66.0	1.7	1.8%	73.5	71.7	1.7	1.9%	83.5	71.8	11.6	14.2%	81.0	81.0	0.0	0.0%

2.6.5.1 Mountain Ephemeral Streams and Desert Dry Washes

As described in Sections 2.4 and 2.4.5.1, conditions at mountain ephemeral stream and desert dry wash impact sites within the SRPL ROW are statistically represented by the CRAM scores from 25 randomly selected sites. Thus, projected CRAM scores for these 25 sites are representative of future conditions at all mountain ephemeral stream and desert dry wash impact sites within the SRPL ROW following project implementation. A cumulative frequency distribution comparing existing and projected CRAM scores for these stream types is shown in Figure 5.

The combined category of desert dry washes and mountain ephemeral streams lost less than two percentage points between average existing and projected future conditions. The largest individual decrease was 4.1% in the case of one mountain ephemeral stream. Six desert dry washes and four mountain ephemeral streams are not expected to have any decrease in CRAM score. The only decreases in CRAM score projected for these sites were for the Buffer Condition submetric and the Channel Stability metric. Decreases in score were due to minor amounts of aggradation/degradation and a decrease in buffer condition that are expected to occur with implementation of the proposed project. Based on the CRAM error range of 10%, the existing and projected CRAM scores are not significantly different from one another. Thus, while minor impacts to desert dry washes and mountain ephemeral streams are likely to occur as a result of the project, these impacts should result in only minimal decreases in CRAM score.

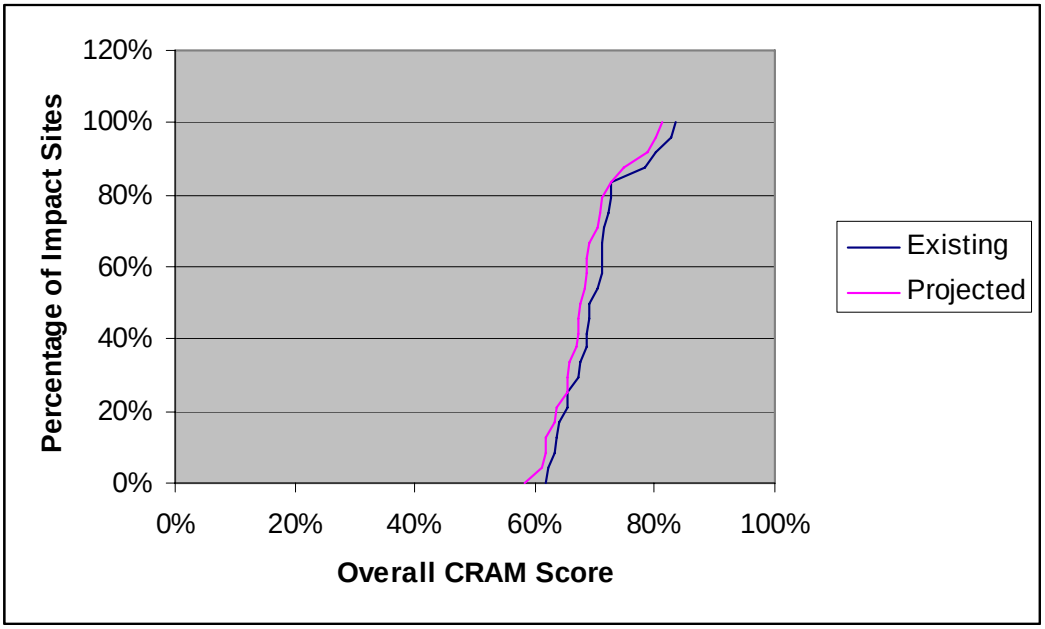


Figure 5. Cumulative Frequency Distribution of Existing and Projected CRAM Scores for All Mountain Ephemeral Stream and Desert Dry Wash Impact Sites within the SRPL ROW.

2.7 Direct and Indirect Impacts to Corps Wetlands within the ROW

As described in Section 2.5, all impacts to Corps wetlands that will result from the SRPL project are in areas classified as riverine wetlands according to CRAM. Two impact sites within the ROW assessed using CRAM included fringes of Corps wetlands, and are representative of existing and projected future conditions for impacted Corps wetlands for the purposes of this

report. These two sites had an average loss of two points in overall CRAM score under projected post-project conditions. This loss of function stemmed from a nine-point decrease in the Hydrology attribute, which in turn was caused by both AAs declining one letter grade for the Channel Stability metric. Both AAs were dropped from an "A" to a "B" because it was assumed that after activity and ground disturbance in close proximity to the stream channels, the streams would change from having little evidence of aggradation and degradation to having "some" aggradation and degradation.

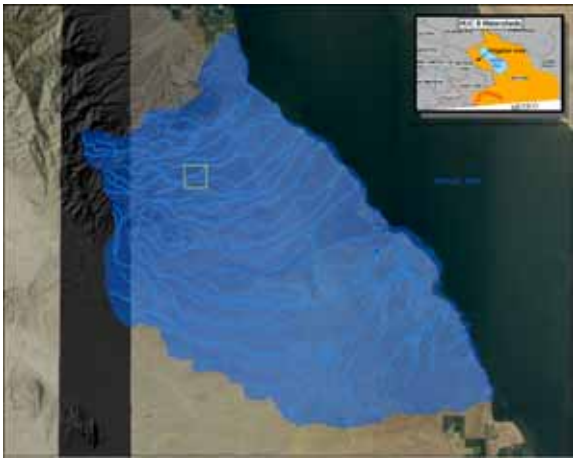
3.0 CONDITIONS WITHIN PROPOSED MITIGATION SITES

3.1 Existing Conditions of Mitigation Sites

The baseline information for existing conditions within each of the five mitigation sites listed in Section 1.0 are discussed in detail below, as well as factors that were considered in selection and identification of mitigation opportunities for each site.

3.1.1 Desert Cahuilla Property

The Desert Cahuilla Property is a 675-acre desert mitigation site located within the upper portion of the Salton Sea Watershed of Imperial County, California (as shown in the yellow box within the figure at right). It is situated approximately 7 miles west of the Salton Sea and is bounded on all sides by desert dry wash habitat with no urban development nearby. The site ranges from approximately 350 to 680 feet NGVD (National Geodetic Vertical Datum) in elevation. The property includes a large portion of the upper watershed of a major wash that flows to the Salton Sea and supports Peninsular Bighorn Sheep (*Ovis canadensis nelsoni*) (PBS) habitat.



Site Selection: This site was selected for mitigation based on the presence of extensive dry washes (approximately 84 acres total), and the relative lack of disturbance of the site owing to its remote location. The preservation of desert dry washes provides mitigation for impacted dry wash habitat by the SRPL Project and will ensure that the upper reaches of the watershed are preserved and managed for natural resource values. The site is important to watershed health because of its size, remote location, and overall proximity to the Salton Sea.

The property is part of a larger acquisition plan to contribute major parcels of land to the Anza Borrego State Park (ABDSP) system and to establish wilderness status in these areas. The property is currently owned by the State Lands Commission, but is not managed for natural resource values, is not patrolled or maintained, and is currently subject to OHV use. As part of the preservation activity, the property will be designated as a wilderness area by California State Parks and will be managed by ABDSP. The site will be under State Park management as a wilderness area and, with Sunrise funding, the area will be managed for desert dry wash habitat and PBS.

The parcel where the dry wash mitigation will occur is part of a larger transaction within a 14,700-acre area. The transaction will result in 5,500 acres (including the dry wash mitigation site) being included in ABDSP and managed by the park mainly for its biological values (PBS in particular). A mitigation overlay will be placed on the desert dry wash mitigation parcel, and it will be managed consistent with the adjacent Wilderness Zones of ABDSP. The endowment provided by SDG&E will provide for ongoing management of the parcel for non-native, invasive species control (among other things) and for access controls (patrols, signage) for the overall 5,500 acres to deter illegal OHV use. USFWS and CDFG support the transaction and management of the lands by ABDSP. OHV use will be controlled mainly through patrols by park rangers. The boundary of the ABDSP lands follows existing trails and ridgelines that can be marked and patrolled. The OHV support groups and the Ocotillo Wells State Vehicular Recreation Area (SVRA) are involved in the transaction and support it because it also will expand the SVRA south of ABDSP. Table 8 shows the acreage of jurisdictional desert dry wash habitat on the Desert Cahuilla Property.

Table 8. Jurisdictional Areas at the Desert Cahuilla Property

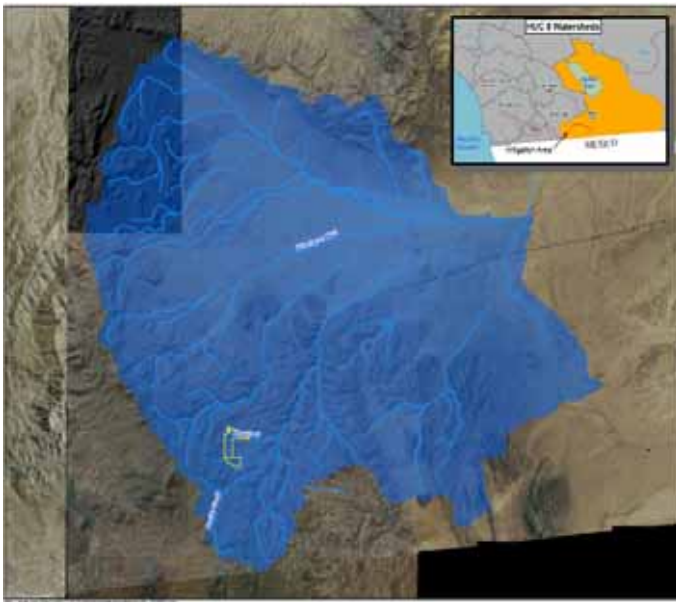
	Area (acres)	**Length (linear feet)**
Desert Dry Wash	84.13	24,400
TOTAL:	84.13	24,400

Soils: Soils in this region are mapped as Badland-Beeline-Rillito. Badland soils are characterized as very rapid runoff. Beeline soils are well drained with medium to rapid runoff and moderately rapid permeability. The Rillito soil series is somewhat excessively drained with slow or medium runoff and moderate permeability (USDA 2010a). Badland, Beeline and Rillito soils are classified as non-hydric on the hydric soils list (USDA 2010b).

Vegetation: This property is made up of Sonoran creosote bush scrub and Sonoran creosote bush scrub-disturbed vegetation communities with a large desert dry wash. Dominant plant species observed within these communities include creosote bush (*Larrea tridentata*), with white bursage, brittlebush (*Encelia farinosa*), and ocotillo (*Fouquieria splendens*). Areas that were void of any vegetation were classified as unvegetated habitat-desert pavement. Non-native, invasive annual grasses are known to occur on the site, but no other significant non-native, invasive species populations are currently known from the site. Future surveys will be conducted to determine the presence of non-native, invasive plant species and management of any populations that are discovered will occur.

Hydrology: Precipitation is the main source of hydrology for this site. This site typically receives approximately 3.21 inches of rainfall per year (USDA 2010c). Site hydrology is essentially undisturbed.

3.1.2 Suckle Property



The Suckle Property is comprised of three parcels totaling 216 acres. It is located along Interstate 8 within the upper reaches of the Salton Sea Watershed (shown at right as a yellow outline within the blue watershed). Several out-buildings and a residence are located adjacent to the northwest corner of the property. A PVC pipe originating at the northernmost desert fan palm oasis appears to run to one of these buildings. Interstate 8 runs along the northern portion of the site, curving along the western boundary to the south. The site ranges from 2,200 to 2,357 feet in elevation and supports PBS habitat. Preservation of the site will include transfer of title or protection under a conservation easement to ensure protection of unique vegetation and wildlife habitat.

Site Selection: Currently, the property is private and open for private development. Protection of the site is important for watershed health to prevent the further spread of non-native, invasive species downstream within the watershed and to prevent illegal public access and degradation of large portions of the watershed. Illegal public access and invasive plant species threaten the quality of the vegetation and habitat. Preservation and restoration of the unique habitat areas and water sources will aid wildlife species in the area, including bats, Barefoot Banded Gecko (*Coleonyx switaki*) (BBG), and PBS habitat. Additionally, issues related to water rights will be resolved with purchase by Sunrise related to the current diversion of water from the palm oasis habitat.

The site was selected based on the presence of desert dry wash systems, the presence of desert fan palm oasis habitat, and the opportunities present for removal of non-native, invasive salt cedar (*Tamarix ramosissima*) and giant reed (*Arundo donax*) to improve habitat conditions. The site contains more than seven acres of desert dry washes, and approximately 0.9 acres of desert fan palm oasis vegetation (see Table 9). Salt cedar is present in much of the desert dry wash area.

Table 9. Jurisdictional Areas at the Suckle Property

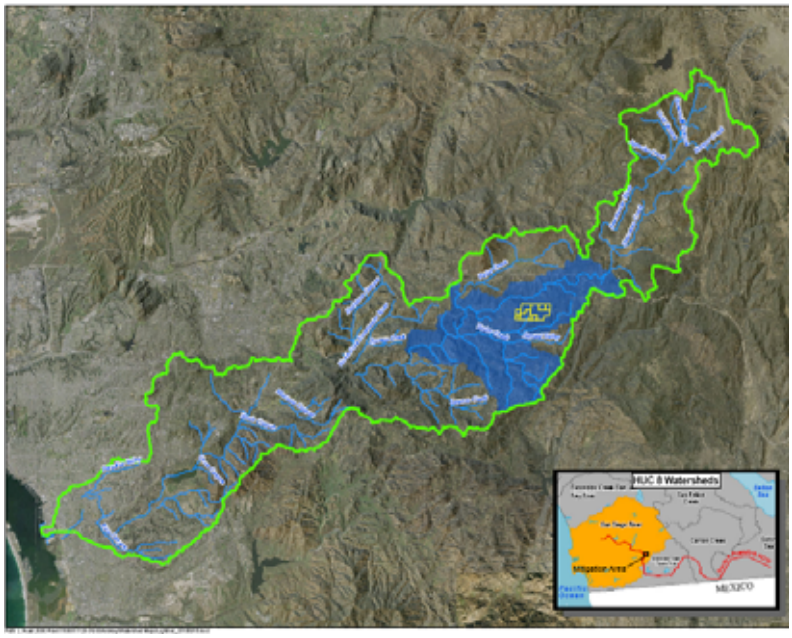
	Area (acres)	Length (linear feet)
Desert Dry Wash	7.47	11,200
Desert Fan Palm Oasis (wetland)	0.88	-
TOTAL:	7.92	11,200

Soils: Soils at the site are mapped as Rock Outcrop-Lithic Torriorthents-Omstott. Omsott soils are characterized as well drained with rapid to medium runoff and moderate to moderately rapid permeability (USDA 2010a). Soils do not appear on the hydric soils list (USDA 2010b).

Vegetation: This property is made up of Sonoran mixed woody and succulent scrub habitat. Dominant plant species observed include white bursage (*Ambrosia dumosa*), desert peach (*Prunus andersonii*), Bigelow's nolina (*Nolina bigelovii*), desert agave (*Agave deserti*), prickly pear (*Cylindropuntia* spp.), and Parish's goldeneye (*Viguiera parishii*). Dominant native plant species found in the northern desert fan palm oasis habitat include California fan palm (*Washingtonia filifera*), yerba mansa (*Anemopsis californica*), and sandbar willow (*Salix exigua*). The southern desert fan palm oasis was dominated by California fan palm and Fremont cottonwood (*Populus fremontii*). In addition, salt cedar is present throughout most of the southern desert dry wash which runs west to east and within one of the centrally located desert dry washes, also running west to east.

Hydrology: Precipitation is the main source of hydrology for this site. This site typically receives approximately 3.21 inches of rainfall per year (USDA 2010c). Interstate 8 intersects with an area of desert dry washes on the southern end of the property. The largest desert dry wash on the southern end of the property flows from the west through a culvert under Interstate 8 and onto the Suckle property. Natural hydrology in this dry wash system may be somewhat impeded by the non-native, invasive plant species infestations of giant reed and salt cedar in the middle of this wash.

3.1.3 Lightner Property



The Lightner Property totals approximately 697 acres[3] and comprised of 9 parcels. It is located within the central portion of the San Diego River Watershed (shown in yellow within the larger watershed at right), approximately 1.5 miles south of Interstate 8 off of Japatul Valley Road and Bell Bluff Truck Trail in San Diego County, California. The Suncrest Substation of the SRPL Project is located in the central portion of the property spanning two parcels (Assessor Parcel Number [APN] 52303013 and 52303014). This mitigation property is surrounded on all sides by mountainous terrain with no urban development in close proximity. This site ranges from 2,240 to 3,080 feet NGVD in elevation.

Site Selection: The Lightner Property was selected as mitigation based on the presence of a large intact watershed area containing ephemeral and intermittent streams along with wet meadows supporting emergent vegetation. The site is important to watershed health as it contains the headwaters of several streams which become significant south of the site. Improving site conditions will enhance the overall health of the entire watershed. It also supports a diverse number of habitats including pristine Engelmann oak (*Quercus engelmannii*)

[3] All acreages reported for mitigation areas are exclusive of the transmission ROW or other transmission facilities.

woodland habitat (a sensitive community in San Diego County) and habitat for the Hermes copper butterfly (*Lycaena hermes*).

Historically, the site has been subject to livestock grazing, resulting in alteration of stream hydrology. The entire property is zoned for development, with potential for rural residential development as evidenced by test wells. In addition, the property has been subjected to livestock grazing, resulting in alteration of stream hydrology through grazing and through the construction of several stock ponds. Protection of the site ensures the preservation of a large portion of the upper watershed. The presence of the Suncrest Substation within the site offers the opportunity to manage long-term preservation of habitat values in the area directly surrounding one of the project's largest impact areas. Additionally, the United States Fish and Wildlife Service (USFWS) and CDFG have accepted the site as a "keystone property" for the San Diego Multiple Species Conservation Plan (MSCP) program. The property will be managed by the San Diego River Conservancy. A title transfer or conservation easement will ensure protection of the upper watershed, including a large wet meadow area, riparian areas, and Engelmann oak woodland.

The site offers a variety of restoration opportunities including the removal of abandoned stockponds, partial opening of earthen dams along streams, enhancement of riparian and wetland areas through planting and revegetation, and removal and management of invasive species. In addition, some roads on the site will be removed, regraded, and planted with native vegetation.

A total of eight wetlands and 23 total streams are present on the property; 16 streams are ephemeral and seven are intermittent. The acreage and length of ephemeral and intermittent streams and wetlands is outlined in Table 10 below.

Table 10. Jurisdictional Areas at the Lightner Property

	Area (acres)	**Length (linear feet)**
Ephemeral Streams	0.38	12,064
Intermittent Streams	0.26	7,623
Emergent Wetlands	0.83	-
TOTAL:	1.47	19,868

Soils: The dominant soil type found within this property is Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes. Additional soil types on the property include Fallbrook rocky sandy loam, 9 to 30 percent slopes; Fallbrook sandy loam, 9 to 15 percent slopes, eroded; Cieneba coarse sandy loam, 30 to 65 percent slopes, eroded; Cieneba-Fallbrook rocky sandy loams, 30 to 65 percent slopes, eroded; Acid igneous rock land; and Cieneba rocky coarse sandy loam, 9 to 30 percent slopes, eroded. These soil series are well to somewhat excessively drained ranging from low to rapid runoff with moderately rapid permeability (USDA 2010a). None of the soil series listed above appear on the San Diego County hydric soils list (USDA 2010b).

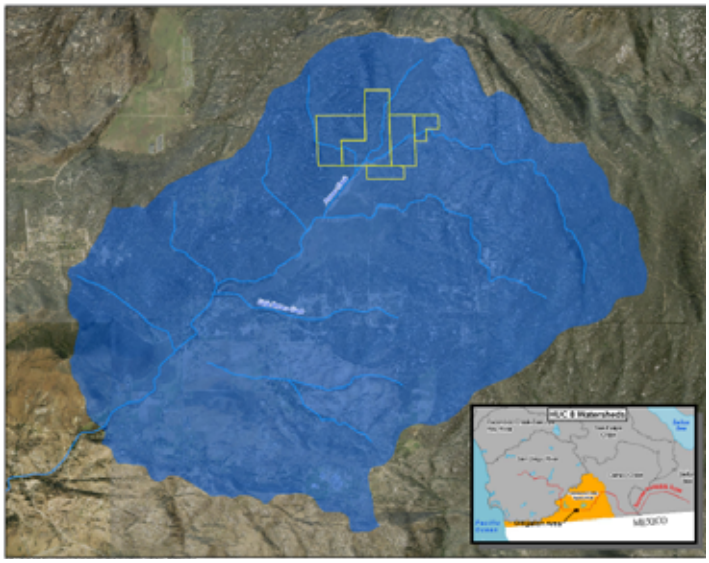
Vegetation: The majority of the property is dominated by chaparral and oak woodlands except in areas where emergent wetlands were observed. All ephemeral streams and all but one intermittent stream observed were surrounded by southern mixed chaparral species. Dominant plant species observed within this community include scrub oak (*Quercus berberidifolia*), chamise, California buckwheat (*Eriogonum fasciculatum*), various manzanita species, and a

variety of lilac species (*Ceanothus* spp.). One intermittent stream in the western half of the property contains predominantly southern mixed chaparral vegetation; however, low densities of riparian species including western sycamores (*Platanus racemosa*), coast live oak, and mule fat (*Baccharis salicifolia*) were found adjacent to this stream. These riparian species are representative of southern coast live oak riparian forest in San Diego County. Dominant plants found in emergent wetlands were Mariposa rush (*Juncus dubius*) and common toad rush (*Juncus bufonius*). Hyssop loosestrife (*Lythrum hyssopifolium*) was also a dominant wetland plant species, but was only found to occur in one of the eastern wetlands on the property. Non-native, invasive plant species observed on-site include short pod mustard (*Hirschfeldia incana*) and tocalote (*Centaurea melitensis*).

Hydrology: Precipitation and resulting runoff from adjacent lands are the main sources of hydrology for ephemeral streams on this property. Intermittent streams rely on precipitation and runoff as well but are also spring-fed which contributes to the increased duration of water flow. On average, this region receives 18.6 inches of rain per year (USDA 2010c). Natural hydrology for portions of the site has been altered through the construction and placement of earthen dams/berms and road crossings. Several earthen dams/berms are located in the western region of the property (APN # 52302007), altering sediment dynamics and hydrologic regimes in the downstream areas. A road crossing is located on the eastern boundary of APN # 52303012, bisecting an emergent wetland.

3.1.4 Long Potrero Property

The Long Potrero Property is a 471-acre mitigation site consisting of five parcels. It is located in the northern portion of the Cottonwood Creek-Tijuana River watershed (shown in yellow within the watershed at right), approximately 7.5 miles southwest of Interstate 8 off of Buckman Springs Road and Highway 94/Campo Road in San Diego County, California. This site is surrounded by mountainous terrain with no urban development nearby. Elevations on this site range from 2,420 to 2,690 feet NGVD.



Site Selection: The Long Potrero site provides an opportunity to provide a variety of habitat protection for wetlands, riparian areas, and endangered species and to protect the headwaters of the watershed. Mountainous terrain to the north of the site is protected through the Cleveland National Forest, and the additional protection of this section of the watershed will improve watershed health for sensitive species. This area is extremely valuable in terms of a high mountain meadow area and supports emergent wetland (in the form of wet meadows), riparian areas, and streams. San Diego County, the USFWS, and the CDFG have designated this property as the highest priority for special status species protection and for inclusion in the MSCP habitat preservation area and currently support a wildlife corridor between open space areas. In addition, preservation of the property ensures that the upper portion of the watershed is preserved. The property is currently privately owned and is not managed for natural resource values. Dumping and littering along numerous existing roadways threaten existing vegetation

and wildlife habitat. The property will be managed by the San Diego River Conservancy, the County of San Diego, or the BLM. A title transfer or conservation easement will ensure preservation of natural resources of the site, including arroyo toad (*Bufo californicus*) and spadefoot toad (*Spea hammondii*) habitat, potential southwestern pond turtle (*Clemmys marmorata pallida*) habitat, raptor foraging habitat, and corridors for other wildlife.

The site is known to support the arroyo toad and is within Quino checkerspot butterfly (*Euphydryas editha quino*) critical habitat. Though the presence of these species may limit the altering of some of the earthen dams, the removal of non-native, invasive plant species would further increase the overall functions and services of the site. The property is adjacent to the Cleveland National Forest; therefore, protection of this site would increase the overall amount of protected open space lands associated with the National Forest.

Stream features on the property will be enhanced through invasive species removal and revegetation with native species, which will improve natural features downstream, in the lower watershed. This site is composed of a series of ephemeral, intermittent, and perennial streams along with the presence of several freshwater marshes and emergent wetlands. There are a total of 22 wetlands and 18 streams present on this site; five streams are ephemeral, 12 are intermittent, and one is perennial. The acreage and length of ephemeral streams is outlined in Table 11 below.

Table 11. Jurisdictional areas at the Long Potrero Property

	Area (acres)	**Length (linear Feet)**
Ephemeral Streams	0.25	3,400
Intermittent Streams	1.67	15,603
Perennial Streams	0.43	3,908
Freshwater Marsh/ Emergent Wetlands	15.91	-
TOTAL	18.26	22,911

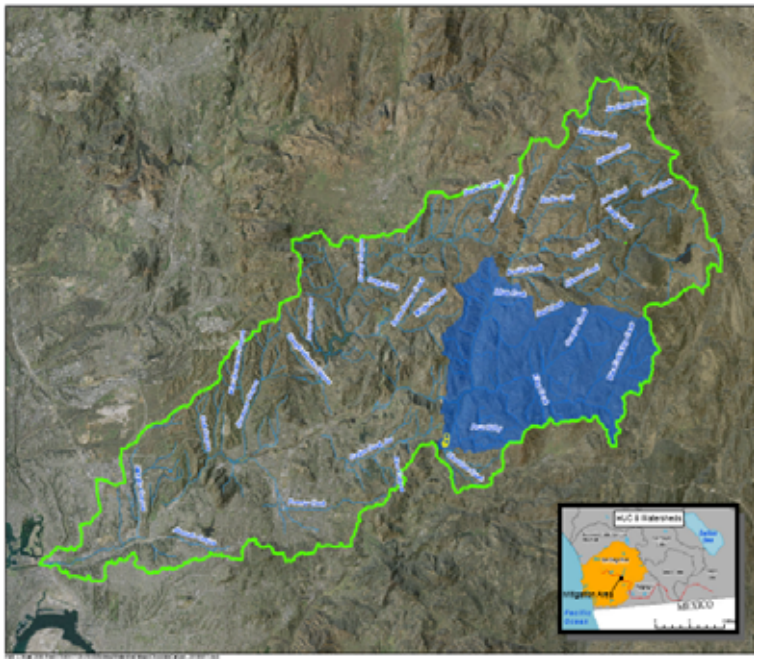
Soils: There are seven native soil types mapped throughout the property. The two dominant soil types mapped are La Posta rocky loam coarse sand, 5 to 30 percent slopes and acid ingenious rock land. Additional soil types on the property consist of: Tollhouse rocky coarse sandy loam, 30 to 65 percent slopes; Fallbrook sandy loam, 5 to 9 percent slopes; Fallbrook sandy loam, 9 to 15 percent slopes; Visalia sandy loam, 0 to 2 percent slopes; and Mottsville loamy coarse sand, 2 to 9 percent slopes. Soils on this site are well to excessively drained and range from slow to medium runoff. The Fallbrook and Tollhouse soils have rapid to very rapid runoff (USDA 2010a). None of the soil series listed above appears on the San Diego County hydric soils list. The Visalia series does contain unnamed inclusions which are mapped as hydric (USDA 2010b).

Vegetation: The Long Potrero property is dominated by southern mixed chaparral except in areas where riparian and emergent wetlands areas were observed. Dominant southern mixed chaparral species observed on the site include chamise, California buckwheat, redstem filaree (*Erodium cicutarium*), laurel sumac (*Malosma laurina*) and various bromes (*Bromus* spp.). Riparian areas were dominated by coast live oak while freshwater marshes and emergent

wetlands were dominated by Mariposa rush, common toad rush, common spike rush (*Eleocharis macrostachya*) and little hogweed (*Portulaca oleracea*) with low densities of curly dock (*Rumex crispus*), willow dock (*Rumex salicifolius*), tarragon (*Artemisia dracunculus*), and Douglas mugwort (*Artemesia* douglasiana) occurring throughout.

Hydrology: Precipitation and resulting runoff from adjacent lands are the main sources of hydrology for ephemeral streams on this property while intermittent and perennial streams are spring-fed. Rainfall for this region averages 15.4 inches per year (USDA 2010c). Numerous access roads and earthen dams/berms are present on site, impeding the flow of some streams on site. Wetlands are bisected and discontinuous due to access roads. In addition, several stock ponds, including one perennial pond, have formed in areas adjacent to the earthen dams/berms.

3.1.5 Chocolate Canyon Property



The Chocolate Canyon Property is approximately 75 acres and is comprised of six parcels. It is located within the southern portion of the San Diego River Watershed (shown in yellow within the watershed at right within the blue HEC 10 watershed), north of Interstate 8, directly adjacent to the highway off Peutz Valley Road in San Diego County, California. The northern and eastern boundaries of the property are bounded by mountainous terrain with urban sprawl to the west. This site ranges from 900 to 1,290 feet NGVD in elevation.

Site Selection: The Chocolate Canyon property was selected as a mitigation property due to its connection with adjoining open space, its use as a wildlife corridor, and its location within the watershed. The property includes an important part of the watershed that drains to public water drinking supply; therefore, preservation of the site and removal of non-native, invasive species from the site is important to watershed health. Preservation of this area offers the opportunity to expand an existing MSCP preserve area. The City of San Diego will grant protection of this property as part of Multi-habitat Planning Area (MHPA) and watershed lands and will manage the property. The property originally qualified for developed under MSCP regulations, which would have allowed limited development in open space lands. As part of MHPA, the entire property will be preserved and no development will be permitted. Preservation will include permanent stream, Least Bell's Vireo (*Vireo bellii pusillus*), and Southwestern Willow Flycatcher (*Empidonax traillii extimus*) habitat. The site also provides an important wildlife corridor, with the nearby underpass at Interstate-5 that allows for wildlife to pass beneath highway.

The mitigation site contains a mixture of ephemeral, intermittent, and perennial streams along with an abundance of freshwater marsh wetlands. Selection of this site would allow for the protection of intermittent and riparian habitats found on the property. Enhancement opportunities are also available with the removal of non-native, invasive plant species such as

giant reed and castor bean (*Ricinus communis*). This in turn will provide habitat improvement for the Least Bell's Vireo and Southwestern Willow Flycatcher.

There are a total of six freshwater wetlands and 21 total streams. Of these 21 streams, 19 are ephemeral, one is intermittent, and one is perennial (Table 12).

Table 12. Jurisdictional areas at Chocolate Canyon

	Area (acres)	Length (linear Feet)
Ephemeral Streams	0.27	8,758
Intermittent Streams	0.01	305
Perennial Streams	1.08	3,150
Freshwater Marsh	1.01	-
TOTAL:	2.37	12,213

Soils: The dominant soil type mapped for this mitigation site is listed as Cienba-Fallbrook rocky sandy loams, 30 to 65 percent slopes, eroded. A small portion of the northeastern section of the property is mapped as Cienba coarse sandy loam, 30 to 65 percent slopes, eroded. The soils are well to excessively drained and range from medium to very rapid runoff (USDA 2010a). Neither soil series appears on the San Diego County hydric soils list (USDA 2010b).

Vegetation: The dominant vegetation community within this site is Diegan coastal sage scrub except in riparian areas adjacent to intermittent and perennial streams and where freshwater marshes were mapped. Dominant plant species observed within this community include California buckwheat, laurel sumac, along with various brome species throughout. Riparian areas adjacent to the intermittent and perennial stream are characterized as southern coast live oak riparian forest with the presence of coast live oak, willow species, and western sycamores. High densities of poison oak (*Toxicodendron diversilobum*) were also observed along both intermittent and perennial stream banks while moderate densities of California grape (*Vitis californica*) were found only along perennial stream banks. Freshwater marshes occurred along the stream channel of the main perennial stream. Dominant vegetation observed in these marshes include California blackberry (*Rubus ursinus*), Douglas mugwort, and common three square (*Schoenoplectus pungens*). Several large patches of the invasive giant reed were observed along the perennial stream channel and a few individual stands of castor bean were found along the main access road in the southwestern section of the property.

Hydrology: Precipitation and resulting runoff from adjacent lands are the main sources of hydrology for the ephemeral and intermittent streams which then flow into the main perennial stream, Chocolate Canyon Creek. Stream flow from Chocolate Canyon Creek then travels downstream into the El Capitan Reservoir. Average precipitation for this region is approximately 18.6 inches of rain per year (USDA 2010c). Access roads appear to have altered the natural hydrology by bisecting a small portion of the ephemeral streams onsite. The hydrology for this and the intermittent stream appear to remain in their natural state downstream of a small bridge that occurs in the upstream portion of the mitigation site. Upstream of the mitigation site, an approximately 198-foot culvert carries flow Interstate-8.

3.2 Basis for Request to Include Preservation as Part of Compensatory Mitigation

The basis for preservation to be included for each mitigation site is summarized in Table 13 below based upon requirements from the Corps 2008 Mitigation Rule 332.3(h): (h) Preservation:

(1) Preservation may be used to provide compensatory mitigation for activities authorized by DA permits when all the following criteria are met:

- *(i) The resources to be preserved provide important physical, chemical, or biological functions for the watershed;*
- *(ii) The resources to be preserved contribute significantly to the ecological sustainability of the watershed. In determining the contribution of those resources to the ecological sustainability of the watershed, the district engineer must use appropriate quantitative assessment tools, where available;*
- *(iii) Preservation is determined by the district engineer to be appropriate and practicable;*
- *(iv) The resources are under threat of destruction or adverse modifications; and*
- *(v) The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).*

(2) Where preservation is used to provide compensatory mitigation, to the extent appropriate and practicable the preservation shall be done in conjunction with aquatic resource restoration, establishment, and/or enhancement activities.

Table 13. Basis for Preservation

Requirements to be Met for Preservation	Desert Cahuilla	Suckle	Long Potrero	Lightner	Chocolate Canyon
The resources to be preserved provide important physical, chemical, or biological functions for the watershed.	Includes major portion of upper watershed of major wash that flows to the Salton Sea. Also, part of a larger acquisition plan for the region. Preserves Pennisular Bighorn Sheep (PBS) habitat.	Preserves PBS habitat. Preservation and restoration of unique palm oasis habitat will aid all wildlife species in the area including bats, BBG, and PBS.	Ensures top of watershed is preserved. Preserves arroyo toad and spadefoot toad-occupied habitat, Tecate tarplant-occupied habitat, potential western pond turtle habitat, and raptor foraging habitat.	Ensures top of watershed is preserved and managed for natural resource values. Includes large wet meadow area and riparian areas	Preserves permanent stream, LBV, and SWFL habitat. Is important watershed that drains to public water drinking supply
The resources to be preserved contribute significantly to the ecological sustainability of the watershed.	This parcel is part of a larger acquisition program to place major parcels of land Anza Borrego State Park and to establish wilderness status in these areas.	Unique habitat areas (including palm oasis) which provide water sources to wildlife in region, including PBS.	Property privately owned; numerous existing roadways and some dumping and littering. County, USFWS and CDFG designated this property as highest priority for special status species protection and for inclusion in MSCP habitat preservation area. Wildlife corridor protected	USFWS and CDFG accepted "keystone property" for City/County MSCP program (and see above). Englemann oak woodland may be the best in the County.	Important wildlife corridor as there is an underpass at I-5 at this location that allows for wildlife to pass beneath highway. Excellent vireo habitat along stream corridor

Requirements to be Met for Preservation	Desert Cahuilla	Suckle	Long Potrero	Lightner	Chocolate Canyon
The resources are under threat of destruction or adverse modifications.	Owned by State Lands; but not managed for natural resource values and subject to ORV use. Not patrolled or maintained. Under State Park management as wilderness area and, with Sunrise funding, will be managed for natural resource values including desert wash and PBS.	Impacts to stream/wash features by invasive plant species. Private property on the market. development. Illegal public access. Water rights issue will be resolved with purchase by Sunrise	Private property that had existing roads, dumping, and littering. Not subject to management for natural resource values.	Entire property zoned for development and slated for rural residences (evidence of test wells and dams for stock ponds). Has been subject to livestock grazing previously resulting in alteration of stream hydrology	Areas could have been developed under MSCP regulations allowing for limited development in open space lands with some set aside. This acquisition will preserve the entire property.
The preserved site will be permanently protected through an appropriate real estate or other legal instrument (e.g., easement, title transfer to state resource agency or land trust).	Property will be designed wilderness area by California State Parks	Will be protected under title transfer or conservation easement	Will be protected under title transfer or conservation easement	Will be protected under title transfer or conservation easement	City of San Diego to protect as part of MHPA and as watershed lands
Where preservation is used to provide compensatory mitigation, to the extent appropriate and practicable the preservation shall be done in conjunction with aquatic resource restoration, establishment, and/or enhancement activities.	If exotics are found within stream/wash features, they will be removed. Large preservation acreage on the property will be managed for natural resource values and as wilderness area	Will seek to resolve water rights issues so that current water diversion from palm oasis is resolved. Invasive plants to be removed where found.	Stream features on the property will be enhanced through invasive species removal and revegetation with native species	Restoration and enhancement actions are proposed for the property to remove old stockponds, farm roads, and to remove invasive and restore native vegetation and riparian areas along streams.	*Arundo* will be removed from the perennial stream. Other areas will be preserved.

3.3 CRAM Functional Assessment of the Mitigation Sites

To provide insight into conditions at typical mitigation sites for the HMMP, CRAM assessments were performed at four of the five mitigation sites (assessments were not performed at Desert Cahuilla as the only mitigation activity at this site is preservation). After conversations with Corps representatives, it was established that CRAM would not be used to assess the condition of first-order or "headwater" streams, including a number of streams on the Lightner and Long Potrero properties where mitigation activities are proposed. Instead, only intermittent or perennial streams and depressional wetlands where mitigation activities are proposed were assessed. Assessments were conducted at the Suckle, Lightner, and Long Potrero Properties in September 2010, including one desert dry wash, three streams and two wetland areas. One additional assessment was performed at the Chocolate Canyon site in June 2010 (perennial stream 117-S-1) which is considered to be both an impact site, due to proposed construction of a bridge nearby, and a mitigation site, due to proposed restoration activities for the stream.

The assessments provide scores which quantify the existing condition and functional value of dry washes, streams and wetlands being used as mitigation for impacts to WOUS and WOS along the SRPL ROW. These seven CRAM assessments are representative of the proposed mitigation activities for the Sunrise Powerlink project. The seven mitigation site CRAM assessments represent all proposed restoration activities in intermittent or perennial streams and depressional wetlands and also provide insight on conditions at the four proposed mitigation sites where activities other than preservation will take place.

3.3.1 Suckle Property

Of the six desert dry wash habitats present within the Suckle Property, the southernmost feature which runs west to east was chosen as the representative feature of this site to be assessed using CRAM (see Figure 6). The assessment area was established roughly in the center of the feature, between two hydrologic breaks and had an overall score of 68%. This feature scored highly in buffer and landscape context due to its remote and mostly undisturbed location receiving mostly "A" for all attributes except for Buffer Condition which scored a "B" due to the presence of Highway 8 within the 250 m buffer. Hydrology attributes also scored relatively high with the Water Source and Hydrologic Connectivity metric receiving an "A".

Hydroperiod/Channel Stability was lowered to a "B" due to some evidence of degradation and aggradation within the stream channel. The Physical Structure metric had low scoring attributes with Structural Patch Richness receiving a "D" and Topographic Complexity a "C". Desert dry wash systems are by nature low gradient systems and have consistently scored low for this metric. It is recognized that this is a limitation in using the Riverine CRAM module for assessments on these systems. Lastly, the Biotic Structure metric had low scoring attributes receiving mostly a "B" for all attributes except for Number of Plant Layers, which received a "B", and Percent Invasion which received a "D" due to the presence of many invasive species such as salt cedar, Saharan mustard (*Brassica tournefortii*), and oats (*Avena spp.*).

The Sunrise Powerlink ROW does not run through this property and therefore it will not be impacted by any construction activities associated with ROW.

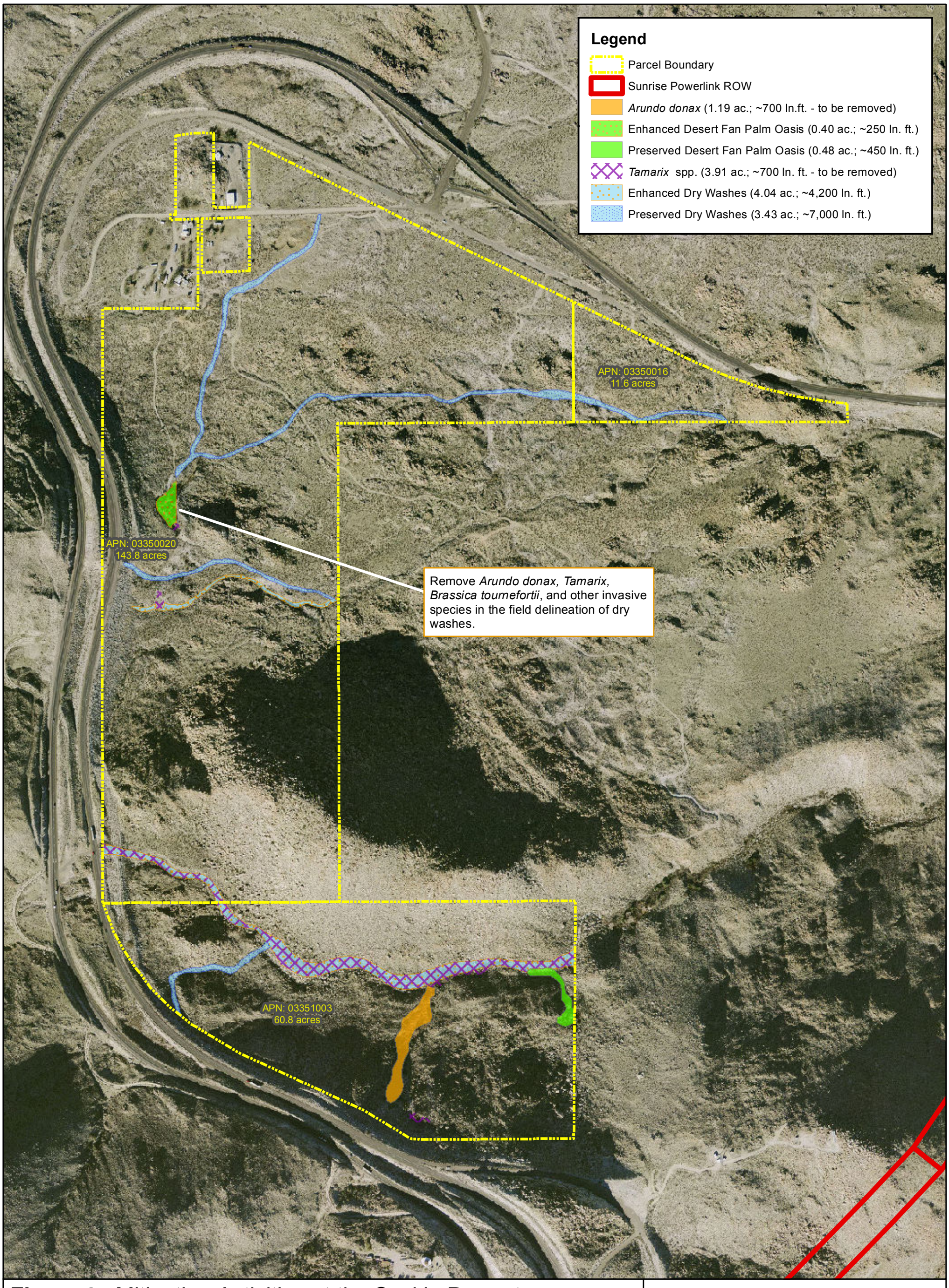


Figure 6. Mitigation Activities at the Suckle Property

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Sunrise Powerlink
Imperial County, California

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Map Date: July 2010
Map By: Derek Chan
Base Source: Imperial County
Filepath: L:\Acad 2000 Files\17000\17128-3\GIS\ArcMap\Mitigation\Suckle\Suckle_Mitigation_20100930.mxd

3.3.2 Lightner Property

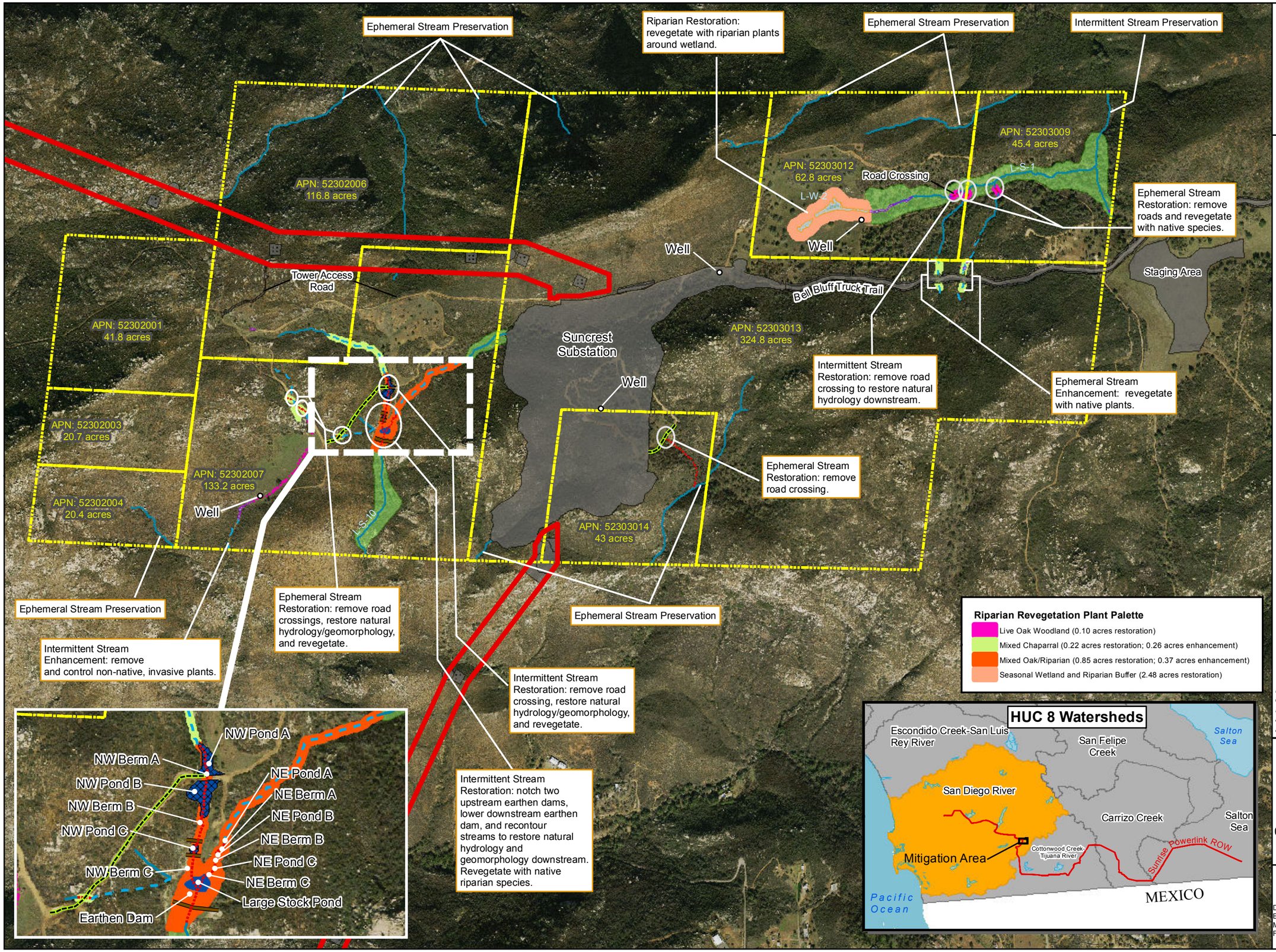
Of the seven intermittent streams and eight wetlands present on the Lightner Property, two streams and one wetland were chosen as representative features to be assessed using CRAM. One stream, L-S-1 (Figure 7), is located in the northeastern region and the second, L-S-10, is located in the southwestern region of the property. Both AAs for these streams scored relatively high with an overall CRAM score of approximately 80%. Both stream scored an "A" for all Buffer and Landscape Connectivity attributes except for Buffer Condition which was lowered to a "B" due to an intermediate mix of native and non-native vegetation. The Hydrology metric also scored highly for these streams, receiving an "A" for all three metrics, an indication that they are not entrenched and are characterized by equilibrium conditions with precipitation and freshwater natural runoff being the main sources to affect the dry season conditions. L-S-1 scored lower than L-S-10 for Physical Structure due to less patch types being observed and this feature only having a single bench. Overall, both streams scored the same for Biotic Structure, receiving mostly an "A" or a "B" except for number of co-dominant species metric which L-S-1 scored a "C".

The wetland assessed on this property, L-W-2 (Figure 7), was also located in the northeastern region of the property. This wetland is characterized as a seasonal and portions of the eastern edge are fringe wetlands surrounding L-S-1. Overall score for this AA was relatively low at 65%. Buffer metrics scored relatively high receiving "A's" and "B's"; however, Landscape Connectivity was lowered to a "D" due a large percentage of the area adjacent to the AA being of non-wetland status. Hydrology scored an "A" for all attributes of this metric whereas Physical Structure scored a "C" and "D" for these metrics. Biotic structure metric scores ranged from very high to very low with vertical biotic structure scoring highest at an "A", percent invasion scoring a "B", number of plant layers and horizontal interspersion both scoring a "C" and number of co-dominants receiving a "D".

3.3.3 Long Potrero Property

The Long Potrero Property supports a total of 12 intermittent streams and 22 wetland features. Of these, one stream located in the central region and one wetland located in the southwestern region were chosen as representative features to be assessed using CRAM. The intermittent stream chosen, LP-S-12 (Figure 8), received a moderate overall CRAM score of 66%. Buffer and Landscape Context metric scored highly for this stream, receiving an "A" for each attribute except for buffer condition which scored a "B" due to an intermediate mix of native and non-native vegetation. Hydrology also scored high, receiving an "A" for two out of three attributes. The hydroperiod/channel stability attribute scored a "B" due to a small to moderate degree of entrenchment. Physical structure attributes both scored a "C" whereas biotic structure attributes varied from scoring as high as a "B" to as low as a "D". Number of plant layers and percent invasion were the only attributes in this metric to score a "B". Horizontal interspersion scored a "C" due to low number of "plant zones" observed and vertical biotic structure scored a "D" due to minimal overlap of plant layers present.

In following guidance received from the Corps, it was determined that the wetland chosen, LP-W-4 (Figure 8), would be assessed by performing CRAM surveys at two separate locations within the wetland. One was conducted in the center of the wetland, where wetland indicators were strongest and the other was conducted at the wetland edge to account for edge affects. The scores were then tabulated for each AA then averaged to yield one final CRAM score for this wetland. The scores discussed below for LP-W-4 represent the averaged scores for both AAs.



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Sunrise Powerlink

San Diego County, California

Figure 7.

Mitigation Activity at the Lightner Property

Legend

- Parcel Boundary
- Sunrise Powerlink ROW
- Construction Impact Area
- Preserved Riparian Habitat (15.83 acres)
- Enhanced Wetlands (0.63 acres)
- Preserved Wetlands (0.20 acres)
- Man-made Pond (to be removed)
- Man-made Pond (to be enhanced)
- Dirt Roads (to be removed)
- Earthen Dams/Berms (to be removed)
- Non-defined Channel

Streams

Mitigation Action:

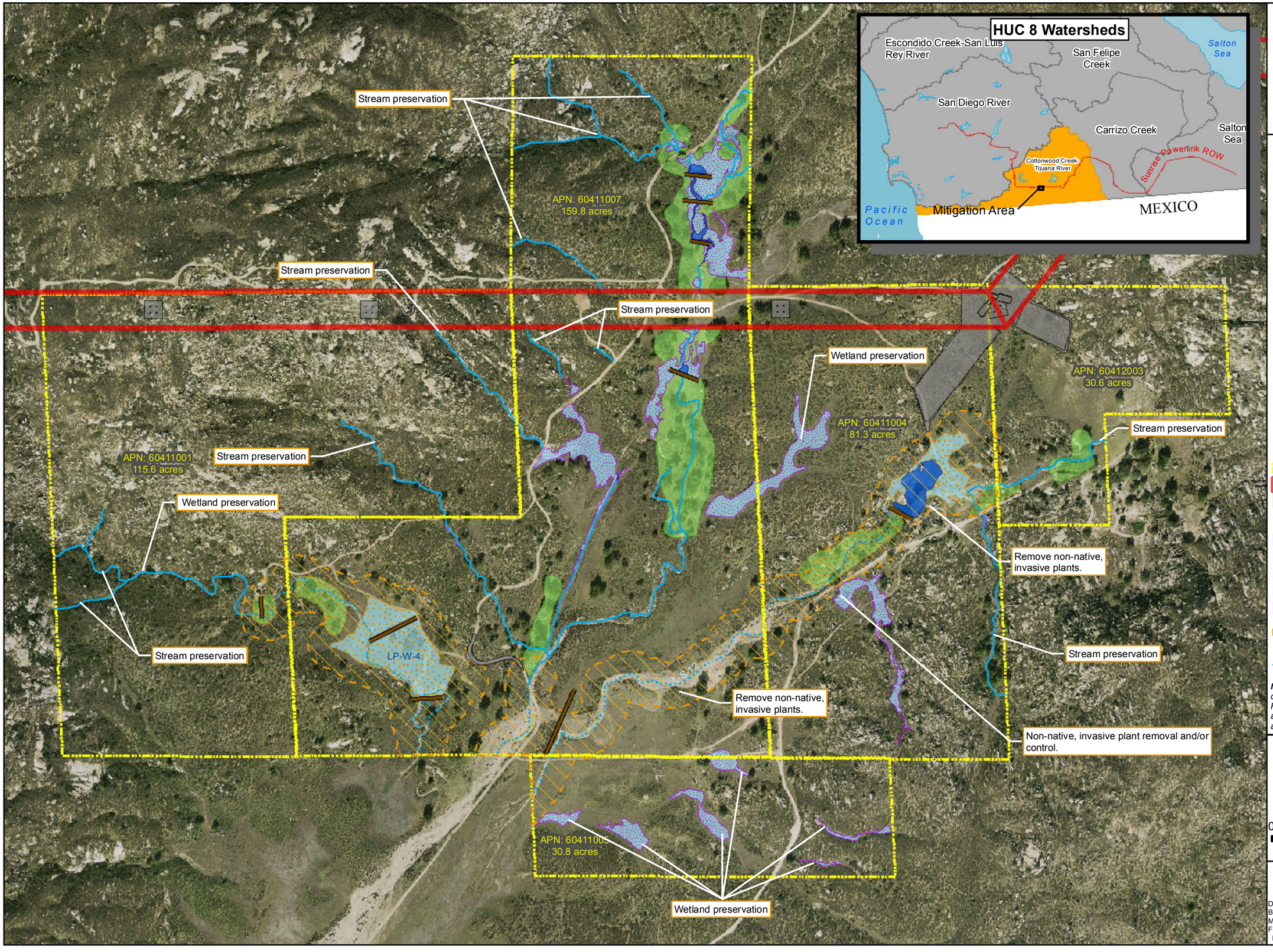
- Enhancement (0.10 ac.; 3,558 ln. ft.)
- Preservation (0.54 ac.; 16,310 ln. ft.)
- Restoration (0.04 ac.; 1,117 ln. ft.)

Note: *Stream and Riparian acreage calcuations do not include areas within the Sunrise Powerlink ROW or Construction Impact Areas. Stream acreages are based on OHWM width. Riparian areas are based on CDFG riparian dripline.*

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Feet

Date: September 2010
Base Source: NAIP, 2005; San Diego County
Map By: Derek Chan
Filepath: L:\Acad 2000 Files\17000\17128-3\GIS\ArcMap\Mitigation\Lightner\Lightner_Mitigation_20100930.mxd



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Figure 8.

Mitigation Activites at the Long Potrero Property

Legend

- Parcel Boundary
- Sunrise Powerlink ROW
- Construction Impact Area
- Earthen Dams/Berms
- Man-made Ponds (1.28 acres)
- Enhanced Riparian Habitat (3.95 acres)
- Preserved Riparian Habitat (12.62 acres)
- Enhanced Wetlands (5.99 acres)
- Preserved Wetlands (9.92 acres)
- Proposed Non-native, Invasive Species Removal
- Enhanced Streams (0.96 ac.; 6,054 ln. ft.)
- Preserved Streams (1.39 ac.; 16,857 ln. ft.)

Note: *Stream and Riparian acreage calcuations do not include areas within the Sunrise Powerlink ROW or Construction Impact Areas. Stream acreages are based on OHWM width. Riparian areas are based on CDFG riparian dripline.*

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Feet

Date: September 2010
Base Source: NAIP, 2005; San Diego County
Map By: Derek Chan
Filepath: L:\Acad 2000 Files\17000\17128-3\GIS\ArcMap\Mitigation\LongPotrero\LongPotrero_Mitigation_20100930

LP-W-4 received an averaged overall CRAM score of 61%. Landscape connectivity, however, scored a "D" due to a large percentage of habitat surrounding the AA being of non-wetland status. In general, Buffer metrics scores were high with two metrics receiving an "A" and one receiving a "B". Similarly, hydrology attributes scored high, with an average score of an "A".

Physical structure attributes scored low with structural patch richness receiving a "D" based on only four different patch types observed and topographic complexity a "C" due on the little to no micro-topographic complexity of the wetland. The biotic structure metric scored a "C" for three out of the five attributes while number of plant layers scored a "B" and number of co-dominant species scored a "D".

3.3.4 Chocolate Canyon Property

The one perennial stream, 117-S-1 (Figure 9), on the Chocolate Canyon Property was chosen as the representative feature to be assessed using CRAM. This stream, however, was also assessed by CRAM as an impacted feature during previous site visits (see Section 2.4). Though the AAs vary slightly, the baseline conditions for this stream are the same as those reported in previous sections. However, future projected scores for this stream post-mitigation activities are expected to differ from post construction impacts due to the removal of non-native, invasive plant species. The expected changes in functions and values of this stream post mitigation activities are discussed in Section 4.1.

4.0 MITIGATION GOALS AND OBJECTIVES

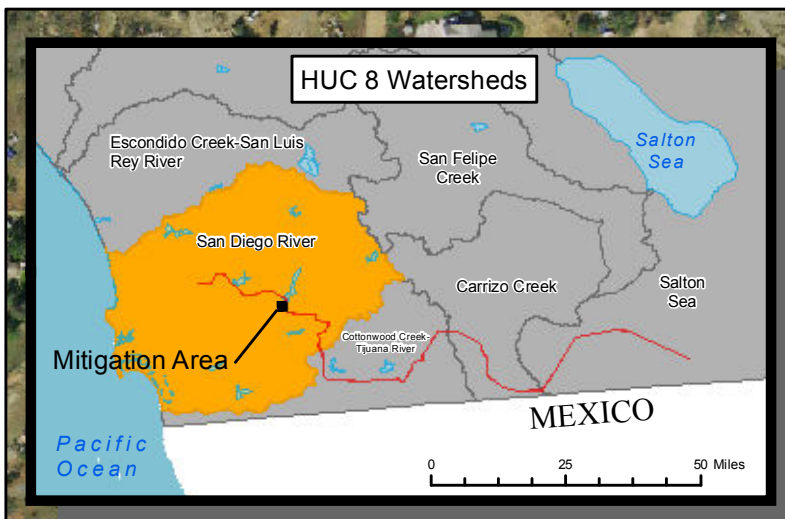
The objective of the mitigation program is to result in "no net loss" and, if possible, a net increase in habitat function and service for unavoidable project impacts to streams and wetlands through preservation, enhancement, and restoration of streams and dry washes at five mitigation sites. For desert ecosytems, preservation is considered to be mitigation for impacts to desert dry wash systems as desert ecosystems take centuries to recover or to have establishment of native species, prohibiting the creation or restoration of these systems. However, non-native, invasive plant species removal can enhance habitat in these systems.

The overall goals of the mitigation are to:

- Preserve and manage both uplands and aquatic resources on each of the five properties in perpetuity
- Restore and enhance stream and wetland functions, including buffer and wildlife habitat functions
- Provide the structure and funding for management of weeds, trash, vandalism, trespassing and any other human-induced disturbances in perpetuity through a non-wasting endowment

Mitigation activities include preservation, enhancement, and restoration actions as described below are defined by the Corps 2008 Mitigation Rule as:

- **Preservation**: The permanent protection of ecologically important wetlands or other aquatic resources through the implementation of appropriate legal and physical mechanisms (i.e. conservation easements, title transfers). Preservation may include protection of upland areas adjacent to wetlands as necessary to ensure protection or enhancement of the aquatic ecosystem. Preservation does not result in a net gain of



Legend

- Parcel Boundary
- Sunrise Powerlink ROW
- Construction Impact Area
- *Ricinus communis* (0.12 acres - to be removed)
- *Arundo donax* (0.47 acres - to be removed)
- Riparian Enhancement (0.30 acres)
- Riparian Preservation (10.25 acres)
- Wetland Enhancement (0.02 acres)
- Wetland Preservation (.99 acres)
- Enhanced Streams (1.08 ac.; 3,162 ln. ft.)
- Preserved Streams (0.28 ac.; 9,051 ln. ft.)

(1) All jurisdictional riparian habitat, perennial, intermittent and ephemeral streams, and wetlands outside the ROW will be preserved within these Mitigation Areas.

(3) Mitigation opportunities consist of removing all invasive *Ricinus communis* (0.12 acres) from locations within the Chocolate Canyon watershed and it's tributaries within these Mitigation Areas. Biological surveys will be conducted each year to make sure that *R. communis* does not colonize within the mitigation area.

(2) Mitigation opportunities consist of removing all invasive *Arundo donax* (0.47 acres) from locations along Chocolate Canyon stream and it's tributaries within these Mitigation Areas. Biological surveys will be conducted each year to make sure that *A. donax* does not colonize within the mitigation area.

Note: *Stream and Riparian acreage calcuations do not include areas within the Sunrise Powerlink ROW or Construction Impact Areas. Stream acreages are based on OHWM width. Riparian areas are based on CDFG riparian dripline.*

APN: 40222108
35.8 acres

APN: 40222107
36.4 acres

APN: 40235104
6.1 acres

APN: 40221101
6.7 acres

APN: 40222009
2.1 acres

APN: 40222010
7.7 acres

117-S-1

Chocolate Canyon Stream

8

Figure 9. Mitigation Activities at Chocolate Canyon

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Sunrise Powerlink
San Diego County, California

0 150 300 600 Feet

wra
ENVIRONMENTAL CONSULTANTS

Map Date: September 2010
Map By: Derek Chan
Base Source: NAIP, 2005, San Diego County
Filepath:L:\Acad 2000 Files\17000\17128-3\GIS\ArcMap\Mitigation\ChocolateCanyon\ChocolateCanyon_Mitigation_20100920.mxd

wetland acres and may only be used in certain circumstances, including when the resources to be preserved contribute significantly to the ecological sustainability of the watershed.

- **Enhancement**: Activities conducted within existing wetlands that heighten, intensify, or improve one or more wetland functions. Enhancement is often undertaken for a specific purpose such as to improve water quality, flood water retention or wildlife habitat. Enhancement results in a gain in wetland function, but does not result in a net gain in wetland acres.

- **Restoration**: Re-establishment or rehabililitation of a wetland or other aquatic resource with the goal of returning natural or historic functions and characteristics to a former or degraded wetland. Restoration may result in a gain in wetland function or wetland acres, or both. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: reestablishment and rehabilitation. *Re-establishment* means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/ historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions. *Rehabilitation* means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/ historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

For the purposes of this report, we refer to all re-establishment and rehabilitation activities as restoration as the distinction between “natural/historic” and degraded is not easily provided.

4.1 Projected CRAM Scores Following Restoration of Mitigation Sites

Using proposed mitigation plans and data collected at proposed mitigation sites for the SRPL project, CRAM was used to predict how these sites may improve following mitigation activities. These projected scores are based on conditions anticipated approximately 5 years after project implementation, as the full benefit of mitigation actions may not be evident immediately upon completion. As soil disturbance and human activity becomes less evident, mitigation AAs should improve their scores for the Buffer Condition submetric, and metric and submetric scores for the Biotic Structure attribute have potential to increase as mitigation plantings develop. Hydrology and Physical Structure attribute scores would also improve during the slow process of natural development following wetland restoration, although this process may take longer than 5 years. Table 14 compares average existing scores to average projected scores for these sites. CRAM scores for individual sites are presented in Appendix B.

4.1.1 Suckle Property

Removal of non-native plant species, which currently dominate much of the desert dry washes on the Suckle Property, is planned as part of the stream enhancement measures for this mitigation site. Removal of invasive species such as giant reed, salt cedar, tocalote and Saharan mustard is anticipated to greatly improve the Percent Invasion and Buffer Condition scores. The overall CRAM score for this desert dry wash is projected to increase by three percentage points from 68% to 71% within the first five years.

Table 14. Average Existing and Projected Scores for All Assessed Mitigation Sites

	Depressional Wetlands				Intermittent Streams				Desert Dry Wash				Perennial Stream			
CRAM Projection	**Original Avg. Scores**	**Projected Average Scores**	**Impact delta**	**Percent Increase**	**Original Avg. Scores**	**Projected Average Scores**	**Impact delta**	**Percent Increase**	**Original Avg. Scores**	**Projected Average Scores**	**Impact delta**	**Percent Increase**	**Original Avg. Scores**	**Projected Average Scores**	**Impact delta**	**Percent Increase**
Buffer and Landscape Connectivity																
Landscape Connectivity	3.0	3.0	0.0	0.0%	12.0	12.0	0.0	0.0%	12.0	12.0	0.0	0.0%	3.0	3.0	0.0	0.0%
% of AA with Buffer	12.0	12.0	0.0	0.0%	12.0	12.0	0.0	0.0%	12.0	12.0	0.0	0.0%	12.0	12.0	0.0	0.0%
Average Buffer Width	12.0	12.0	0.0	0.0%	12.0	12.0	0.0	0.0%	12.0	12.0	0.0	0.0%	12.0	12.0	0.0	0.0%
Buffer Condition	9.0	10.5	1.5	16.7%	9.0	11.0	2.0	22.2%	9.0	12.0	3.0	33.3%	9.0	9.0	0.0	0.0%
Raw Score	13.4	14.2	0.8	6.2%	22.4	23.5	1.1	4.9%	22.4	24.0	1.6	494.6%	13.4	13.4	0.0	0.0%
Final Score	55.8	59.3	3.5	6.2%	93.3	97.9	4.6	4.9%	93.3	100.0	6.7	594.6%	55.8	55.8	0.0	0.0%
Hydrology																
Water Source	12.0	12.0	0.0	0.0%	10.0	12.0	2.0	20.0%	12.0	12.0	0.0	0.0%	9.0	9.0	0.0	0.0%
Hydroperiod/Channel Stability	11.3	11.3	0.0	0.0%	11.0	11.0	0.0	0.0%	9.0	9.0	0.0	0.0%	9.0	9.0	0.0	0.0%
Hydrologic Connectivity	12.0	12.0	0.0	0.0%	12.0	12.0	0.0	0.0%	12.0	12.0	0.0	0.0%	12.0	12.0	0.0	0.0%
Raw Score	35.3	35.3	0.0	0.0%	33.0	35.0	2.0	6.1%	33.0	33.0	0.0	0.0%	30.0	30.0	0.0	0.0%
Final Score	97.9	97.9	0.0	0.0%	91.7	97.2	5.6	6.1%	91.7	91.7	0.0	0.0%	83.3	83.3	0.0	0.0%
Physical Structure																
Structural Patch Richness	4.5	4.5	0.0	0.0%	6.0	6.0	0.0	0.0%	3.0	3.0	0.0	0.0%	12.0	12.0	0.0	0.0%
Topographic Complexity	4.5	4.5	0.0	0.0%	6.0	18.0	12.0	200.0%	6.0	6.0	0.0	0.0%	9.0	9.0	0.0	0.0%
Raw Score	9.0	9.0	0.0	0.0%	12.0	24.0	12.0	100.0%	9.0	9.0	0.0	0.0%	21.0	21.0	0.0	0.0%
Final Score	37.5	37.5	0.0	0.0%	50.0	100.0	50.0	100.0%	37.5	37.5	0.0	0.0%	87.5	87.5	0.0	0.0%
Biotic Structure																
PC: No. of plant layers	6.8	8.3	1.5	22.2%	11.0	11.0	0.0	0.0%	9.0	9.0	0.0	0.0%	12.0	12.0	0.0	0.0%
PC: No. of condominants	3.0	4.5	1.5	50.0%	7.0	7.0	0.0	0.0%	6.0	6.0	0.0	0.0%	12.0	12.0	0.0	0.0%
PC: Percent Invasion	7.5	10.5	3.0	40.0%	9.0	10.0	1.0	11.1%	3.0	9.0	6.0	200.0%	9.0	12.0	3.0	33.3%
Horizontal Interspersion/Zonation	6.0	7.5	1.5	25.0%	8.0	8.0	0.0	0.0%	6.0	6.0	0.0	0.0%	12.0	12.0	0.0	0.0%
Vertical Biotic Structure	9.0	9.0	0.0	0.0%	9.0	9.0	0.0	0.0%	6.0	6.0	0.0	0.0%	12.0	12.0	0.0	0.0%
Raw Score	20.8	24.3	3.5	16.9%	26.0	26.3	0.3	1.3%	18.0	20.0	2.0	11.1%	35.0	36.0	1.0	2.9%
Final Score	57.6	67.4	9.7	16.9%	72.2	73.1	0.9	1.3%	50.0	55.6	5.6	11.1%	97.2	100.0	2.8	2.9%

4.1.2 Lightner Property

The mitigation plan for L-W-2 (Figure 7) includes revegetating the surrounding habitat with riparian plants. A portion of these plants will be planted within the AA, increasing the number of co-dominant species. In time, this would also increase the number of plant layers by adding a Tall layer and eventually a Very Tall layer; however, the plantings will likely only grow to Medium or Tall in the first five years, and the CRAM score is anticipated to increase one letter grade for this attribute. In addition, vegetation management and planting of native species would reduce the percent invasion within this AA, as well as improve the Horizontal Interspersion and Zonation. The overall CRAM score for this wetland is projected to increase by four percentage points from 65% to 69% within the first five years.

The earthen dams upstream of L-S-10 (Figure 7) will be removed to restore natural hydrology, and the disturbed area around the dam will be revegetated and restored. This would improve the Buffer Condition score by removing a large portion of non-native species and by reducing the soil disturbance. Although non-native, invasive species will be removed from the dam area, the Percent Invasion score is unlikely to change as it is already high (i.e. Percent Invasion is low). The Water Source score for this stream is anticipated to increase greatly as natural hydrology is restored. The overall CRAM score for this stream is projected to increase by six percentage points from 81% to 87% within five years.

Mitigation plans for L-S-1 (Figure 7) include removal of the earthen access road and revegetation of native plant species at the downstream edge of the AA for this stream. These activities would restore natural hydrology downstream, reduce the soil disturbance, and increase the native plant cover. The metric that is anticipated to improve from these mitigation actions is the Buffer Condition; the Percent Invasion score is already relatively high and is not anticipated to change. The overall CRAM score for this stream is projected to increase by one percentage point from 79% to 80% over the first five years.

4.1.3 Long Potrero Property

Habitat surrounding stream LP-S-12 (Figure 8) would be enhanced by the implementation of mitigation measures, which include removal of non-native, invasive plants and enhancement of the riparian habitat. The AA for this stream did not include any riparian habitat, so the primary improvements to this AA would be in the Buffer Conditions metric and the Percent Invasion metric. Soil disturbance will continue after mitigation measures are implemented as the access roads will continue to be in use by nearby residents. Therefore, removal of non-native plants may not be sufficient to improve the Buffer Condition score; however, it is anticipated to improve the Percent Invasion score. The overall CRAM score for this stream is projected to increase by 0.7 percentage points from 70.5% to 71.2% within the first five years.

Similar to LP-S-12, habitat within and surrounding wetland LP-W-4 will be enhanced and non-native plants will be removed. Implementation of these mitigation measures is anticipated to improve the scores for Percent Invasion and Buffer Condition, although limited soil disturbance may remain in the buffer area after mitigation measures are implemented. The overall CRAM score for this wetland is projected to increase by three percentage points from 59% to 62% over the first five years.

4.1.4 Chocolate Canyon Property

Mitigation measures to enhance the Chocolate Canyon Property include removal of non-native, invasive plants from the 117-S-1 (Figure 9) stream channel and along the western property edge. With the implementation of this measure, the CRAM score for stream 117-S-1 is anticipated to improve in the Percent Invasion metric. The scores for this stream under existing conditions were high, and the lower scores should not change with the implementation of proposed mitigation activities. The overall CRAM score for this stream is projected to increase by once percentage point from 81% to 82% over the first five years.

4.1.5 Summary of Projected Future Conditions for Mitigation Sites

As described in Section 3.3, the seven CRAM assessments of mitigation sites are representative of all proposed mitigation activities for the SRPL project. A comparison of average existing and projected CRAM scores is presented in Table 14.

During the five-year period considered for the projected CRAM assessment (Section 4.1), scores for the Buffer and Landscape Connectivity attribute are expected to improve for depressional wetlands, intermittent streams, and the desert dry wash due to restoration of the buffer land to a more natural condition. Scores for the Hydrology and Physical Structure attributes are not expected to change for any of the wetland categories except intermittent streams, in which the Hydrology attribute is expected to improve substantially. All wetland categories are expected to improve on the Biotic Structure Attribute, where improvements range from 0.8 percentage points in the case of intermittent streams to 16.6 percentage points in the case of depressional wetlands.

4.2 Conclusions of CRAM Functional Assessment for Mitigation

An approximation of overall project impacts and mitigation can be gained by comparing existing and projected future CRAM scores at impacted sites and at proposed mitigation sites. As outlined in Section 2.6.5, the condition of sampled riverine wetlands along the SRPL ROW is expected to decrease by an average of 3% points, overall, due to project implementation. The CRAM score for the one perennial stream within the ROW is not expected to decrease. The majority of individual projected impacts would result from aggradation/degradation of stream channels and degradation of wetland buffer areas, while the largest individual impact would occur at one intermittent stream where the Suncrest Substation is proposed.

While impacts to Buffer Condition and Channel Stability were common among desert dry washes and mountain ephemeral impact locations, these combined stream categories saw a less than 2% decline in overall CRAM scores. The largest decline in CRAM score came from one intermittent stream on the Lightner property where the Suncrest Substation is proposed, causing a loss of both stream channel and adjacent riparian habitat. This drop in overall CRAM score of 38.7 percentage points for this AA (11.6% points for all intermittent streams combined) is the most substantial single impact of the SRPL project as reflected in CRAM scores.

The average increase for projected scores at the five mitigation stream sites was 2.6% points. This included average increases of 2.8 percentage points for intermittent streams, 0.7 percentage points for the one perennial stream, and 2.4 percentage points for the one desert dry wash (Table 14). These increases in score happened in the areas of Buffer Condition, Water Source (Hydrology), Number of Plant Layers, Number of Co-dominant Species,

Horizontal Interspersion and Zonation, and Percent Invasion (Biotic Structure). In addition, mitigation proposed for depressional wetlands is projected to increase CRAM scores by 3.3% points through improvements in Buffer Condition as well as Biotic Structure.

Impacts to Buffer Condition occurred at five desert dry wash sites and five mountain ephemeral stream sites, causing an average drop of 3% points for the Buffer and Landscape Connectivity attribute of each. Using the example of proposed restoration activities at a desert dry wash on the Suckle Property, the projected CRAM score improved for the Buffer Condition submetric, resulting in an increase of 6.7% points. The score for Percent Invasion at this site also improved, as the presence of non-native, invasive plant species is another component of Buffer Condition. In addition, soil disturbance caused by the presence of nearby access roads contributed to lower projected scores for Buffer Condition at some AAs. Removal of access roads on the Lightner Property may provide mitigation for these impacts. It was also noted during assessments of existing conditions that OHV use in desert dry washes was often associated with low scores for buffer condition. Following land acquisition of the Suckle and Desert Cahuilla properties for mitigation, these areas would be made off-limits to OHV use which currently occurs at both sites. Thus, improvements in the area of Buffer Condition are anticipated following mitigation implementation, and preservation of desert sites has the potential to improve all streams within these properties whether they are actively restored or not.

The Channel Stability metric declined under projected conditions for impact sites at desert dry washes, mountain ephemeral streams, and intermittent streams. CRAM scores at the four assessed stream mitigation sites did not improve for this metric under projected future conditions. While two sites already had the highest score possible (A), the remaining two sites at the Long Potrero property were in close proximity to roads and other human activity that may prevent improvements to existing conditions in this area. While projected CRAM scores do not show improvements for this metric at the mitigation sites, preservation and restoration activities should promote conditions that will promote less aggradation and degradation over time. In many cases, these effects may be so subtle and not detectable by CRAM within the 5 years of monitoring. Cessation of OHV traffic on the Suckle and Desert Cahuilla Properties is likely to also improve the Channel Stability metric within all streams on these properties. Planting of native vegetation and removal of existing access roads at the Lightner Property should also improve the amount of aggradation/degradation of nearby streams over time.

Although projected CRAM scores for assessed intermittent streams increased by 2.8% points, numerous additional restoration actions are proposed to mitigate this impact, many of which were not assessed using CRAM. These actions are discussed in Section 5.

In conclusion, CRAM provides a basis for comparing impacts along the SRPL ROW to proposed mitigation actions. Using a number of different approaches, proposed mitigation actions for the SRPL project should address the areas of functionality that are impaired by the SRPL project.

5.0 MITIGATION IMPLEMENTATION

This section of the HMMP is divided into two parts. The first part provides a description of mitigation implemented for each mitigation site, with maps and tables showing acreages and locations of mitigation within each property. The second section describes implementation methods for general mitigation activities that may be performed at one or more of the mitigation sites. These activities are generic in nature and will be referenced in appropriate sections for each respective mitigation site where appropriate.

5.1 Activities Planned at Each Mitigation Site

Preservation, restoration, and enhancement activities planned for each mitigation site are described in the following sections. Details regarding site preparation and Best Management Practices (BMPs) used throughout all of the mitigation sites are described in Section 5.2. Mitigation for the loss of functional services and values within project impact areas will occur on these sites (see Section 2.6).

5.1.1 Mitigation Activities at the Desert Cahuilla Property

As described above in Section 3.1, the Desert Cahuilla property (Figure 10) was selected based on the presence of extensive areas of desert dry washes and is included as mitigation for project impacts to desert dry washes. Preservation of desert dry wash and surrounding upland habitat is the only activity to be implemented at the Desert Cahuilla Property. Mitigation acreage within the Desert Cahuilla property is listed in Table 15 below.

Table 15. Summary of Mitigation at the Desert Cahuilla Property

Mitigation Action	Area (acres)	Length (linear feet)
Desert Dry Wash Preservation	84.13	24,400

The transfer of title to the California State Parks and designation as mitigation will offer substantial protection to this area. It is part of a much larger land transaction that will benefit PBS and other sensitive plant and wildlife species. It will be regularly patrolled and will be managed for natural resource values as opposed to unmanaged lands subject to ORV use. Additional benefits will include placement under State Park guidelines for invasive weed management.

Sequence and Timing

Mitigation will be implemented concurrent with project impacts to desert dry washes.

APN: 00701001
675.3 acres

Legend

Parcel Boundary

Dry Washes (84.13 acres, ~24,400 ln. ft.)

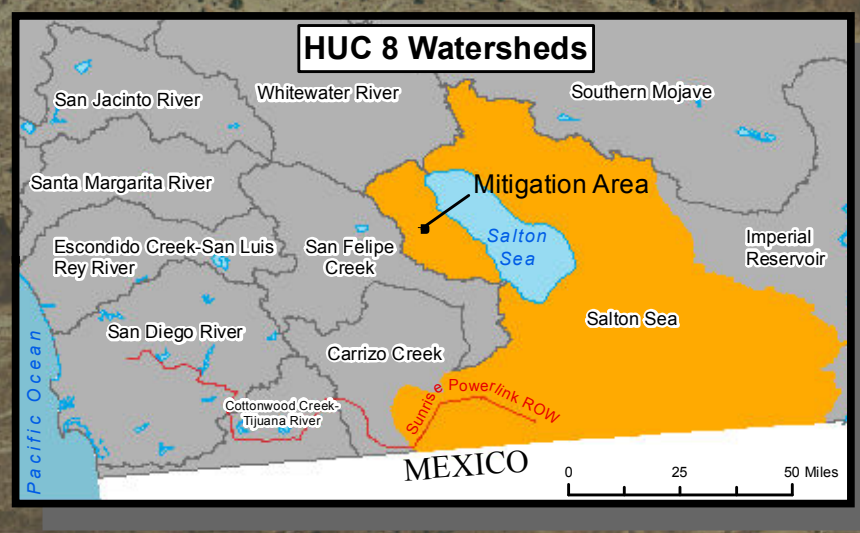


Figure 10. Mitigation Activities at the Desert Cahuilla Property

N
W E
S

Sunrise Powerlink
Imperial County, California

0 300 600 1,200 Feet

wra
ENVIRONMENTAL CONSULTANTS

Map Date: July 2010
Map By: Derek Chan
Base Source: NAIP, 2005; Imperial County, NHD, NWI
Filepath: L:\Acad 2000 Files\17000\17128-3\GIS\ArcMap\Mitigation\DesertCahuilla_Existing_20100707.mxd

5.1.2 Mitigation Activities at the Suckle Property

The Suckle property was selected for mitigation based on the presence of dry washes, as well as desert fan palm oasis vegetation. The Suckle property is included as mitigation for project impacts to desert dry washes, and also offers the opportunity for preservation and enhancement of desert fan palm oasis wetland vegetation through the removal of the non-native, invasive salt cedar. Total area of cover of non-native, invasive plant species to be removed was assessed at this property by aerial imagery and site visits by WRA staff. Mitigation to be implemented at the Suckle property includes:

- Preservation of desert dry washes and surrounding upland habitat
- Preservation of desert fan palm oasis woodland vegetation
- Enhancement of desert dry washes and desert fan palm oasis vegetation through non-native, invasive plant species removal.

Mitigation acreage within the Suckle property is listed in Table 16 below. Mitigation activities planned for the Suckle property are shown in Figure 6, and described further in the text below.

Table 16. Summary of Mitigation at the Suckle Property

Mitigation Action	Area (acres)	Length (linear feet)
Desert Dry Washes		
Desert Dry Wash Preservation	3.43	7,000
Desert Dry Wash Enhancement and Preservation	4.04	4,200
Total Desert Dry Washes	**7.47**	**11,200**
Wetlands		
Desert Fan Palm Oasis Enhancement and Preservation	0.88	-
Total Wetlands	**0.88**	**-**

Non-native Plant Removal

Non-native, invasive plant species to be removed include those species listed on the California Invasive Plant Council (Cal-IPC; http://www.cal-ipc.org/ip/inventory/weedlist.php) as having a severe or moderate (A or B) invasive impact, including salt cedar, giant reed, and non-grass annual plant species including tocalote and Saharan mustard. These non-native, invasive plant species will be removed from desert dry washes, desert fan palm oasis wetland vegetation, and surrounding areas within the Suckle property. Non-native, invasive grass species were not observed to be present on-site outside of sparse (less than 1 %) cover similar to surrounding reference locations. In general, outside of desert dry wash bed and banks (confined system), non-native, invasive plant species did not occur. Therefore, efforts to remove and control non-native, invasive plant species will focus on salt cedar and giant reed that is currently present within the bed and banks of the channel (see Table 17).

Table 17. Priority Non-native, Invasive Plants to be Removed at the Suckle Property

Botanical Name	Common Name	Method of Control
Arundo donax	arundogiant reed	Arundo Giant Reed Control Method (Section 5.2)
Brassica tournefortii	Saharan mustard	Hand and Mechanical Removal (Section 5.2)
Tamarix ramosissima spp.*ramosissima*	tamarisk, salt cedar	Tamarisk Salt Cedar Control Method (Section 5.2)

Small populations of Saharan mustard will also be eradicated. These species will be removed by hand or treated by spot spraying with an herbicide that has been approved by the regulatory agencies. Plant material that is removed will be bagged and treated in a manner that prevents the spread of seed within and off the site.

Sequence and Timing

Mitigation will be implemented concurrent with project impacts to desert dry washes. Sequence and timing that is related to specific planting methods and weed removal methods are described in Sections 5.2.

5.1.3 Mitigation Activities at the Lightner Property

As described above in Section 3.3, the Lightner property was selected for mitigation based on a number of opportunities for restoration of natural stream hydrology and geomorphology in areas previously altered by human activities such as grazing, road construction, and pond creation. The Lightner property offers opportunity to mitigate for project impacts to ephemeral and intermittent streams, wetlands, and riparian vegetation. Mitigation implementation proposed at the Lightner Property includes:

- Preservation of streams, wetlands, and riparian habitat
- Stream and riparian restoration through removal of abandoned roads and road stream crossings (Appendix A)
- Stream enhancement and restoration through removal and alteration of dams
- Stream enhancement through removal of non-native, invasive plant species
- Enhancement of wetland and riparian vegetation diversity and structure through planting of native vegetation

Mitigation acreage within the Lightner property is listed in Table 18 below. Mitigation activities planned for the Lightner property are shown in Figure 7, and described further in the text below.

Table 18. Summary of Mitigation at the Lightner Property

Mitigation Action	Area (acres)	Length (linear feet)
Streams		
Stream Preservation	0.54	16,310
Stream Enhancement and Preservation	0.10	3,558
Stream Restoration and Preservation	0.04	1,117
Total Streams	**0.68**	**20,985**
Wetlands		
Wetland Preservation	0.20	-
Wetland Enhancement and Preservation	0.63	-
Total Wetlands	**0.83**	**-**
Riparian		
Riparian Preservation	15.83	-
Riparian Enhancement and Preservation	0.63	-
Riparian Restoration and Preservation	3.43	-
Total Riparian	**19.89**	**-**

Stream Channel and Riparian Restoration

Stream restoration activities at the Lightner property include the restoration of natural stream hydrology by decommissioning some dirt roads, restoration of stream channel areas currently impacted by the presence of earthen dams and culverts, and replanting restored intermittent streams with riparian vegetation and ephemeral streams with adjacent chaparral vegetation. Methods for revegetation are described below in Section 5.2.

Road Crossing Removal and Stream Restoration in Northeast

The restoration of streams that have been crossed by roads will result in 0.081 acres of stream restoration (see below). Near the northeastern corner of the property (APNs: 5230312 and 52303009), a narrow, unpaved road runs along an intermittent stream and crosses it once, in addition to crossing two ephemeral tributaries. These three locations can be viewed in greater detail in Figures C-1 and C-2 of Appendix C. Despite the 18-inch diameter culvert installed along the intermittent stream beneath the road (currently blocked), the crossing constructed of earthen materials (silts, sands, and some boulders) effectively impounds water upstream, forming a seasonal pond during wet years. The stored water remains because the bottom elevation of the pond is lower than the base of the culvert opening. The ponded water was recently measured to be about 2 feet in maximum depth and about 500 square feet in water surface area.

As viewed in field photos taken at this road crossing (Figures C-3 and C-4), the channel morphology immediately upstream and downstream of the crossing can be characterized as a small (5-8 feet wide x 0.5-1 foot deep), steep (~6% gradient) channel, densely covered with herbaceous and wetland vegetation, with some riparian vegetation farther upstream and downstream from the road crossing. The valley bottom in this reach is somewhat confined, while the pond area is relatively wider, with upland surfaces sloping down to the active channel in a concave profile (10-35% gradient). The channel and valley bottom geometry is clearly

expressed in three cross-sections that were surveyed upstream of the pond, across the pond, and downstream of the road crossing (Figure C-6). The pond area and road crossing are also represented in a longitudinal profile of this reach (Figure C-7), where one can see the channel drops down into the pond, which further suggests that the pond was excavated, possibly to provide road construction materials, water supply for livestock, or both.

Based on a review of historical aerial photographs of the property, the road crossing at the intermittent stream was determined to be relatively new, having been constructed sometime between the summers of 2002 and 2003 (Google Earth, accessed 28 June 2010). Prior to 2002, the road followed a different course through the valley and, instead, continued in the upstream direction toward the broad meadow without crossing the stream. A historic aerial photograph taken in 1953 shows the road's original alignment along the southern side of the stream channel (Figure C-2).

As part of the mitigation plan for this property, the three road crossings described above will be removed to restore the natural stream hydrology and morphology. This mitigation activity will result in approximately 0.0046 acres of stream restoration area. At the intermittent stream road crossing, this relatively larger stream impediment will be wholly removed, and recontouring of the stream reach upstream in the pond area will occur to restore a more constant channel and valley bottom geometry (in cross-section view) and gradient (in longitudinal profile view). This mitigation activity will result in approximately 0.0035 acres of stream restoration area. The dip-section crossings at the two ephemeral stream channels will also be removed, although this can be achieved by digging a small pilot channel through the road at the crossing. At all sites, road cuts that may be present adjacent to the crossings will be filled to restore the natural upland topography and to avoid road drainage impacts to the restored stream course. Plantings along disturbed and/or re-contoured surface will occur to stabilize slopes and minimize excessive fine sediment runoff. Overall, it is important that these streams and adjacent upland areas be restored in this recommended fashion to: (1) re-establish hydrologic connectivity through the respective stream reaches; and (2) avoid channel instabilities that could lead to differential erosion and/or sedimentation, which would likely undermine the success of the stream restoration actions.

Road Crossing Removal and Restoration of the Stream Channel above the Southwest Grassland

The road crossing removal and restoration of the stream channel above the southwest grassland will result in approximately 0.0107 acres of restoration. At the western end of Bell Bluff Truck Trail, a narrow, unpaved road branches and trends south and down-gradient toward the southwestern grassland at the southwestern corner of the property (APNs: 52302006 and 52302007). An ephemeral stream channel that drains to the grassland area is crossed in two locations by this road (Figure C-9). Additionally, a rather poorly-defined ephemeral tributary stream also crosses the road halfway between the other two crossings. These crossings are dip-sections which ideally allow waters to flow over the road and continue downstream in the stream channel. However, due to a long history of multiple road re-alignments in the immediate area (see below), the natural drainage pattern has been altered. Specifically, the existing road intercepts runoff from the western half of this stream basin and routes the flow into a ditch that never reconnects with the natural stream channel; both flow toward the upper end of the southwestern grassland.

A review of historic aerial photographs of this area of the property reveals that the roads have been moved several times. As can be viewed in an aerial photograph taken in 1953 (Figure C-10), an abandoned road that presently joins the existing road from the northwest (orange-

colored line in Figures C-9 and C-10) was once the primary access road through this area, but was abandoned sometime between 1996 and 2002 (Google Earth, accessed June 2010). The existing, active road course was built sometime during this time period, which created the upper-most crossing of the ephemeral stream channel in this area. Heading down-gradient, the road previously bifurcated into two roadways that straddled the lower reach of the stream channel (Figure C-10). The west, or river right, branch of this abandoned road remains today as an incised ditch that routes water intercepted by the active roadway away from the natural stream channel (Figures C-11, 12, and 13). The lower-most crossing of the natural stream channel by the active roadway is positioned close to and towards the east of this incised ditch (Figures C-9, C-14). The channel and the ditch both fan out at the upper end of the grassland and on either side of an historic dwelling structure that pre-dates the 1953 aerial photographs.

To reconnect the western half of the natural drainage area to the ephemeral stream channel, the existing road will be removed nearly in its entirety. Specifically, the two road crossings shown in Figures 11 and 16 (of Appendix C) will be removed and a channel will be carved through the crossing to reconnect the upstream and downstream channel reaches. Additionally, the surfaces adjacent to the crossings will be recontoured to restore a more natural topography, which will ultimately ensure that the drainage basin is effectively connected with the active stream channel. The upper-most removal will specifically reconnect the headwaters (swale) to the active stream channel (add about 10 ft [road width] in stream length). The lower-most crossing removal will similarly add about 10 ft in restored stream length.

In addition to the road crossing removal, the drainage pattern will be restored by removing the road (through excavation and/or filling where appropriate), filling in the downstream road ditch that presently routes water to the west, and by re-connecting the small tributary channel (or swale) to the stream channel. This action will also preserve the abandoned road/ditch segment that joins the active roadway from the northwest since it appears that this feature can effectively function as a tributary to the natural stream channel (Figures C-9, 11, 15). The point of re-connection of the small tributary, the abandoned road/ditch segment, and the natural stream channel is shown in Figures C-9 and C-12. The creation of this confluence will restore the natural drainage area to the ephemeral stream channel. These mitigation activities will result in approximately 0.0107 acres of stream restoration area.

A series of longitudinal profiles and cross-sections recently surveyed in the valley bottom effectively represent the key existing topographic features that are discussed above, including the natural stream channel, the existing and abandoned roadways, and road-related ditches (Figure C-16). In all cross-sections, it can be clearly seen that the natural stream channel lies at a lower elevation than the adjacent ditches and, therefore, this result supports our contention that removal of the roads and filling of the road-related ditches will ensure that the western half of the basin will freely drain to the natural channel, effectively increasing its total drainage area and, more importantly, the amount of water conveyed by the stream. The final restoration action will be to extend the stream channel an additional 25 to 40 feet from its existing mouth (or fan) to avoid discharging flow directly at a large, old Engelmann oak tree and the historic dwelling structures.

Road Crossing Removal and Restoration of the Stream Channel West of the Stock Pond

The road crossing removal and restoration of the stream channel west of the stock pond will result in approximately 0.0037 acres of stream restoration area. The existing, unpaved road discussed above continues down-gradient and towards the east where it crosses two ephemeral stream channels (Figure C-17). Both of these streams drain the same steep-sided hillside before discharging in the large reservoir. The channels are poorly defined and densely covered

by chaparral, thereby making field assessments difficult. The southwestern stream channel extends above the road crossing while the northeastern stream ends at its respective crossing (Figures C-18 and 19).

The roadway was cut into the steep hillside and a small berm (<2 ft high) lies along the outboard side. Rilling is pervasive on this road surface indicating that runoff concentrates and erodes the surface before eventually reaching a water break or cut in the road berm and flowing down-gradient to the large reservoir. Based on a review of available historic aerial photographs, it appears that the road was constructed between the summers of 2002 and 2003 (Google Earth, accessed June 2010).

The road will be removed in its entirety from the ridge line west of the two stream channels and to the northeast where it forms a small stock pond. The best approach to remove the road and ensure successful reconnection and/or enhancement of the two stream channels will be to effectively restore the natural topography. This will entail filling in the road cut sections and excavating the areas of the road that have been built above the adjacent, natural topography. Additionally, cuts will be made across the roadway to re-connect the downstream and upstream sections of the southwestern stream channel. In the restored hillside above the northeastern stream channel, the channel will be extended slightly up-gradient by cutting an equally sized channel into the re-contoured surface. In total, this action will add approximately 25 feet of stream length and will restore and/or enhance the natural hydrology (i.e., drainage area). This action will also prevent further fine sediment erosion into the existing road surface, which likely has been accumulating down-gradient in the large reservoir. In total, this mitigation activity will result in approximately 0.0037 acres of stream restoration area.

Road Crossing Removal and Stream Restoration East of the Substation

The road crossing removal and stream restoration activities east of the substation will result in approximately 0.0128 acres of stream restoration area. Beneath the substation footprint lays an existing road loop that originates from Bell Bluff Truck Trail to the north (Figure C-20). A portion of this road will remain beyond the east-side of the substation footprint. This road segment also crosses the headwaters of an ephemeral stream channel that drains to the southeast. The recently constructed roadway (between 2002 and 2003 [Google Earth, accessed June 2010]) is built up about 4 to 8 feet from the base of the headwater swale on the up-gradient and down-gradient sides of the crossing, respectively. A weakly defined channel is present immediately down-gradient from the crossing that is about 2 feet wide and less than 0.5 feet deep. The channel frequently becomes difficult to discern from the adjacent valley bottom due to sedimentation, leaf litter coverage, or both; however, this channel form continues down to the stream's confluence with another ephemeral stream channel approximately 500 feet downstream from the road crossing. On either side of the headwaters swale, the road is cut into the ground surface, which appears to route intercepted runoff via outboard ditches on the down-gradient and up-gradient sides of the crossing (C-21 and C-22).

The crossing will be completely removed within the drainage boundaries of the ephemeral stream. At the actual crossing where the road is built up, the fill material will be excavated down to the natural ground surface elevation. The road cut areas situated farther back from the crossing will be filled, along with any road-related ditches to restore natural runoff patterns that lead towards the stream channel rather than down the adjacent upland areas as is presently occurring. This restoration action will directly increase the stream length by about 12 feet (road width) and will enhance the hydrologic connectivity between the stream and its headwaters. This mitigation activity will result in approximately 0.0128 acres of stream restoration area.

Removal and Alteration of Dams and Associated Stream Channel Restoration

A stock pond and dam located to the west of the substation footprint receives runoff from a contributing drainage area of approximately 0.21 square miles (Figure C-23 and 24). Two intermittent streams drain into the reservoir, referred to herein as the northwestern and northeastern stream channels (Figure C-25). The northwestern stream channel is crossed by a narrow, unpaved roadway that was constructed between the summers of 2002 and 2003 (Google Earth, accessed June 2010) (Figures C-23 and C-26). The headwaters of the northeastern stream channel will be modified as they lie beneath the future substation footprint (see Appendix D). Both streams also have three berms that each impound a variably-sized stock pond, likely used when the property supported active cattle ranching.

Based on a review of historical aerial photographs of the property, it appears that the large reservoir and dam were present onsite prior to 1953—the oldest aerial photograph date available for review in this assessment (Figure C-24). It is not clear in this photograph whether the stock ponds were present, although it is obvious that the upstream-most berm and pond on the northwestern stream channel (NW Berm A and Pond A) were not present since these features were constructed in 2002 or 2003 when the road was built (Figure C-26). Presently, a few of the ponds, of which there are three on each stream (not including the large reservoir), store standing water in wet years. The "wet" ponds observed in recent June 2010 surveys of the site were NW Pond C (the downstream-most pond on the northwestern stream channel) and NE Pond A (the upstream-most pond on the northeastern stream channel). The large reservoir had several feet in depth of stored water at the time of the survey. The berms, ponds, stock pond, and dam are shown in greater detail in longitudinal profiles of the two streams and farther downstream beyond the dam (Figure C-27).

The two stream channels upstream of their ponds and berms share similar characteristics, namely they have comparable drainage areas, stream gradients (~6%), valley morphologies, and channel geometries: bankfull width and depth of about 2 and 0.5 feet, respectively (Figures C-28a and b). The bed and bank substrates are composed mostly of silty sand, with rare occurrences of gravels, cobbles, and even boulders and bedrock. Dense chaparral vegetation covers much of both streams, while the northeastern stream channel supports a relatively more established riparian corridor as it is somewhat shielded to the north of a rocky butte (i.e., cooler temperatures with less-direct solar radiation).

Because the large reservoir supports habitat for migratory birds in the spring, this feature will remain and the stream channel will not be restored to a completely natural condition here. However, lowering of the dam to an elevation just above the determined Ordinary High Water Mark (OHWM) elevation of about 2,860 feet above mean sea level NGVD is recommended. This restoration action will retain waters in the reservoir during spring while improving hydrologic connectivity between the upstream reaches and downstream of the existing dam. Additionally, the road crossing at NW Berm A will be removed completely and the previously excavated upland slopes adjacent to the historic stream channel will be filled to restore channel and valley cross-section geometries and longitudinal gradients that are consistent with those above NW Pond A. This channel geometry will need to broaden as it approaches the large reservoir.

The other berms and ponds that will be removed are NW Pond and Berm B, NE Pond and Berm B, and NE Pond and Berm C as these are more frequently dry and do not afford any suitable wetland habitat. The channel and valley bottom cross-section geometries and longitudinal gradients will be restored to a more natural configuration as much as possible to avoid inducing

erosion and/or sedimentation processes that could negatively impact the stream's post-restoration morphologic, hydrologic, and ecologic conditions. The NW Pond and Berm C and NE Pond and Berm A would remain intact as they do afford suitable wetland habitat.

In total, the removal and alteration of dams will result in approximately 0.0205 acres of stream restoration area.

Non-native Plant Removal

Non-native, invasive plant species will be removed from the stream channels, wetlands, and ponds at the Lightner Property. Efforts to remove and control non-native, invasive plant species will focus on the species listed in Table 19, as well as other species designated as having a severe or moderate (A or B) invasive impact by Cal-IPC. In general, at this site, the areas adjacent to the stream channels are not adversely impacted by non-native invasive weeds. Weeds at the site do occur at specific locations, which are generally associated with human disturbance such as the construction of the largest dam for the existing stock pond. The downstream side of the existing dam is covered with tocalote, which will be removed. As a result, weed removal activities at the Lightner Property will focus on the removal of weeds from within the banks of stream channels, wetlands, and ponds. In general, weed removal at the Lightner Property will not include the adjacent upland areas to stream channels because it is not needed. These species will be removed using appropriate techniques for individual species based on best available management techniques. Plant material that is removed will be bagged and removed in a manner that prevents the spread of seed within the site. This mitigation activity will result in a combined total of approximately 0.63 acres of stream, wetland and riparian enhancement areas.

Table 19. Priority Non-native and Invasive Plants to be Removed for Wetland Enhancement at the Lightner Property

Botanical Name	Common Name	Method of Control
Centaurea melitensis	Tocalote	Hand/Mechanical Removal, Herbicide
Hirschfeldia incana	Shortpod mustard	Hand/Mechanical Removal, Herbicide

Revegetation

Enhancement and restoration mitigation activities will include planting native plants to enhance or create native plant communities. Revegetation activities will utilize four plant palettes for the revegetation of the mitigation activity areas: Mixed Chaparral, Mixed Oak/Riparian, Live Oak Woodland, and Seasonal Wetland and Riparian Buffer (for location and areas of planting by palette see Figure 7). Each of these planting palettes will be described in the following subsections. Planting palettes are based on typologies observed at reference sites and within the SRPL Revegetation Plan (Chambers Group, Inc. 2010). Biologists observed reference sites during field visits for the existing conditions report, CRAM analysis and delineation of waters. Additional field visits were conducted by WRA staff to confirm the plant species composition, density, and structure at reference sites in July and September 2010. Mitigation activity will result in a combined total of approximately 3.65 acres of stream, wetland and riparian restoration areas.

Mixed Chaparral Plant Palette

The primary method of establishing these plants will be topsoil with seed bank and direct seeding. The project will initially attempt to revegetate chaparral scrub areas using topsoil with seed bank and/or direct seeding but might, as part of an adaptive management program, use containerized plants if the primary methods do not result in survival rates that meet performance requirements. The plant species and method of planting for the Mixed Chaparral plant palette are listed in Table 20. The project may not utilize all of the plants that are listed in the plant palette depending on availability of the seed from the property.

Table 20. Plant Species and Planting Method[1] for Mixed Chaparral Plant Palette

Botanical Name	Common Name	Method of Planting[1]
Arctostaphylos glauca	big berry manzanita	Direct Seed, Containerized Plants[2]
Adenostoma fasciculatum	chamise	Direct Seed, Containerized Plants[2]
Artemisia californica	coastal sage brush	Direct Seed, Containerized Plants[2]
Ceanothus greggii	desert ceanothus	Direct Seed, Containerized Plants[2]
Ceanothus leucodermis	chaparral whitethorn	Direct Seed, Containerized Plants[2]
Eriogonum fasciculatum	California buckwheat	Direct Seed, Containerized Plants[2]
Lotus scoparius	Deerweed	Direct Seed
Malosma laurina	laurel sumac	Direct Seed, Containerized Plants[2]
Nassella cernua	nodding needlegrass	Direct Seed
Quercus berberdifolia	scrub oak	Containerized Plant
Salvia apiana	white sage	Direct Seed

Notes
1. Topsoil will be salvaged from areas with Chaparral scrub within the footprint of the proposed substation. Topsoil with seed bank will be used in all areas where access facilitates placement of topsoil. Topsoil with seed bank may not be used in areas that are subject to erosion within restored stream channels.
2. Containerized plants may be used if seed sources are unavailable.

Riparian Buffer for Seasonal Wetlands Plant Palette

There is one substantial seasonal wetland in the northeastern the Lightner Property (see Figure 7) that will be enhanced by planting riparian species along the perimeter of the wetland. Planting will occur within two distinct zones: intermediate zone (area on the upland edge of the wetland within 3 to 10 feet of the wetland where plants are dependent on the proximity to wetland hydrology), and dry zone (upland area surrounding the wetland, within 40 to 80 feet of the intermediate zone). The intermediate and dry zone plantings will restore a riparian buffer around the wetland. The plant species and method of planting for the revegetation of the seasonal wetland and adjacent riparian buffer are listed in Table 21.

Table 21. Plant Species and Method of Planting for the Riparian Buffer for Seasonal Wetlands Plant Palette

Botanical Name	Common Name	Method of Planting
Ceanothus greggii	desert ceanothus	Direct Seed, Containerized Plants[1]
Ceanothus leucodermis	chaparral whitethorn	Direct Seed, Containerized Plants[1]
Calandrinia ciliata	red maids	Direct Seed
Juncus bufonius	toad rush	Direct Seed, Containerized Plants[1]

Table 21. Plant Species and Method of Planting for the Riparian Buffer for Seasonal Wetlands Plant Palette

Nemophila menziesii	baby blue eyes	Direct Seed
Baccharis salicifolia	mulefat	Pole cutting, Containerized Plants[1]
Quercus agrifolia	coast live oak	Containerized Plants
Elymus glaucus	blue wildrye	Direct Seed
Malosma laurina	laurel sumac	Direct Seed
Muhlenbergia rigens	deergrass	Direct Seed, Containerized Plants[1]
Quercus engelmannii	Engelmann oak	Containerized Plants

Notes:
1. Containerized plants may be used if seed sources are unavailable.

Mixed Oak/Riparian Plant Palette

Planting of the Mixed Oak/Riparian plant palette will occur between OHWM and top of bank (TOB), and above the TOB. A consulting biologist, hydrologist, or otherwise qualified consultant will determine these indicators to establish planting areas in the field. The plant species and method of planting for the revegetation of seasonal wetlands and adjacent areas are listed in Table 22.

Table 22. Plant Species and Method of Planting for the Mixed Oak/Riparian Plant Palette

	Botanical Name	**Common Name**	**Method of Planting**
	Calandrinia ciliata	red maids	Direct Seed
	Claytonia perfoliata	miner's lettuce	Direct Seed
	Elymus glaucus	blue wildrye	Direct Seed, Containerized Plants[1]
	Arctostaphylos glauca	big berry manzanita	Direct Seed, Containerized Plants[1]
	Artemisia californica	California sagebrush	Direct Seed
	Ceanothus leucodermis	chaparral whitethorn	Direct Seed, Containerized Plants[1]
	Ceanothus greggii	desert ceanothus	Direct Seed, Containerized Plants[1]
	Eriogonum fasciculatum	California buckwheat	Direct Seed, Containerized Plants[1]
	Malosma laurina	laurel sumac	Direct Seed
	Muhlenbergia rigens	deergrass	Direct Seed, Containerized Plants[1]
	Quercus agrifolia	coast live oak	Containerized Plants
	Quercus engelmannii	Engelmann oak	Containerized Plants
	Rhus ovata	sugarbush	Direct Seed, Containerized Plants[1]
	Salvia apiana	white sage	Direct Seed

Notes:
1. Containerized plants are to be used if seeding does not result in an outcome that meets the performance requirements.

Live Oak Woodland Plant Palette

Planting of the Live Oak Woodland plant palette will occur between OHWM and TOB and above TOB. A consulting biologist, hydrologist, or otherwise qualified consultant will determine these indicators to establish planting locations in the field. The plant species and method of planting for the revegetation of streams and adjacent areas are listed in Table 23.

Table 23. Plant Species and Method of Planting for the Live Oak Woodland Plant Palette

	Botanical Name	Common Name	Method of Planting
	Elymus glaucus	blue wildrye	Direct Seed, Containerized Plants[1]
	Muhlenbergia rigens	deergrass	Direct Seed, Containerized Plants[1]
	Quercus agrifolia	coast live oak	Containerized Plants
	Quercus engelmannii	Engelmann oak	Containerized Plants
	Sambucus nigra	blue elderberry	Containerized Plants

Notes:
1. Containerized plants are to be used if seeding does not result in an outcome that meets the performance requirements.

Sequence and Timing

Mitigation activities at Lightner will be concurrent with the construction of the substation. In general grading will be performed between April 15 and October 15 to avoid working during the rainy season. The first seed application will be performed in conjunction with the application of erosion control measures. There will not be any temporal loss of functions and values based upon the current construction schedule. Detailed timing requirements are described in Section 5.2.2, which describes the planting methods that will be utilized. The timing and sequence of the mitigation activities will need to be coordinated with the construction substation activities with regard to access and safety.

5.1.4 Mitigation Activities at the Long Potrero Property

The following section describes the mitigation activities that will be performed at the Long Potrero Property (Figure 8). These activities are summarized in the list below. Mitigation activities at the Long Potrero Property are limited due to the presence of the federally endangered arroyo toad. No grading or significant earth disturbance will be permitted with the site to protect this species and its habitat. In addition, driving on all roads should be limited to 2 hours after sunrise to 2 hours before sunset to prevent impacts to arroyo toad.

- Preservation of streams, wetlands, and riparian habitat
- Enhancement of streams, wetlands and riparian habitat through removal of non-native, invasive plant species (limited to occur from October through December, outside of arroyo toad breeding season)

Mitigation acreage within the Long Potrero property is listed in Table 24 below. Mitigation activities planned for the Long Potrero property are shown in Figure 8, and described further in the text below.

Table 24. Summary of Mitigation Activities Long Potrero Property

Mitigation Action	Area (acres)	Length (linear feet)
Streams		
Stream Preservation	1.39	16,857
Stream Enhancement and Preservation	0.96	6,054
Total	**2.35**	**22,911**
Wetlands		
Wetland Preservation	9.92	N/A
Wetland Enhancement and Preservation	5.99	N/A
Total	**15.91**	**N/A**
Riparian		
Riparian Preservation	12.62	N/A
Riparian Enhancement and Preservation	3.95	N/A
Total	**16.57**	**N/A**

Invasive Plant Control

Non-native, invasive plant species will be removed from the site, as feasible, from within the stream channels, wetlands, and ponds. In addition, control of these species within 120 feet of the stream channels, wetlands, and ponds will occur to increase the functions and values of habitat for native wildlife and plant species, including special-status species.

In general, at this site, non-native, invasive, annual weed species are distributed throughout the upland areas that are adjacent to the streams, wetlands, and ponds. In these areas, annual weed species, particularly grass species, occur somewhat evenly distributed throughout the grasslands. Within the stream channels, non-native, annual weed species occur sporadically and are not currently having a significant adverse impact on the functions and resources of the streams. Within the wetland areas, annual weeds are more predominant within, surrounding, and outside of the wetlands. This is particularly true of areas within the wetlands that appear too deep for perennial seasonal wetland vegetation. The density of weed species within some of the wetland habitat degrades the functions and values of the wetlands to wildlife and to native plant species.

Weed removal of non-native, invasive, annual species will focus on removal of weeds from within the banks of the stream channels and within the wetland and pond areas. In addition, weeds will be controlled in the buffer areas adjacent to the stream channels and wetland areas to reduce the spread of annual weed into the aquatic resource. As part of the mitigation activities, annual weed species will be controlled within a 120' buffer adjacent to stream channels and around wetlands and ponds. This buffer size was determined based on a balance between establishing a width large enough to effectively reduce the spread of weeds into the

aquatic resources, while at the same time limiting the width based on practical limitations associated with managing weed species in remote areas surrounded by dense, non-native annual grass species' populations.

In addition, there are several other areas where non-native, invasive plant species will be removed. Specifically, several salt cedar plants will be removed which occur within the eastern-most man-made pond and just below the dam of this pond. Lastly, the top of the dam and portions of the downstream slope of the dam at this pond is covered with tocalote, which will be removed. Other weed species, including non-native annual grass species, will be controlled under the larger project-wide weed management plan.

Table 25 lists the non-native, invasive plant species that will be removed and controlled and the method(s) that will be used to control them.

Sequence and Timing

The sequence and timing for the mitigation activities will likely be concurrent with project construction for activities in mountain stream areas. Sequence and timing that is related to specific planting methods and weed removal methods are described in Sections 5.2.

Table 25. Non-native, Invasive Plant Species to be Controlled and the Method of Control

Botanical Name	Common Name	Method of Control
Centaurea melitensis	tocalote	Hand/Mechanical without Ground Disturbance, Herbicide, Mowing
Hirschfeldia incana	Shortpod mustard	Hand/Mechanical Removal, Herbicide
Rumex crispus	curly dock	Hand/Mechanical without Ground Disturbance, Herbicide
Tamarix ramosissima	salt cedar	Salt Cedar Control Method

5.1.5 Mitigation Activities at Chocolate Canyon

The following section describes the mitigation at the Chocolate Canyon Property (Figure 9). Mitigation at Chocolate Canyon includes:

- Preservation of streams, wetlands, and riparian habitat
- Enhancement of streams, wetlands, and riparian habitat through removal of non-native, invasive plant species

Mitigation acreage within Chocolate Canyon is listed in Table 26 below. Mitigation activities planned for Chocolate Canyon are shown in Figure 9, and described further in the text below.

Table 26. Summary of Mitigation Activity at the Chocolate Canyon Property

Mitigation Action	Area (acres)	Length (linear feet)
Streams		
Stream Preservation	0.28	9,051
Stream Enhancement and Preservation	1.08	3,162
Streams Total	**1.36**	**12,213**
Wetlands		
Wetland Preservation	0.99	NA
Wetland Enhancement and Preservation	0.02	NA
Wetlands Total	**1.01**	**NA**
Riparian		
Riparian Preservation	10.25	NA
Riparian Enhancement	0.30	NA
Riparian Total	**10.55**	**NA**

Non-native, Invasive Plant Species Removal

Non-native, invasive plant species will be removed from the Chocolate Canyon site, as feasible, within 40 feet of the stream channels, wetlands, and ponds. Giant reed and castor bean have been observed on the site, and are targets for removal, due to their ability to invade and replace native plant communities and diminish wildlife habitat (Table 27). In general, non-native, invasive plant species within the bed and banks of the channel are limited to castor bean, which is located at the top of the watershed in an upland area and giant reed, which is located within the stream channel. The rest of the canyon is primarily vegetated with dense chaparral with no significant areas with dense weeds outside of roadside disturbed areas. In addition, the canyon walls on either side of the stream channel are very steep and access in and out of the stream bed is extremely difficult. As a result of site conditions, including the limited distribution of weed species and the difficult topography, the 40-foot weed control buffer was established as a balance between effective weed control and the practical limitations of the site.

Table 27. Non-native, Invasive Plant Species to be Controlled and the Method of Control for the Chocolate Canyon Property

Botanical Name	Common Name	Method of Control
Arundo donax	giant reed	Giant Reed Removal Protocol
Ricinus communis	castor bean	Hand/Mechanical Removal, Herbicide

Giant reed infestations will be removed from the main Chocolate Canyon perennial stream (Figure 9). Methods used for removal of giant reed are described in Section 5.2. At Mitigation Area 3, castor bean will be removed by hand. As necessary, herbicide may be applied.

Sequence and Timing

Mitigation will be implemented concurrent with project impacts to jurisdictional areas within San Diego County and will not result in a temporal loss of functions and values at this location.

5.2 General Mitigation Implementation Methods and BMPs

This section describes general methods for implementation of mitigation activities that would occur throughout all of the mitigation sites. These activities include site preparation, weed removal, planting, and erosion control BMPs that would be implemented as applicable to a given site. In addition, all mitigation activities will avoid impacts to nesting birds and will follow the breeding season dates listed in the Sunrise Powerlink Final EIR/EIS (Aspen Environmental Group 2008).

5.2.1 Implementation Methods for Control of Non-native, Invasive Plant Species

Non-native, invasive plant species removal will be implemented as part of enhancement activities, during site preparation for restoration activities, and as part of long-term management activities throughout the project alignment (Recon Environmental Inc. 2010). Non-native, invasive plant species removal will target all California Invasive Plant Council (Cal-IPC; http://www.cal-ipc.org/ip/inventory/weedlist.php) non-native, invasive annual and perennial plant species listed as having a severe or moderate (A or B) invasive impact with the exception of annual grass species which are abundant within reference locations. Non-native, invasive plant species removal methods to be implemented for each species at each site are indicated in each of the respective invasive plant species control tables in Section 5.1, above. Specifics on the implementation of these methods are described in more detail below.

In general and when feasible, live reproductive plant materials such as seed and rhizomes, will be removed from the site. Some of these mitigation sites, however, such as Chocolate Canyon and Suckle Property, are extremely remote and difficult to access. It may not be feasible to remove plant material from these sites. In addition, these sites, particularly the Suckle Property, have extremely fragile habitats that could be damaged by attempting to remove large quantities of plant material from these areas. For these sites, the option of processing and disposing of plant material on-site in an appropriate manner to be determined by the land manager. In all cases, viable plant material will be processed and disposed of outside of the bed and banks of the channel. Plant material processing that may be proposed includes one or more of the methods that are listed below.

- Burning during appropriate time of year to prevent spread of fire
- Cut into manageable size and disposed of on-site to create brush piles for wildlife
- Removal of material from the site
- Burial of material

<u>Weed Removal as part of site preparation</u>

Mowing will be one method used for initial removal of non-native, invasive plants to prepare restoration and enhancement areas, as appropriate, prior to application of seeding and the installation of container plants. Based on the remoteness and topography of the mitigation sites, mowing will be implemented using weed-eaters (or “weed-whackers”) or similar trimmers with string or metal blades. This method may be used to minimize the extent and height of non-native annual herbs and grasses. Mowing will be used only if it will not have a deleterious effect on native plant species that are interspersed with the weeds.

<u>Hand and Mechanical Removal of Entire Plants</u>

Hand removal or use of small handheld equipment (such as a Weed Wrench or a chainsaw) is the preferred method of removing invasive plant species from the mitigation areas, as

appropriate. This method of weed removal will be used in areas where the associated ground disturbance will not adversely affect sensitive wildlife species. Plant materials that are removed will be removed entirely and disposed of carefully, including stems and all root fragments, to prevent regeneration or spread. In general, removal will be performed during the late winter or early spring when soils are moist enough to remove entire plants without breaking the roots.

Weeds will be removed before the species sets seed. When this is not feasible, seed heads will be removed from plants prior to removing the stems and roots. Seed heads of invasive species will be placed in plastic trash bags and removed from the project site for proper disposal.

If hand removal methods are tried and found to be ineffective after two years of repeated treatment, or the problem is too widespread for hand removal to be practical, then chemical controls may be implemented as described below. Chemical controls will be used during the first year of treatment for those species known not to respond effectively to hand removal.

All of the methods described in this section will be adapted to each species based on its morphology and phenology.

Hand and Mechanical Removal without Ground Disturbance

As necessary, weed removal will be performed using methods that do not cause ground disturbance. At these sites, mowing will be used to remove herbaceous non-woody plant material. For woody material, including shrubs and trees, the trunk of the plant will be removed within 6 inches of the ground.

If the species has the ability to sprout from the cut trunk, then the cut stump will be treated with Garlon® or other Environmental Protection Agency (EPA)-approved herbicide in accordance with the manufacturer's specifications to ensure that the cut stump will not sprout. Cut stumps will be subsequently monitored and repeatedly cut and treated with herbicide until the stump is dead. Except as described above, and for the remainder of the ROW, the above ground plant material shall be removed from the site and disposed at a municipal recycling center that is equipped to process and recycle green waste (Recon Environmental Inc. 2010). The removal shall be performed at a time when the plants do not have ripe seed. If this is not feasible, then seeds will be removed, placed in plastic bags and disposed offsite. Seedlings and small plants may be hand-pulled, if it is determined to be acceptable by the project biologists.

Herbicides

Herbicides will be used when removal and mowing are not effective and may be used in conjunction with these other methods for species that are known to be difficult to control. The project will use glyphosate-, triclopyr-, or imazapyr- based herbicides, such as Rodeo®, or other products that are approved for use near wetlands and streams. Herbicides will not be used when rain is predicted within 24 hours after application. The owner and applicator must comply with all state and local regulations regarding the application of herbicides.

Herbicides will be applied using a localized spot-treatment method and applied in a manner that will eliminate or reduce drift onto native plants. Herbicides may also be applied to cut stumps for large woody plants or large clumps of herbaceous weed that cannot be effectively removed.

As an alternative to commercially manufactured herbicides, the project may use an organic alternative of horticultural vinegar (20%) spray or common household vinegar (5%) spray. Herbicides may also be applied to cut stumps for large woody plants.

Giant Reed Removal

Currently, the preferred methods of giant reed removal in Southern California are called the bend-and-spray and hook methods. Alternatively, the cut stump method can be used in areas where giant reed stems cannot be bent and direct foliar spray methods can also be used, particular in high-density locations. Where giant reed is removed near the edge of streams, caution must be used so as not to allow any pieces of giant reed to fall in or near intermittent or perennial streams. Timing of giant reed stem spraying and removal is extremely important. Late summer through early fall (August to October) is the most effective time of year. Follow up spraying of resprouts must be done on an annual basis once resprouts are approximately 3 feet tall, and may be required multiple times within one year to eliminate infestations.

Due to the height of giant reed (up to 20 feet tall) and interspersion with surrounding native vegetation, sensitive species, and/or water, these methods have proven effective for remotely located small to moderately sized infestations (Newhouser 2008). Using the bend-and-spray method, a worker bends the giant reed stems away from the native vegetation and the applicator sprays with the approved herbicide. The person prepping the giant reed grasps the cane with two hands between stem nodes and bends or snaps the cane so that it splits longitudinally without breaking off. If done properly, over 90% of the bent canes will remain intact for spraying. The nodes should not be bent as they tend to break off completely. Giant reed stems must be living to translocate herbicide to their rhizomes and kill the plant. Next, a fan shape should be created with the bent canes on the ground. With a crew of two or three workers to bend the giant reed stems, and one applicator, the removal team can rotate between three or four clumps of giant reed at a time.

The hook method allows the applicator to work solo, working the hook with left hand (between pumping) and spraying with the right hand. Using a hook, the worker gathers up to 10 giant reed stalks to concentrate them for quicker application. This method uses the least amount of herbicide and has the least potential to overspray and risk of non-target plant species damage. The hook resembles a swimming pool rescue hook (8-foot wooden pole with an 18-inch PVC hook with an additional side hook on top) and was designed to reach up and pull giant reed stems down away from desirable vegetation to spray them. The hook is very useful on small patches of giant reed to reach to the center of the clump. According to the hook technique, the worker inserts the hook vertically into the upright canes and then turns the hook horizontally to grab approximately 10 canes. The next step is to pull the stems towards you while stepping back and sliding the hook up the canes. As you slide the hook up the stems, the giant reed stems will bend toward you and you will be able to spray the full length of the cluster of stems in the hook.

The cut-stump method may be used in remote areas where giant reed stems cannot be bent to spray or in situations where a foliar spray application poses a significant risk to aquatic species, desirable vegetation, and other non-target species. It may also be used where standing, dead giant reed poses a fire hazard and when conducting a follow-up treatment on a small amount of regrowth. Using this method, giant reed stems are cut approximately one foot from the ground with a chainsaw, lopper, or machete. The stem stump is then immediately painted with herbicide (must be painted with herbicide within 1 minute of cutting to be effective). Dye will be added to the herbicide to mark treated stumps and ensure full coverage. When feasible, all cut biomass must be mulched and/or carried off site per the specific site management plan.

Two different foliar spray methods can also be used: the high volume and low volume foliar spray methods. Both methods involve spraying the foliage until saturated with herbicide. The high volume foliar spray method is recommended for large, high-density infestations greater

than 6 to 8 feet in height with little or no native vegetation. The low volume foliar spray is recommended for dense stands of infestations less than 6 to 8 feet in height. Advantages of the foliar spray methods include minimal soil disturbance and relatively little equipment, labor, and time. However, the resprouts need 3 to 5 years of retreatment for complete eradication and there is relatively higher risk of the herbicide affecting non-targeted plants.

Salt Cedar Removal

Salt cedar may be removed by hand, using herbicide application, cut-stump, or basal bark methods. When plants are small, hand pulling or a weed wrench can be used to remove individuals. Hand pulling and uprooting insures that plants do not resprout. When feasible, all biomass must be removed and disposed of at an appropriate off site location. Aerial application of the imazapyr herbicide, alone or in combination with glyphosate, may be used for controlling salt cedar in dense stands where little or no native vegetation is present. On smaller sites the cut-stump method has been found successful when triclopyr herbicides are used. Salt cedar plants can also be treated by girdling the bark and applying the cut surface with herbicide. These plants can be left in place to die and be retreated if necessary. Basal bark applications of Garlon4 have been effective on plants with a basal diameter of less than 4 inches. The use of triclopyr (Garlon®4 or Remedy™) mixed with oil and applied as a basal bark or cut stump treatment has been used with great success on scattered infestations, with limited resprouting occurring. Using the basal bark treatment, an herbicide mixture is applied to the lower 18 inches of the plant. Herbicides that may be used at aquatic sites include Arsenal® and Habitat®, and others approved by the EPA for aquatic settings. All herbicides must be used with care.

5.2.2 Implementation Methods for Planting

The following planting methods may be used: topsoil with seed bank, direct seed, containerized plants, and pole cuttings. This section describes the implementation methods that will be used at the sites to plant native plant species.

Topsoil with Seed Bank

Within the foot print of the proposed substation at the Lighter Property, topsoil containing natural seed bank materials may be salvaged from areas with existing native chaparral vegetation types for use at the stream restoration sites. In these areas, the above ground plant material will be removed and processed into mulch for re-use around newly planted, containerized upland plants. After the plant material has been cleared and grubbed, approximately 4 to 6 inches of topsoil will be removed and stockpiled for reuse. Salvaged topsoil with seed bank will be stored in a control area and monitored to prevent contamination and unauthorized use. Salvaged topsoil with seed bank will be utilized within 12 months of salvaging. Salvaged topsoil with seed bank will be spread on designated enhancement areas to a depth of 2 to 4 inches and stabilized using the erosion control measures that are outlined in this mitigation plan. Topsoil should not be stored in piles greater than 2 feet tall.

Direct Seeding

Seed for revegetation efforts will be collected from the mitigation properties, the ROW immediately adjacent to the mitigation properties, or similar habitat types that are located within San Diego County. Seed collection will be performed by a seed provider with experience identifying, collecting, and processing seed of native plant species. Seed collection will be performed during the appropriate time of year for each species. If possible, at least two temporally discrete seed collections will be performed for each species to increase the

probability of obtaining ripe seed. Seeding will take place annually between October 1st and November 1st. The first seeding will be performed in conjunction with site preparation and the installation of erosion control measures. Seed will be over-seeded to counter potentially low germination rates.

Planting Containerized Plants

Containerized plants will be used to re-establish oak species and may be used to re-established selected wetland species. Tree seed and containerized wetland plants will be collected by a seed provider with experience identifying, collecting, and processing seed of native plant species from a similar habitat type within San Diego County and propagated on-site or off-site at a nursery with experience growing native plant species to produce containerized plants for revegetation activities that are scheduled for the fall/winter of 2011 or later. We recommend that oak acorns be grown in deep containers (greater than 14 inches) to allow for deep root development prior to planting.

Supplemental water may be available to support the establishment of containerized plants. In general, species established by direct seed or placement of salvaged topsoil with seed bank will not require irrigation. Supplemental water may be provided for species that are established using containerized plants such as oaks and some of the larger shrub species. Potential sources of on-site water will be investigated (e.g. wells). Alternatively, irrigation water will be provided manually from either a water truck or on-site storage tanks.

Planting Pole Cuttings

Willow pole cuttings shall be cut from nearby sources from a minimum of 5 individual live plants, to increase the probability of including cuttings from both male and female plants. Poles will have a minimum length of 3 feet long and a maximum length of 4 feet. Poles will have a minimum cut-end basal diameter of ¾-inches and a maximum cut-end basal diameter of 1 ½ inches. The base of pole cuttings will be buried in a planting hole such that 2/3 of the length of the pole is below ground. Pole cuttings will be installed by augering a hole with a diameter of approximately 6-inches in diameter and 2-feet deep. The hole will be dug with hand tools. Pole cuttings will be placed at or just above the typical water line of ponds, wetlands, and along stream channels. Pole cuttings will be planted between November 15 and December 15. The mitigation plan includes overplanting of planting pole cuttings to allow for adaptive management, if high mortality rates occur.

5.2.3 Erosion Control Measures

Erosion control measures will be utilized in areas that involve grading and in conjunction with any mitigation activities that result in bare ground. These areas will be covered with rice straw to protect the surface from erosion. In areas where the slope is greater than 3:1 (horizontal to vertical), straw wattles, straw bales, and/or silt fence may be installed to reduce the velocity of runoff and trap sediment. Wattles, bales and silt fence will either be biodegradable or will be removed as part of the mitigation, when they are no longer needed.

5.3 Summary of Mitigation Activities

A summary of total mitigation for permanent and temporary impacts for each resource type based on OHWM is detailed in Table 28 (and for TOB is detailed in Table 29). In addition, a summary of mitigation activities at each mitigation property for the SRPL project is contained in Table 30.

Table 28. Summary of Total Mitigation for Permanent and Temporary Impacts per Resource Type (based on OHWM)

Resource Type	Temporary Impacts		On-Site Mitigation (acres)	Permanent Impacts	Offsite Mitigation (acres)			TOTAL MITIGATION (acres)
	Impact (acres)	Mitigation Ratio		Impact (acres)	Preservation	Enhancement	Restoration	
Desert Dry Washes	6.97	1:1	6.97	2.44	84.13 (DC)	(DC)	(DC)	**98.57**
					3.43 (S)	4.04 (S)	(S)	
					(LP)	(LP)	(LP)	
					(L)	(L)	(L)	
					(CC)	(CC)	(CC)	
				Subtotal	**87.56**	**4.04**	**-**	
Streams with No Riparian Vegetation	0.54	1:1	0.54	0.33	(DC)	(DC)	(DC)	**4.93**
					(S)	(S)	(S)	
					1.39 (LP)	0.96 (LP)	(LP)	
					0.54 (L)	0.10 (L)	0.04 (L)	
					0.28 (CC)	1.08 (CC)	(CC)	
				Subtotal	**2.21**	**2.14**	**0.04**	
Streams with Riparian Vegetation[4]	0	2:1	0	0.02	(DC)	(DC)	(DC)	**47.27**
					(S)	(S)	(S)	
					12.62 (LP)	3.95 (LP)	(LP)	
					15.83 (L)	0.63 (L)	3.43 (L)	
					10.25 (CC)	0.30 (CC)	(CC)	
				Subtotal	**38.70**	**4.88**	**3.43**	
Wetlands	0	2:1	0	0.08	(DC)	(DC)	(DC)	**18.63**
					(S)	0.88 (S)	(S)	
					9.92 (LP)	5.99 (LP)	(LP)	
					0.20 (L)	0.63 (L)	(L)	
					0.99 (CC)	0.02 (CC)	(CC)	
				Subtotal	**11.14**	**7.52**	**-**	

Abbreviations for Mitigation Sites:
DC= Desert Cahuilla Property Mitigation Site
S= Suckle Property Mitigation Site
LP= Long Potrero Property Mitigation Site
L= Lightner Property Mitigation Site
CC= Chocolate Canyon Property Mitigation Site

[4] Mitigation acreages for SRV's are referred to on figures and in text as "Riparian Habitat" preservation, enhancement, and restoration.

Table 29. Summary of Total Mitigation for Permanent and Temporary Impacts per Resource Type (based on TOB)

Resource Type	Temporary Impacts		On-Site Mitigation (acres)	Permanent Impacts	Offsite Mitigation (acres)			TOTAL MITIGATION (Onsite and Offsite acres)
	Impact (acres)	Ratio		Impact (acres)	Preservation	Enhancement	Restoration	
Desert Dry Washes	7.22	1:1	7.22	2.72	84.13 (DC)	(DC)	(DC)	**98.82**
					3.43 (S)	4.04 (S)	(S)	
					(LP)	(LP)	(LP)	
					(L)	(L)	(L)	
					(CC)	(CC)	(CC)	
				Subtotal	**87.56**	**4.04**	**-**	
Streams with No Riparian Vegetation	0.97	1:1	0.97	0.35	(DC)	(DC)	(DC)	**5.36**
					(S)	(S)	(S)	
					1.39 (LP)	0.96 (LP)	(LP)	
					0.54 (L)	0.10 (L)	0.04 (L)	
					0.28 (CC)	1.08 (CC)	(CC)	
				Subtotal	**2.21**	**2.14**	**0.04**	
Streams with Riparian Vegetation[5]	0.01	2:1 or 3:1	0.02 or 0.03	0.02	(DC)	(DC)	(DC)	**47.04**
					(S)	(S)	(S)	
					12.62 (LP)	3.95 (LP)	(LP)	
					15.83 (L)	0.63 (L)	3.43 (L)	
					10.25 (CC)	0.30 (CC)	(CC)	
				Subtotal	**38.70**	**4.88**	**3.43**	
Wetlands	0	2:1	0	0.08	(DC)	(DC)	(DC)	**18.71**
					(S)	0.88 (S)	(S)	
					9.92 (LP)	5.99 (LP)	(LP)	
					0.20 (L)	0.63 (L)	(L)	
					0.99 (CC)	0.02 (CC)	(CC)	
				Subtotal	**11.11**	**7.52**	**-**	

Abbreviations for Mitigation Sites:
DC= Desert Cahuilla Property Mitigation Site
S= Suckle Property Mitigation Site
LP= Long Potrero Property Mitigation Site
L= Lightner Property Mitigation Site
CC= Chocolate Canyon Property Mitigation Site

[5] Mitigation acreages for SRV's are referred to on figures and in text as "Riparian Habitat" preservation, enhancement, and restoration.

Table 30. Summary of Sunrise Powerlink Aquatic Resource Mitigation

Site	Resource Type	Mitigation Area [acres; linear feet (l.f.) for streams]			
		Preservation	Enhancement	Restoration	Total
Desert Cahuilla	Desert Dry Washes	84.13 (24,400)			84.13 (24,400)
	Streams				
	Wetlands				
	Riparian				
Suckle Property	Desert Dry Washes	3.43 (7,000)	4.04 (4,200)		7.47 (11,200)
	Streams				
	Wetlands	0.48	0.40		0.88
	Riparian				
Lightner Property	Desert Dry Washes				
	Intermittent and Ephemeral Streams	0.54 (16,310)	0.10 (3,558)	0.04 (1,117)	0.68 (20,985)
	Wetlands	0.20	0.63		0.83
	Riparian	15.83	0.63	3.43	19.89
Long Potrero	Desert Dry Washes				
	Intermittent and Ephemeral Streams	1.39 (16,857)	0.96 (6,054)		2.35 (22,911)
	Wetlands	9.92	5.99		15.91
	Riparian	12.62	3.95		16.57
Chocolate Canyon	Desert Dry Washes				
	Perennial and Intermittent Streams	0.28 (9,051)	1.08 (3,162)		1.36 (12,213)
	Wetlands	0.99	0.02		1.01
	Riparian	10.25	0.30		10.55
Totals	**Desert Dry Washes**	**87.56**	**4.04**		**91.60**
	Streams	**2.21 (42,218)**	**2.14 (12,774)**	**0.04 (1,117)**	**4.39 (56,109)**
	Wetland	**11.11**	**7.52**		**18.63**
	Riparian	**38.70**	**4.88**	**3.43**	**47.01**

6.0 INITIAL MONITORING MAINTENANCE, AND PERFORMANCE CRITERIA

6.1 As-built Conditions Reporting

As-built conditions reporting will take place at the end of the 120-day establishment period which will serve to notify the agencies of the completion of construction. In addition, this will be reported as part of the first annual monitoring report for each mitigation site where construction is proposed. As-built conditions reporting will include descriptions of grading and enhancement activities undertaken during mitigation implementation. If grading and enhancement activities take place during consecutive years, the reporting will occur as part of the annual reporting the first year following implementation at a given mitigation site.

6.2 Mitigation Monitoring and Performance Criteria

The purpose of the project's mitigation monitoring program is to monitor the mitigation sites to assess the effects of enhancement and restoration activities, as well as monitor for the management of negative environmental stressors that may affect ecosystem function. The project would use CRAM to provide quantitative evaluation of mitigation site waters during the initial monitoring period, as well as qualitative monitoring that would include monitoring and mapping of non-native invasive species, man-induced erosion, and other negative environmental stressors. Monitoring methods would be site specific to account for the differing habitat conditions and management responsibilities for each mitigation site.

Monitoring at each site would be for a minimum 5 year period, with Year 1 beginning following the completion of mitigation installation at each site and the completion of preservation agreements between SDG&E and the long term land manager for each mitigation site proposed as preservation. For sites were enhancement or other restoration activities are proposed, Year I begins following completion of the restoration action (e.g., non-native, invasive species removal and replanting for enhancement activities or grading and replanting for restoration activities). Monitoring would continue on an annual basis until each site has met all performance criteria AND all regulatory agencies have agreed in writing that the sites have met performance criteria and are ready for transfer to the long-term manager. Site specific monitoring methods are described below.

6.2.1 Desert Cahuilla Property Mitigation Monitoring and Performance Criteria

Mitigation activities at Desert Cahuilla consist of preservation of existing habitat. Due to the remote location of the site, we propose mapping of any threats to watershed health during site visits conducted for future management. Initial management tasks (years 1 to 5) to be conducted by the land manager include installation of signage and maintenance, installation of fencing, assessment of desert dry wash and scrub conditions (including mapping of non-native, invasive plant species and problem areas for control), decommissioning existing road on parcel, and the preparation of annual work plans and reports on management activities.

1. Monitoring of Desert Dry Washes

Purpose: Monitoring of the overall biotic health of dry desert washes on the property to provide information for management purposes.

Timing: Spring following Years 1 and 5 of monitoring.

Methods: Any threats to the watershed health will be documented during management site visits. The final maps of the threat and proposed adaptive management to eliminate the threat will be reported in the annual monitoring report in Years 1 and 5.

Performance Criteria: Total acreage of desert dry washes at the site may change under natural conditions during the course of the monitoring period. Such fluctuation may occur at the site as a natural process, and may result in an increase or a decrease in the total size and configuration of desert dry washes. If anthropogenic activities are determined to have resulted in a decrease in total acres of desert dry washes during monitoring, appropriate management actions will be undertaken to address these issues and restore natural site hydrology.

6.2.2 Suckle Property Mitigation Monitoring and Performance Criteria

Monitoring on the Suckle property will occur on a quarterly basis for the first year, bi-annually for the second year, and annually until performance criteria are met. Qualitative monitoring would be completed at the end of every year with quantitative monitoring (e.g. CRAM, vegetation transects or other data collection methods) would occur bi-annually (e.g. Year 1, 3, and 5). Reporting will occur annually with qualitative years (Year 2 and 4) being a memorandum discussing the general condition of the site and management actions implemented in that year and/or recommended for the following year. Quantitative monitoring years (Years 1, 3, and 5) a full report with analysis will be provided including the information on the following items:

1. Mapping of Desert Dry Washes and Desert Fan Palm Oasis

Purpose: Monitoring of total acreage and distribution of dry desert washes and desert fan palm oasis habitat on the property to provide information for management purposes.

Timing: Spring or summer following Years 1 and 5 of monitoring.

Methods: Mapping of dry desert washes and desert fan palm oasis habitat would be completed using GIS based on high resolution (2-meter or less) aerial photographs flown during the respective monitoring year. GIS mapping would be confirmed in the field through a site visit following GIS mapping. The final maps and total acreage of desert dry washes and desert fan palm oasis present at the site will be reported in the annual monitoring report in Years 1 and 5.

Performance Criteria: Total acreage of desert dry washes and desert fan palm oasis habitat at the site may change under natural conditions during the course of the monitoring period. Such fluctuation may occur at the site as a natural process, and may result in an increase or a decrease in the total size and configuration of desert dry washes. If anthropogenic activities are determined to have resulted in a decrease in total acres of desert dry washes or desert fan palm oasis habitat in Year 5 of monitoring, appropriate management actions will be undertaken to address these issues and restore natural site hydrology.

2. Quantitative CRAM Evaluation of Desert Dry Washes

Purpose: Provide quantitative evaluation of preserved desert dry washes to inform adaptive management through comparison of CRAM scores from year to year.

Methods: CRAM methodology as developed by SCCWRP will be applied in Years 1, 3, and 5 for 10% of the acreage of dry washes on the property. Monitoring locations would provide a standard baseline to allow comparison between CRAM scores across monitoring years.

Evaluation of dry washes using CRAM will be led by certified CRAM practitioners trained in the use of CRAM to evaluate these habitats. The results of dry wash evaluations using CRAM will be presented as part of the monitoring reports and will verify that the sites have increased in value relative to performance standards.

Performance Criteria: CRAM scores will be used to evaluate the need for management action to address scores that decrease as a result of project activities. If CRAM scores decrease, reasons for the decrease will be reported as part of the annual monitoring report and appropriate management actions will be implemented.

3. Qualitative Monitoring for Non-native, Invasive Species

Purpose: To monitor non-native invasive species to identify and re-treat any re-growth or new colonies prior to spreading.

Methods: Invasive species monitoring would occur on a quarterly basis the first year, bi-annual basis the second year, and annually thereafter. After the first two years, the mitigation site will be surveyed during each annual monitoring visit to map and describe the occurrence of negative environmental stressors. For invasive species, the site will be surveyed for the locations of non-native invasive species populations designated as a "High Priority" species by Cal-IPC and the overall success of the non-native, invasive species removal efforts will be assessed. For any observed non-native invasive plant species, locations and extents of each population will be mapped. Other stressors to be evaluated include OHV use and man induced sources of erosion and sedimentation. If environmental stressors are identified, the source of the stressor, for example, a cut fence resulting in OHV use, or off-site source population for invasive species, will be identified and described for management action.

Performance Criteria: Non-native, invasive species will be addressed immediately and a summary of the remedial activities and other management actions will be provided in each annual monitoring report. Annual non-native invasive species populations will be managed so they do not exceed more than 5% cover within waters. Non-native, annual grass species will be controlled within waters for the duration of the monitoring period, but are expected to be present due to their prolific nature within reference locations Perennial non-native invasive species, including salt cedar, giant reed, caster beach, etc. will be managed on an annual basis such that there are no individuals that are left untreated for more than one 12-month period. Monitoring reports will contain a description of management activities performed each year based on previous year's management recommendations. The success of management recommendations will also be evaluated as part of the adaptive management strategy for the site (see Section 6.4 below).

6.2.3 Long Potrero Property Mitigation Monitoring and Performance Criteria

Monitoring on the Long Potrero property will occur on a quarterly basis for the first year, bi-annually for the second year, and annually until performance criteria are met. Qualitative monitoring would be completed at the end of every year with quantitative monitoring (e.g. CRAM, vegetation transects or other data collection methods) occurring bi-annually (e.g. Year 1, 3, and 5. Reporting will occur annually with qualitative years (Year 2 and 4) being a memorandum discussing the general condition of the site and management actions implemented in that year and/or recommended for the following year. Quantitative monitoring years (Years 1, 3, and 5) will be a full report with analysis and will be provided including the information on the following items:

1. Quantitative CRAM Evaluation

Purpose: Provide quantitative evaluation of preserved streams to inform adaptive management through comparison of CRAM scores from year to year from baseline conditions and to compare impacted sites to mitigation areas to show an increase in functions and services.

Methods: CRAM methodology developed by SCCWRP for riverine habitats will be applied annually to enhanced stream reaches and will be compared to the baseline data collected in September 2010. CRAM Assessment Areas will remain the same from year to year to enable consistent comparison of performance. Evaluation of riverine wetlands using CRAM will be led by certified CRAM practitioners trained in the dry wash CRAM module. The results of riverine wetland evaluations using CRAM will be presented as part of the annual monitoring reports.

Performance Criteria: CRAM scores will be compared to baseline CRAM scores for enhanced stream reaches. CRAM scores are anticipated to increase compared to baseline conditions following enhancement and restoration. The rate of increase will vary based on the baseline scores for each reach, and intensity of enhancement and restoration actions. Some CRAM scores may decrease compared to baseline conditions during Year 1 of monitoring as a result of grading or other construction activities that occur upstream of preserved streams and wetlands. However, these scores are anticipated to meet or exceed baseline conditions after Year 2, and will increase compared to baseline conditions by the final year of monitoring. If CRAM scores decrease, reasons for the decrease will be reported as part of the annual monitoring report and adaptive management actions will be implemented

2. Qualitative Monitoring for Non-native, Invasive Species

Purpose: To monitor conditions for non-native invasive species that may affect the ability of the mitigation site to continue to provide adequate habitat functions and to identify and retreat any re-growth or new colonies prior to spreading.

Methods: The mitigation site will be surveyed during each annual monitoring visit to map and describe the occurrence of negative environmental stressors. For non-native, invasive plant species, the site will be surveyed for the locations of non-native, invasive plant species populations designated as having a severe or moderate (A or B) invasive impact by Cal-IPC (except for annual grass species that occur in adjacent, undisturbed areas). Non-native, annual grass species will be controlled within waters for the duration of the monitoring period, but are expected to be present due to their prolific nature within reference locations. For any observed non-native, invasive plant species, locations and extents of each population will be mapped, and estimates of population size (number of individuals) will be made. Other stressors to be evaluated include OHV use and man induced sources of erosion and sedimentation. If environmental stressors are identified, the source of the stressor, for example, a cut fence resulting in OHV use or off-site source population for invasive species, will be identified and described.

Performance Criteria: Within the bed and banks of the channel or limit of the wetland boundary, non-native, invasive perennial plant species populations designated as having a severe or moderate (A or B) invasive impact by Cal-IPC will be managed so they do not exceed more than 0% cover and non-native, invasive, annual plant species designated as having a severe or moderate (A or B) invasive impact by Cal-IPC do not exceed 5% cover within waters. Non-native, annual grass species will be controlled within waters for the duration of the monitoring period, but are expected to be present due to their prolific nature within reference locations.

Monitoring reports in years 1 through 5 will contain a description of management activities performed each year based on previous year's management recommendations. The success of management recommendations will also be evaluated as part of the adaptive management strategy for the site (see Section 6.4 below).

6.2.4 Lightner Property Mitigation Monitoring and Performance Criteria

Monitoring on the Lightner property will occur on a quarterly basis for the first year, bi-annually for the second year, and annually until performance criteria are met. Qualitative monitoring would be completed at the end of every year with quantitative monitoring (e.g. CRAM, vegetation transects or other data collection methods) would occur bi-annually (e.g. Year 1, 3, and 5). Reporting will occur annually with qualitative years (Year 2 and 4) being a memorandum discussing the general condition of the site and management actions implemented in that year and/or recommended for the following year. Quantitative monitoring years (Years 1, 3, and 5) will be a full report with analysis and will be provided including the information on the following items:

1. Hydrological and Erosion Monitoring for Stream Enhancement

Purpose: To evaluate success of stream enhancement activities implemented during the implementation phase.

Methods: Enhanced and restored stream reaches will be monitored by a qualified hydrologist to evaluate the success of stream enhancement and restoration activities. For activities requiring grading and bank stabilization, a minimum of one upstream and downstream hydrological cross section will be taken to monitor stream channel evolution. All enhanced stream reaches will be monitored for erosion including nick points, headcuts, gullies, and washouts. The source of each erosion point will be evaluated to determine if the erosion is a natural part of stream evolution, or if the observed erosion is occurring as a result of human activities, including restoration activities.

Performance Criteria: Areas of erosion that are determined to be detrimental to the goals of the restoration will be addressed each year based on management recommendations in each annual monitoring report. If stream cross sections show that the enhanced stream reaches are not progressing as expected, management actions will be taken to address those issues.

2. Monitoring of Planted Vegetation

Purpose: To evaluate establishment of planted vegetation in enhanced and restored stream reaches.

Methods: Plants will be monitored each year for survival and total percent cover of vegetation. Each species present will be identified to the species level and counted. Irrigation systems will also be monitored to determine if repairs are needed to aid in initial establishment of planted species. In addition, a representative reference site will be evaluated for total percent cover of herbaceous plant species and woody vegetation.

Performance Criteria: As required in the Lake and Streambed Alteration Agreement, all mitigation plantings shall have a minimum of 100% survival the first year and 80% survival thereafter. Perennial woody vegetation shall meet these survivorship criteria over the five-year monitoring period *and/or* have aerial coverage of 30% of an adjacent reference site after 3 years and 60% of an adjacent reference site after 5 years. At the completion of the monitoring period, the mitigation site shall have received no supplemental irrigation for a period of two consecutive

years. Non-native, invasive perennial plant species populations designated as having a severe or moderate (A or B) invasive impact by Cal-IPC will be managed so they do not exceed more than 0% cover within waters, and non-native, invasive, annual plant species designated as having a severe or moderate (A or B) invasive impact by Cal-IPC do not exceed 5% cover within waters. Non-native, annual grass species will be controlled within waters for the duration of the monitoring period, but are expected to be present due to their prolific nature within reference locations.

4. Quantitative CRAM Evaluation

Purpose: Provide quantitative evaluation of preserved streams to inform adaptive management through comparison of CRAM scores from year to year.

Methods: CRAM methodology developed by SCCWRP for riverine habitats in the project reach will be applied annually to enhanced stream reaches. CRAM Assessment Areas will remain the same from year to year to enable consistent comparison of performance. Evaluation of riverine wetlands using CRAM will be led by certified CRAM practitioners trained in the riverine CRAM module or a more specific module for these areas, if developed in the future. The results of riverine wetland evaluations using CRAM will be presented as part of the annual monitoring reports.

Performance Criteria: CRAM scores will be compared to baseline CRAM scores for enhanced stream reaches. CRAM scores are anticipated to increase compared to baseline conditions following enhancement and restoration. The rate and of increase will vary based on the baseline scores for each reach, and intensity of enhancement and restoration actions. Some CRAM scores may decrease compared to baseline conditions during Year 1 of monitoring as a result of grading or other construction activities that occur upstream of preserved waters. However, these scores are anticipated to meet or exceed baseline conditions after Year 5. This applies only to restoration sites within the restored stream channel and does not apply to other areas such as fill/cut or road removal sites. If CRAM scores decrease, reasons for the decrease will be reported as part of the annual monitoring report and management actions will be implemented.

5. Qualitative Monitoring for Non-native, Invasive Species

Purpose: To monitor conditions for non-native, invasive species that may affect the ability of the mitigation site to continue to provide adequate habitat functions and to identify and retreat any re-growth or new colonies prior to spreading.

Methods: The mitigation site will be surveyed during each annual monitoring visit to map and describe the occurrence of negative environmental stressors. For invasive species, the site will be surveyed for the locations of non-native, invasive species populations designated as having a severe or moderate (A or B) invasive impact by Cal-IPC (with the exception of annual grass species). Non-native, annual grass species will be controlled within waters for the duration of the monitoring period, but are expected to be present due to their prolific nature within reference locations. For any observed non-native invasive plant species, locations and extents of each population will be mapped, and estimates of population size (number of individuals) will be made. Other stressors to be evaluated include OHV use and man induced sources of erosion and sedimentation. If environmental stressors are identified, the source of the stressor, for example, a cut fence resulting in OHV use, or off-site source population for invasive species, will be identified and described. Weeds in other locations will follow the Weed Control Plan for the entire ROW (Recon Environmental Inc. 2010).

Performance Criteria: Non-native, invasive plant species listed as having a severe or moderate (A or B) invasive impact by the Cal-IPC (with the exception of annual grass species prevalent in the area) will be managed so they do not exceed more than 5% cover of annual species and 0% cover of perennial species within waters. Non-native, annual grass species will be controlled within waters for the duration of the monitoring period, but are expected to be present due to their prolific nature within reference locations Monitoring reports in years 2 through 5 will contain a description of management activities performed each year based on previous year's management recommendations. The success of management recommendations will also be evaluated as part of the adaptive management strategy for the site (see Section 6.4 below).

6.2.5 Chocolate Canyon Mitigation Monitoring and Performance Criteria

Monitoring at the Chocolate Canyon property will occur on a quarterly basis for the first year, bi-annually for the second year, and annually until performance criteria are met. Qualitative monitoring would be completed at the end of every year with quantitative monitoring (e.g. CRAM, vegetation transects or other data collection methods) would occur bi-annually (e.g. Year 1, 3, and 5). Reporting will occur annually with qualitative years (Year 2 and 4) being a memorandum discussing the general condition of the site and management actions implemented in that year and/or recommended for the following year. Quantitative monitoring years (Years 1, 3, and 5) will be a full report with analysis and will be provided including the information on the following items:

1. Quantitative CRAM Evaluation

Purpose: Provide quantitative evaluation of preserved streams to inform adaptive management through comparison of CRAM scores from year to year.

Methods: CRAM methodology developed for riverine habitats in the mitigation area will be applied annually to enhanced stream reaches. CRAM Assessment Areas will remain the same from year to year to enable consistent comparison of performance. Evaluation of riverine wetlands using CRAM will be led by certified CRAM practitioners trained in the riverine CRAM module. The results of riverine wetland evaluations using CRAM will be presented as part of the annual monitoring reports.

Performance Criteria: CRAM scores will be compared to baseline CRAM scores for enhanced stream reaches. CRAM scores will meet or exceed baseline conditions by the final year of monitoring. The rate and of increase will vary based on the baseline scores for each reach, and intensity of enhancement and restoration actions. If CRAM scores decrease, reasons for the decrease will be reported as part of each annual monitoring report and management actions will be implemented

2. Qualitative Monitoring for Non-native Invasive Species

Purpose: To monitor conditions for non-native, invasive species that may affect the ability of the mitigation site to continue to provide adequate habitat functions and to identify and retreat any re-growth or new colonies prior to spreading.

Methods: The mitigation site will be surveyed during each annual monitoring visit to map and describe the occurrence of negative environmental stressors. For invasive species, the site will be surveyed for the locations of non-native invasive species populations designated as having a severe or moderate (A or B) invasive impact by Cal-IPC. For any observed non-native invasive plant species, locations and extents of each population will be mapped, and estimates of

population size (number of individuals) will be made. Other stressors to be evaluated include OHV use and man induced sources of erosion and sedimentation. If environmental stressors are identified, the source of the stressor, for example, a cut fence resulting in OHV use, or off-site source population for invasive species, will be identified and described.

Performance Criteria: Negative environmental stressors will be addressed to the greatest extent feasible through management actions as recommended in each annual monitoring report. Non-native, invasive plant species listed as having a severe or moderate (A or B) invasive impact by the Cal-IPC (with the exception of annual grass species prevalent in the area) will be managed so they do not exceed more than 5% cover of annual species and 0% cover of perennial species within waters. Non-native, annual grass species will be controlled within waters for the duration of the monitoring period, but are expected to be present due to their prolific nature within reference locations Monitoring reports will contain a description of management activities performed each year based on previous year's management recommendations. The success of management recommendations will also be evaluated as part of the adaptive management strategy for the site (see Section 6.4 below).

6.3 Monitoring Schedule and Reporting Requirements

Monitoring on the property will occur on a quarterly basis for the first year, bi-annually for the second year, and annually until performance criteria are met. Qualitative monitoring would be completed at the end of every year with quantitative monitoring (e.g. CRAM, vegetation transects or other data collection methods) would occur bi-annually (e.g. Year 1, 3, and 5). Reporting will occur annually with qualitative years (Year 2 and 4) being a memorandum discussing the general condition of the site and management actions implemented in that year and/or recommended for the following year. Quantitative monitoring years (Years 1, 3, and 5) will be a full report with analysis.

Monitoring at each mitigation site will be completed during the late spring or early summer of each monitoring year. Separate mitigation monitoring reports will be prepared for each respective mitigation site to enable clear communication to the respective land manager at each location. The reports will be compiled, summarized, and submitted to the Corps, CDFG, and SWRCB by December 31 of each monitoring year.

6.4 Maintenance and Adaptive Management during Initial Monitoring Period

SDG&E will be the responsible party for implementation of management activities during the initial monitoring period. Specific maintenance and management activities will be identified based on the results of each annual monitoring visit. Maintenance and monitoring recommendations will be developed by September 15 of each year to allow time for planning and mobilization of work crews prior to the rainy season. Maintenance activities that involve work in waters and wetlands will be conducted prior to the onset of winter rains. Other maintenance activities will be conducted prior to the annual monitoring in the year following the recommendation.

As part of each annual monitoring report, maintenance and management activities implemented during the previous year will be described and the results will be evaluated under the framework of adaptive management. If management and maintenance methods are not successful in addressing negative environmental stressors identified as part of annual monitoring reports, the methods will be examined and altered to increase the potential for success based on best professional judgment and management methods that are shown to be successful based on

scientific research. In some cases, success of management and maintenance activities may not be evident over the course of only one year. This will be accounted for in annual monitoring reports through evaluation of whether or not management actions are contributing to progress towards the ultimate goal. In these cases, it may be necessary to wait for two years or more before altering methods as part of an adaptive management strategy. Each annual monitoring report will contain a section dedicated to evaluation of management and maintenance actions as part of the adaptive management strategy.

6.5 Financial Assurances

Financial assurance during the initial monitoring period will be guaranteed by SDG&E through issuance of a Letter of Credit. The dollar amount of the Letter of Credit will be based on estimated cost of mitigation implementation to be determined upon acceptance of the mitigation plan by resource agencies. The final dollar amount will be provided by SDG&E under separate cover upon issuance of project permits. Below, we have provided cost estimates for both the mitigation activities and for the initial management of the mitigation sites described in this document (Table 31 a-d). Initial management of the Desert Cahuilla property (including all of the tasks described in Section 6.2.1, above) will be covered under the long-term management costs (see below).

Table 31a. Mitigation Activities and Initial Management Cost Estimate at the Suckle Property

1.0 Mobilization				**Subtotal**	**$17,568**
Item Number	Description	Quantity	Unit	Unit Cost	Cost
1.1	Mobilization	$351,350	% of base cost	5%	$17,568

2.0 Removal of Non-Native, Invasive Plant Species				**Subtotal**	**$351,350**
Item Number	Description	Quantity	Unit	Unit Cost	Cost
2.1	Salt Cedar Removal	3.91	AC	$50,000	$195,500
2.2	Giant Reed Removal	1.19	AC	$75,000	$89,250
2.3	Removal of Non-Native Invasive Plants within Enhanced Dry Washes and Wetlands	4.44	AC	$15,000	$66,600

3.0 Interim Maintenance and Monitoring (1-5 Years)				**Subtotal**	**$301,725**
Item Number	Description	Quantity	Unit	Unit Cost	Cost
3.1	Adaptive Management - Weed Removal	5	Annual	$35,135	$175,675
3.3	Monitoring	5	Annual	$25,210	$126,050

SUBTOTAL	**$670,643**
15% Contingency	**$100,596**
TOTAL	**$771,239**

Table 31b. Mitigation Activities and Initial Management Cost Estimate at the Lightner Property

1.0 Mobilization				**Subtotal**	**$41,550**
Item Number	Description	Quantity	Unit	Unit Cost	Cost
1.1	Mobilization	$635,861	% of base cost	5%	$31,793
1.2	Topsoil Salvage - Substation	488	CU. YD.	$20	$9,757

2.0 Road Crossing Removal and Stream Restoration in Northeast				**Subtotal**	**$18,757**
Item Number	Description	Quantity	Unit	Unit Cost	Cost
2.1	Road Crossing Removal - ephemeral	2	allocation	$3,500	$7,000
2.2	Total Cut Volume	290	CU. YD.	$20	$5,802
2.3	Total Fill Volume	27	CU. YD.	$20	$540
2.4	Net Material	263	CU. YD.	$15	$3,947
2.5	Topsoil w/Seed Bank	41	CU. YD.	$20	$816
2.6	Seeding	0.08	AC	$3,500	$268
2.7	Erosion Control Measures	0.08	AC	$5,000	$383

3.0 Road Crossing Removal and Restoration of the Stream Channel above the Southwest Grassland				**Subtotal**	**$3,138**
Item Number	Description	Quantity	Unit	Unit Cost	Cost
3.1	Total Cut Volume	16	CU. YD.	$20	$322
3.2	Total Fill Volume	54	CU. YD.	$20	$1,073
3.3	Net Material	38	CU. YD.	$15	$563
3.4	Topsoil w/Seed Bank	44	CU. YD.	$20	$887
3.5	Seeding	0.08	AC	$3,500	$292
3.6	Erosion Control Measures	0.08	AC	$5,000	$417

4.0 Road Crossing Removal and Restoration of the Stream Channel West of the Stock Pond				**Subtotal**	**$91,057**
Item Number	Description	Quantity	Unit	Unit Cost	Cost
4.1	Total Cut Volume	494	CU. YD.	$20	$9,873
4.2	Total Fill Volume	2,439	CU. YD.	$20	$48,782
4.3	Net Material	1,945	CU. YD.	$15	$29,182
4.4	Topsoil w/Seed Bank	90	CU. YD.	$20	$1,791
4.5	Seeding	0.17	AC	$3,500	$589
4.6	Erosion Control Measures	0.17	AC	$5,000	$841

5.0 Removal of Abandoned Roads and Road Stream Crossing - East of the Substation	**Subtotal**	**$15,174**

Item Number	Description	Quantity	Unit	Unit Cost	Cost
5.1	Total Cut Volume	324	CU. YD.	$20	$6,481
5.2	Total Fill Volume	287	CU. YD.	$20	$5,741
5.3	Net Material	37	CU. YD.	$15	$556
5.4	Topsoil w/Seed Bank	90	CU. YD.	$20	$1,803
5.5	Seeding	0.17	AC	$3,500	$593
5.6	Erosion Control Measures	0.17	AC	$5,000	$847

6.0 Removal and Alteration of Dams to Restore/Enhance Streams	**Subtotal**	**$73,985**

Item Number	Description	Quantity	Unit	Unit Cost	Cost
6.0	Total Cut Volume	1,851	CU. YD.	$20	$37,017
6.1	Total Fill Volume	237	CU. YD.	$20	$4,748
6.2	Net Material	1,613	CU. YD.	$15	$24,202
6.3	Topsoil w/Seed Bank	223	CU. YD.	$20	$4,459
6.4	Seeding	0.42	AC	$3,500	$1,466
6.5	Erosion Control Measures	0.42	AC	$5,000	$2,094

7.0 Removal of Non-native and Invasive Plant Species	**Subtotal**	**$5,750**

Item Number	Description	Quantity	Unit	Unit Cost	Cost
7.1	Removal of Non-Native Invasive Plants within Enhanced Stream Channels	0.10	AC	$7,500	$750
7.2	Removal of Non-Native Invasive Plants within Specific Locations	0.50	AC	$10,000	$5,000

8.0 Enhancement of Wetland and Riparian Vegetation	**Subtotal**	**$428,000**

Item Number	Description	Quantity	Unit	Unit Cost	Cost
8.1	Live Oak Woodland Plantings	0.10	AC	$50,000	$5,000
8.2	Mixed Chaparral Plantings	0.48	AC	$50,000	$24,000
8.3	Mixed Oak/Riparian Plantings	1.22	AC	$50,000	$61,000

8.4	Seasonal Wetland and Riparian Buffer Plantings	2.48	AC	$50,000	$124,000
8.5	Irrigation	4.28	AC	$50,000	$214,000

9.0 Interim Maintenance and Monitoring (1-5 Years)	**Subtotal**	**$560,275**

Item Number	Description	Quantity	Unit	Unit Cost	Cost
9.1	Adaptive management - Weed Removal	5	Annual	$17,500	$87,500
9.2	Adaptive management - Replacement Plantings	5	Annual	$50,000	$250,000
9.3	Monitoring	5	Annual	$44,555	$222,775

SUBTOTAL	**$1,237,686**
15% Contingency	**$185,653**
TOTAL	**$1,423,339**

Table 31c. Mitigation Activities and Initial Management Cost Estimate at the Long Potrero Property

1.0 Mobilization	**Subtotal**	**$8,638**

Item Number	Description	Quantity	Unit	Unit Cost	Cost
1.1	Mobilization	$172,750	% of base cost	5%	$8,638

2.0 Removal of Non-Native, Invasive Plant Species	**Subtotal**	**$172,750**

Item Number	Description	Quantity	Unit	Unit Cost	Cost
2.1	Removal of Salt Cedar	n/a	allocation	n/a	$5,500
2.2	Removal of Non-Native Invasive Plants within Stream Channels and Wetlands	11.47	AC	$6,000	$68,820
2.3	Removal of Non-Native Invasive Plants within Buffer Areas	32.81	AC	$3,000	$98,430

3.0 Interim Maintenance and Monitoring (1-5 Years)	**Subtotal**	**$167,875**

Item Number	Description	Quantity	Unit	Unit Cost	Cost
3.1	Adaptive Management - Weed Removal	5	Annual	$14,500	$72,500
3.2	Monitoring	5	Annual	$19,075	$95,375

SUBTOTAL	**$349,263**
15% Contingency	**$52,389**
TOTAL	**$401,652**

Table 31d. Mitigation Activities and Initial Management Cost Estimate at the Chocolate Canyon Property

1.0 Mobilization				**Subtotal**	**$26,290**
Item Number	Description	Quantity	Unit	Unit Cost	Cost
1.1	Mobilization	$25,800	% of base cost	5%	$1,290
1.2	Surcharge for Remote Hazardous Work	n/a	allocation	n/a	$25,000

2.0 Removal of Non-Native, Invasive Plant Species				**Subtotal**	**$25,800**
Item Number	Description	Quantity	Unit	Unit Cost	Cost
2.1	Giant Reed Removal	0.32	AC	$75,000	$24,000
2.2	Castor Bean Removal	0.12	AC	$15,000	$1,800

3.0 Interim Maintenance and Monitoring (1-5 Years)				**Subtotal**	**$159,875**
Item Number	Description	Quantity	Unit	Unit Cost	Cost
3.1	Adaptive Management - Weed Removal	5	Annual	$12,900	$64,500
3.2	Monitoring	5	Annual	$19,075	$95,375

SUBTOTAL	**$211,965**
15% Contingency	**$31,795**
TOTAL	**$243,760**

7.0 LONG-TERM MANAGEMENT PLAN

Long-term management is discussed as part of the HMP for the SRPL Project, attached in Appendix E. Long term monitoring methods, management goals, and preservation instruments for the mitigation sites are discussed in that document. A Property Analysis Record (PAR) analysis has been performed for all land management activities including those necessary to maintain the wetlands and streams within the properties. The PAR analysis provides the basis for long-term funding determinations. A summary of the conveyance, land use restrictions, and funding is provided in Table 32. A summary of the long-term endowment costs for each property is provided in Table 33.

Table 32. Summary of elements of Long-Term Management for Mitigation Parcels. Details to be provided in HMP.

Site	*Conveyed to:*	*Land Use Restrictions*	*Funding for Long-term Maintenance*
Desert Cahuilla	California Department of Parks and Recreation, to be part of Anza Borrego Desert State Park	Protected by State Parks designation. Will have a mitigation overlay and will be managed as a wilderness area.	SDG&E will provide funding for perpetual management of the property; long-term costs estimated based on a PAR analysis of property maintenance and management of biological resources. Long-term management would include control of non-native species, habitat and species monitoring, access control, and related measures. SDG&E will provide copies of the management plans that identify how access will be controlled.
Suckle	CDFG and ABDSP have been approached as owners/managers of the property. If a public agency does not assume the role, a conservancy will be selected through a process coordinated with the Wildlife Agencies.	Entire property would be managed for conservation purposes, with emphasis on the wetland resources and habitat for two listed species: PBS and BBG. Restricted access.	
Long Potrero	Likely to be a combination of public agencies: U.S. Department of Agriculture (USDA) Forest Service, U.S. Department of Interior Bureau of Land Management (BLM), and potentially County of San Diego.	Entire property would be managed for conservation purposes, with emphasis on the wetland resources and other sensitive biological resources (including two listed species – Quino checkerspot and arroyo toad). Restricted access.	
Lightner	Likely to be a combination of entities: USDA Forest Service and nonprofit conservancy.	Entire property would be managed for conservation purposes, with emphasis on the wetland resources, native trees, and other sensitive biological resources (including Hermes copper butterfly). Restricted access.	
Chocolate Canyon	City of San Diego	Entire property would be managed for conservation purposes	

Table 33. Long-term Endowment Costs for Mitigation Properties.

	Endowment Total	**Yearly Average Cost: First 5 years**
Chocolate Canyon	$705,321	$21,446
Lightner	$1,844,094	$72,889
Long Potrero	$3,806,420	$105,471
Suckle	$1,119,518	$29,784
Desert Cahuilla	$1,000,000	N/A

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Appendix A. Sunrise Powerlink Temporary Waters Impact Revegetation Plan

SUNRISE POWERLINK℠

Restoration Plan for Sensitive Vegetation Communities in Temporary Impact Areas

Submitted to:

California Public Utilities Commission
U.S. Department of Interior Bureau of Land Management
U.S. Fish and Wildlife Service
California Department of Fish and Game
U.S. Department of Agriculture Forest Service

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September 24, 2010

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ABBREVIATIONS AND ACRONYMS

BLM	Bureau of Land Management, U.S. Department of Interior
BMP	Best Management Practice(s)
BO	Biological Opinion
Cal-IPC	California Invasive Plant Council
CDFG	California Department of Fish and Game
CNDDB	California Natural Diversity Database
CNF	Cleveland National Forest
CPUC	California Public Utilities Commission
Final EIR/EIS	Final Environmental Impact Report & Environmental Impact Statement
HAP/HMP	Habitat Acquisition Plan and Habitat Management Plan
HMMP	Habitat Mitigation and Monitoring Plan
MMCRP	Mitigation Monitoring Compliance, and Reporting Plan
MP	Mile Post
NTRP	Native Tree Restoration Plan
ROD	Record of Decision
ROW	Right-of-Way
RPSP	Restoration Plan for Special Status Plants
RPSV	Restoration Plan for Sensitive Vegetation Communities in Temporary Impact Areas
SDG&E	San Diego Gas and Electric Company
SRPL	Sunrise Powerlink
USFS	United States Forest Service, U.S. Department of Agriculture
USFWS	United States Fish and Wildlife Service

1. INTRODUCTION

This section describes the purpose of this restoration plan and its relationship to other mitigation plans for San Diego Gas and Electric Company's (SDG&E's) Sunrise Powerlink Project (Project).

1.1 PURPOSE

This *Restoration Plan for Sensitive Vegetation Communities in Temporary Impact Areas* (RPSV) was prepared in accordance with mitigation requirements specified in:

- The Final Environmental Impact Report and Environmental Impact Statement (Final EIR/EIS) for the Project, which was prepared and approved by the California Public Utilities Commission (CPUC) and U.S. Department of Interior Bureau of Land Management (BLM) as lead agencies;
- The Mitigation Monitoring, Compliance, and Reporting Program (MMCRP) for the Project (a component of the Final EIR/EIS), specifically measures B-1a and CG-CM-16;
- The Records of Decision (RODs) issued by the BLM and U.S. Department of Agriculture Forest Service (USFS) for the Final EIR/EIS; and
- The Biological Opinion (BO) issued by the U.S. Department of Interior Fish and Wildlife Service (USFWS) pursuant to Section 7 of the federal Endangered Species Act (FESA).

As worded in the Final EIR/EIS and MMCRP and repeated in the RODs and BO:

- Areas temporarily impacted by the Project must be restored to pre-construction conditions,
- The restoration of sensitive vegetation in temporary impact areas must be planned and implemented by a qualified habitat restoration specialist.
- A habitat restoration plan must be prepared and approved prior to vegetation clearing activities;
- Specific types of measures must be addressed in the restoration plan;
- Restoration sites must be maintained and monitored for five years or until the established success criteria are met; and
- Where it is determined that restoration requirements cannot be met, offsite mitigation must be provided at the ratios established for impacts to each type of sensitive vegetation.

In addition, the RPSV must be consistent with Desert Bioregion Revegetation/Restoration Guidance as outlined in the MMCRP measure B-1a and the Edison Electric Institute Memorandum of Understanding ([MOU] Edison Electric Institute, et al., 2006). The Desert Bioregion Revegetation/Restoration Guidance includes alleviation of soil compaction within construction areas, re-contouring soils to pre-impact conditions and appropriate seeding methods for desert vegetation communities. The MOU requests the use of local ecotypes in revegetation and reduction of the potential introduction and control the spread of non-native invasive species.

This RPSV is the habitat restoration plan cited in the Final EIR/EIS, MMCRP measures B-1a and G-CM-16, the RODs, and the BO. It was prepared by restoration specialists at ICF International and Chambers Group and has been submitted to the CPUC, BLM, USFWS, USFS, and CDFG for approval.

1.1.1 Plan Components

The primary purpose of the RPSV is to guide the planning and implementation of restoration measures at individual sites. Site-specific restoration plans will be prepared and submitted to the agencies based on Sections 2-5 of the approved RPSV:

- Section 2 identifies the types of impact areas and vegetation communities subject to the RPSV;
- Section 3 describes the types and sequence of activities required to plan and implement restoration measures;
- Section 4 establishes guidelines for restoring the different vegetation types; and
- Section 5 identifies the maintenance, monitoring, and reporting requirements that apply after planting occurs.

1.1.2 Roles and Responsibilities

Roles and responsibilities for planning and implementing the restoration measures are as follows:

- SDG&E will fund planning and implementation of the measures and is responsible for the successful implementation of the measures as mitigation for Project impacts to sensitive vegetation communities.
- SDG&E will retain a Restoration Program Manager to oversee RPSV implementation. The Program Manager's responsibilities include but are not limited to:
    1) managing the schedule of restoration activities;
    2) overseeing preparation and implementation of the site-specific restoration plans;
    3) overseeing the work all contractors retained for restoration tasks;
    4) preparing reports on RPSV implementation, including reports on maintenance and monitoring tasks;

5) maintaining communications with the Project Biological Monitor appointed by the CPUC; and

6) ensuring that RPSV activities occur according to schedule and within the requirements of all applicable Project permits.

- Restoration Contractors (including Restoration Specialists and Restoration Monitors), Maintenance Contractors, and other parties retained by SDG&E will be responsible for site-specific planning and implementation of restoration activities as directed by the Restoration Program Manager.

1.2 RELATIONSHIP TO OTHER PROJECT MITIGATION PLANS

In addition to the RPSV, there are other required mitigation plans for the Project that address restoration requirements. These include the following documents:

- Habitat Acquisition Plan and Habitat Management Plan (HAP/HMP),
- Cleveland National Forest (CNF) HAP/HMP,
- Habitat Mitigation and Monitoring Program (HMMP),
- Restoration Plan for Special Status Plants (RPSP), and
- Native Tree Restoration Plan (NTRP).

Table 1 provides a brief description of each plan and relationship of the RPSV to each.

Table 1. Relationship of the RPSV to Other Project Mitigation Plans

Document	Description	Relationship of the RPSV
Habitat Acquisition Plan and Habitat Management Plan (HAP/HMP)	The HAP/HMP addresses the offsite mitigation requirements for the Project's impacts on sensitive vegetation communities and listed species outside of Cleveland National Forest. The impacts are those identified in the Project Modification Report (PMR) dated May 2010. The HAP/HMP identifies nine properties that will be conserved and managed through funding provided by SDG&E and includes a management plan for each property. Each management plan identifies the mitigation function of the property, the proposed land manager and owner, management tasks necessary to conserve the property's mitigation values, funding required for initial and ongoing management, and the current status of the land acquisition. Under the HAP/HMP, approximately 8,940 acres will be acquired, and approximately $17,072,416 will be provided for management. As of September 22, 2010, five of the properties (2,460 acres) have been acquired.	The RPSV addresses the onsite (restoration) requirements for the impacts of the Project as presented in the May 2010 PMR. It covers the temporary impacts to the same vegetation types addressed in the HAP/HMP. The RPSV also provides information and guidelines that can be considered in the management of the HAP/HMP properties. The acres of habitat conserved on the nine HAP/HMP properties exceed the amount required to meet the offsite requirements specified for the Project. This provides assurances to the agencies that temporary impacts will still be fully mitigated if restoration is not 100% successful.
Cleveland National Forest HAP/HMP	The CNF HAP/HAP will identify the offsite mitigation lands for Project impacts to sensitive vegetation and species in CNF and will include a management plan for those properties. USFS has provided SDG&E with a list of potential mitigation properties and has indicated that, based on the requirements specified in the USFS ROD, at least 185.56 acres are needed as mitigation.	The RPSV will be the onsite (restoration) counterpart to the offsite mitigation identified in the CNF HAP/HMP.
Habitat Mitigation and Monitoring Plan (HMMP)	The HMMP identifies the offsite properties where jurisdictional waters and wetland/riparian resources will be preserved, enhanced, and/or restored as a condition of the Project's 401/404 permits and Streambed Alteration Agreement (SAA). The HMMP indicates where the HMMP measures will be implemented, what success criteria will apply, the cost of those measures, and the source of assured funding for those measures. Temporary as well as permanent impacts to dry washes and riparian/wetland habitats are covered by the HMMP. After the HMMP success criteria are met, long-term management of the offsite property is guided by the HAP/HMP.	The measures in the RPSV for restoring riparian and wetland vegetation in temporary impact areas are based on those in the HMMP. The measures in the RPSV for upland vegetation identify how restoration adjacent to riparian/wetland types in temporary impact areas would be addressed.
Restoration Plan for Special Status Plant Species (RPSP)	The MMCRP requires that impacts to listed plants be mitigated through salvage and relocation and/or offsite conservation at a 2:1 ratio and that impacts to CNPS List 1 and 2, BLM sensitive species, and USFS sensitive species be mitigated through reseeding or relocation as part of the restoration of temporary impact areas or via offsite habitat conservation. No listed plants and nine CNPS List 1 or 2, and/or BLM or USFS sensitive species will be affected. The RPSV provides for the reseeding/relocation of 7 non-listed species and for the offsite conservation of 2 non-listed species.	Some RPSV measures will be implemented in temporary impact areas, most likely in temporary construction yards, pull sites and access roads. Where appropriate, the RPSV seed mixes will include special status non-listed plants.
Native Tree Restoration Plan (NTRP)	The MMRCP requires that Project impacts to native trees be mitigated through the planting of replacement trees and/or or the conservation of existing woodlands at specified ratios. The NTRP identifies the methods and ratios that will apply in circumstances when replanting is required; it also identifies the woodland conservation that SDG&E is providing in advance of impacts.	The RSVP and NTRP include the same provision for planting native trees.

2. IMPACT AREAS AND VEGETATION TYPES SUBJECT TO THE RSVP

This section provides a brief description of the types of temporary areas where restoration is required and estimated amount and types of sensitive vegetation in those areas.

2.1 PROJECT IMPACT AREAS

The construction phase of the Project entails a combination of permanent and temporary ground disturbance.

Permanent impact areas include:

- Structure pad areas – 100 feet (ft) x 100 ft areas that include the concrete foundations of the transmission line structures (lattice towers and poles).
- Maintenance areas – 75 ft x 35 ft areas adjacent to over lapping the structure pad area at sites constructed by conventional methods; established to provide storage and provide access to the structure during operations and maintenance.
- Tower staging access pads (TSAPs) – 100-ft diameter areas for equipment loading/work staging for structures built and maintained by helicopter.
- The Suncrest Substation – a 76-acre area that includes the substation facility, where the 500 kilovolt (kV) portion of the transmission line converts to 230 kV.
- Permanent access roads – new roads and improved existing roads that provide access to the structure and substation work sites and also will be used during operations and maintenance.
- Grading areas – locations not encompassed by the above impact areas, where grading is required for infrastructure. Ranging in size from 0.04 to 1.8 acres.

Temporary impact areas include:

- Work Areas – 200 ft x 200 ft or 200 ft x 400ft areas encompassing a structure pad, used during construction only to establish tower foundations, complete conventional tower assembly and erection, and store and maintain equipment for tower assembly. Work areas are not required for structures constructed by helicopter.
- Stringing areas – areas where wire stringing and tensioning equipment is used and stored during construction; also used for temporary storage of wire/conductor supplies. Ranging in size from one to several acres.

- Construction yards – ranging in size from 5 to 100 acres, used for equipment and construction materials storage, crew staging, and field office operations.
- Guard areas -- Three vertical poles with cross arms, used to prevent wires from contacting the ground during stringing; used at road crossings. Bucket trucks also can serve as guard structures. Installation and removal typically disturbs approximately 150 square ft per set of three poles.
- Temporary access roads – new roads or improved existing roads (20 ft wide) that are used only to provide access during construction and will be decommissioned afterwards.

The temporary impact areas are where restoration will occur. Table 2 indicates the number of sites per type of temporary impact and provides a description of the type and duration of activities and the anticipated post-construction condition at each type of site. The number of sites per type of impact is based on the information in the May 2010 PMR.

2.2 VEGETATION COMMUNITIES

Table 3 identifies the sensitive vegetation communities (type and subtype) that occur in temporary impact areas, the estimated acres per type and subtype, and the sensitive species associated with the vegetation communities. Table 4 indicates the acres of vegetation per type of temporary impact area.

Table 2. Temporary Impact Areas Where Restoration Will Occur

Type (number)	Anticipated Activities /Duration	Anticipated Post-Construction Site Condition
Access Roads (5.24 miles)	Temporary access roads will be used to access tower sites where conventional construction is necessary but the roads are not allowed to remain. These roads will be in place for approximately six to eight weeks duration to accommodate the tower construction process.	Expect all vegetation to removed, grading to be performed and heavy equipment use during the construction period will result in a moderate to high degree of soil compaction. Decompaction, weed removal, soil re-contouring (and amending), and hydro-seeding would be required.
Guard Structures (239)	Guard structures consist of three metal poles that will be installed in the ground within a variety of habitat areas to prevent wires from contacting the ground during stringing. Each guard structure will be in place for up to four weeks during wire installation.	Expect minimal ground disturbance consisting of three divot holes in each habitat area that may only require soil replacement and/or minor broadcast seed application and follow up weed monitoring/maintenance may be required at each site.
Construction Yards (19)	Construction yards will have multiple uses that are anticipated to extend over one year at most sites, and over two years at yards where field offices will be established (Alpine, Rough Acres). These activities include tower steel and construction materials (soil, rock, concrete) storage, contractor vehicle and heavy equipment parking, helicopter landing, vehicle wash stations, etc.	Expect all woody vegetation to be removed where necessary, with relatively level areas and sparse vegetation crushed. Expect rock and/or steel plates to be used in some areas, and grading to fit the needs of the contractor at these sites. Due to varied uses and extended duration of impacts, a high degree of soil compaction may occur. Trash and debris removal, soil decompaction, weed removal, soil re-contouring (and amending), and hydro-seeding would be required throughout each site.
Stringing Sites (78)	Stringing sites will be used after tower construction is completed and during wire pulling and installation. Wire stringing activities are anticipated to occur for approximately four weeks at each pull site.	Expect most sites to use drive and crush, as opposed to blading and direct removal of vegetation. Heavy equipment will be used on the site so some degree of localized soil compaction is anticipated. Where grading and vegetation/soil removal are necessary, soil salvage would be recommended. Decompaction, soil re-contouring (and amending), and hydro-seeding would be required in portions of each site.
Work Areas (205)	Temporary work areas will be used to establish tower foundations, complete conventional tower assembly and erection, and store and maintain equipment for tower assembly. These areas will receive heavy foot traffic as well as a variety of heavy equipment, steel, tools, and other construction materials. Construction activities are anticipated to occur over three to six weeks at most tower sites.	Expect most temporary work areas to be graded and have vegetation removed. Soil salvage is not anticipated in these areas but would be recommended where feasible. Heavy machinery and foot traffic would result in some degree of soil compaction. Decompaction, weed removal, soil re-contouring (and amending), and hydro-seeding would be required throughout each site.

Table 3. Sensitive Vegetation and Associated Sensitive Species in Temporary Impact Areas by Vegetation Type

Vegetation Communities		Acres within Temporary Impact Areas	Associated Sensitive Species
Chaparral	Chamise Chaparral	33.71	Quino checkerspot butterfly, coastal California gnatcatcher, California legless lizard, San Diego horned lizard, coastal rosy boa, San Diego ring-necked snake, San Diego mountain kingsnake, Townsend's big-eared bat.
	Northern Mixed Chaparral	51.40	
	Redshank Chaparral	2.56	
	Scrub Oak Chaparral	1.16	
	Semi-Desert Chaparral	118.78	
	Southern Mixed Chaparral	16.35	
	Total	223.96	
Coastal and Montane Scrub	Big Sagebrush Scrub	8.43	Quino checkerspot butterfly, coastal California gnatcatcher, San Diego horned lizard, coastal rosy boa, San Diego mountain kingsnake, Townsend's big-eared bat.
	Diegan Coastal Sage Scrub	21.92	
	Diegan Coastal Sage Scrub – Inland Form	6.97	
	Flat-Topped Buckwheat Scrub	29.62	
	Total	66.94	
Desert Scrub and Dune	Sonoran Creosote Bush Scrub	117.40	Quino checkerspot butterfly, flat-tailed horned lizard, coastal rosy boa, Peninsular bighorn sheep.
	Sonoran Mixed Woody and Succulent Scrub	6.75	
	Sonoran Desert Mixed Scrub	2.48	
	Sonoran Mixed Woody Scrub	11.59	
	Sonoran Desert Wash Scrub	0.58	
	Sonoran Desert Scrub	3.47	
	Total	142.27	
Grassland and Meadow	Non-Native Grassland	48.31	Quino checkerspot butterfly, southwestern pond turtle, California legless lizard, San Diego horned lizard, San Diego Ring-necked snake, Townsend's big-eared bat.
Herbaceous Wetland, Freshwater Marsh and Streams	Non-Vegetated Channel	2.37	Arroyo toad, southwestern pond turtle, California legless lizard, San Diego ring-necked snake, two-striped garter snake
Woodland and Forest	Coast Live Oak Woodland	3.60	California spotted owl, large-blotched salamander, California legless lizard, San Diego horned lizard, San Diego mountain kingsnake, San Diego ring-necked snake, two-striped garter snake, Townsend's big eared bat, pallid bat, western red bat.
	Peninsular Juniper Woodland and Scrub	0.32	
	Total	3.92	
Riparian Woodlands and Forests	Southern Coast Live Oak Riparian Forest	0.08	Least Bell's vireo, southwestern willow flycatcher, bald eagle, California spotted owl, Arroyo toad, southwestern pond turtle, large-blotched salamander, California legless lizard, San Diego horned lizard, San Diego mountain kingsnake, San Diego ring-necked snake, two-striped garter snake. Townsend's big eared bat, pallid bat, western red bat.

Table 4. Sensitive Vegetation in Temporary Impact Areas by Area Type

Temporary Impact Type	Vegetation Type	Acres
Access Roads	Chaparrals	1.64
	Coastal and Montane Scrub Habitats	2.81
	Desert Scrub and Dune Habitats	0.87
	Grasslands and Meadows	0.73
	Herbaceous Wetlands, Freshwater, and Streams	0.07
	Woodlands and Forests	0.02
Access Road Total		6.14
Construction Yards	Chaparrals	105.84
	Coastal and Montane Scrub Habitats	39.50
	Desert Scrub and Dune Habitats	83.82
	Grasslands and Meadows	38.65
	Herbaceous Wetlands, Freshwater, and Streams	0.31
	Woodlands and Forests	1.87
Construction Yard Total		269.99
Guard Areas	Chaparrals	0.38
	Coastal and Montane Scrub Habitats	0.12
	Desert Scrub and Dune Habitats	0.11
	Grasslands and Meadows	0.02
	Herbaceous Wetlands, Freshwater, and Streams	0.01
	Riparian Forests and Woodlands	0.03
	Woodlands and Forests	0.04
Guard Areas Total		0.71
String Sites	Chaparrals	66.35
	Coastal and Montane Scrub Habitats	14.50
	Desert Scrub and Dune Habitats	23.78
	Grasslands and Meadows	7.00
	Herbaceous Wetlands, Freshwater, and Streams	0.72
	Woodlands and Forests	0.46
String Site Area Total		112.80
Work Areas	Chaparrals	49.76
	Coastal and Montane Scrub Habitats	10.00
	Desert Scrub and Dune Habitats	33.68
	Grasslands and Meadows	2.01
	Herbaceous Wetlands, Freshwater, and Streams	1.26
	Riparian Forests and Woodlands	0.06
	Woodlands and Forests	1.53
Work Area Total		98.31
Grand Total		487.95

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3. RESTORATION ACTIVITIES

This section describes the types of restoration activities that will occur before, during, and after construction.

3.1 ACTIVITIES BEFORE AND DURING CONSTRUCTION

3.1.1 PRE-CONSTRUCTION SITE DOCUMENTATION

Prior to the beginning of Project construction activities in temporary impact areas (temporary work areas, stringing sites, construction yards, temporary access roads), data on existing biological conditions including a plant species list (native and non-native plants) and site photos will be compiled. This information, along with the previously conducted vegetation mapping, focused plant and wildlife surveys, stream and wetland surveys, and weed surveys completed for the Project between 2007 and 2010 will help establish the baseline condition for each of the temporary project impact areas; these baseline conditions will help determine the target conditions for the site restoration, and specific performance criteria will be developed based on the existing site conditions.

For early planning and reporting purposes, the extent of impact areas has been estimated as closely as possible based on previous field delineations and construction plans, but on-site verification of the construction footprint and environmental conditions will provide the most accurate and detailed assessment of actual impacts. In addition, while early survey work provided sufficient information to characterize basic vegetation and habitat conditions at most sites, the Restoration Specialists can provide a more exact assessment of species and habitat within the actual area of impact. Vegetation around the areas of temporary impacts will be surveyed and separate species lists will be compiled for the areas considered to be “waters” or non-vegetated channel, and the adjacent upland areas. The Project Restoration Specialists will document the existing topography for temporarily impacted waters within the construction footprint. This information will be important for re-contouring channel banks and other soil surfaces to pre-project conditions. If wetlands are present, vegetation within the wetlands will be described separately.

The Restoration Program Manager will determine the need for collection of any additional site specific information to inform the restoration process. Due to the minimal nature of anticipated impacts in guard areas, this level of pre-construction information will not be collected in guard areas.

3.1.2 SEED COLLECTION

Native plant seeds will be collected from permanent and temporary Project impact areas, as well as non-impacted portions of the project ROW prior to beginning Project construction activities. Initial seed

collection efforts will focus on sensitive plant species located within Project impact areas, and subsequent seed collection will include more common plant species that will comprise the volume of the seed mixes utilized for Project restoration activities. See collection seed from the Project ROW will occur on an annual basis through the end of the construction period to ensure adequate seed supplies for all Project restoration activities, including potential remedial seeding.

All seed material will be collected by a professional contract seed-collector, qualified and authorized to collect native seed from wild source populations. Species flowering periods, annual rainfall patterns, elevation, and general field variability of plant populations all influence the timing of seed set, so collection managers will inspect native seed sources prior to mobilizing crews to identify optimal collection times for the desired species and for efficiency, seed will be collected for multiple species concurrently when possible. Seed material will consist of locally endemic native seed collected from the Project ROW where approved by the BLM, CPUC, USFS, and Wildlife Agencies, or from approved areas no more than 20 miles outside of the Project ROW (e.g. offsite habitat acquisition/mitigation parcels, etc.). Collecting seed for Project restoration activities from this predefined region will ensure consistency with the MMCRP, and will protect the regional biodiversity and evolutionary fitness of native plant populations from genetic contamination potentially introduced by seed material obtained commercially or from other bioregions.

Availability of seed may be limited by edaphic factors including drought during the collection period, so flexibility in species selection and application rates will be necessary. Actual amounts of seed necessary will ultimately be determined by the purity and germination rates of the collected seed. Seed utilized will not contain more than 0.5 percent weed (as defined by Cal-IPC, 2006) seed by volume. All seed material will be separated and clearly labeled with the date of collection, location, and species by scientific name. All seed material will also be weighed, cleaned, and tested for purity and germination values. Seed material will then be mixed for the appropriate acreage of each habitat type within the various restoration sites along the Project ROW. Seeds will be stored in a cool, dry environment until delivery.

3.1.3 Plant Material Salvage

Live plant material will be salvaged in specific Project areas only, where mitigation measures dictate that sensitive plant species be removed from an impact area prior to construction, stored onsite during construction, and transplanted into the site after construction has been completed. Although no Project impact areas have been identified for native plant salvage, the Restoration Program Manager may identify Project areas prior to construction where native plant salvage will be implemented.

3.1.4 Soil Salvage

Salvaging soils prior to construction generally will be implemented to restore temporary Project impact areas in which excavation of soil is necessary. In these areas, prior to the commencement of grading the Restoration Specialist will recommend salvaging the upper six to eight inches of topsoil, especially in areas containing a high proportion of native plant species. Areas with high densities of non-native or invasive plant species will be excluded from soil salvaging efforts. Salvaging topsoil will help to retain the

beneficial soil mycorrhizal network, microorganisms, and native seed bank and assist in the establishment of native plants. All existing native vegetation will be mulched into the topsoil prior to salvage, and the topsoil will be stockpiled within the temporary impact area during construction. Height of the topsoil stockpile should be less than three feet when possible, because excessive height may cause the internal temperature of the pile to increase, thereby "cooking" any native seed and microbial material contained in the stockpile. The stockpile will have invasive weeds from establishing removed before establishing, but native plant material will be encouraged to grow on the stockpile. To minimize compaction, no equipment will be allowed to travel over or park on the stockpile under any circumstances. Silt fencing will be installed around the stockpile to prevent erosion and as a barrier to preclude any unauthorized access.

Topsoil salvage is not anticipated for soils in desert areas of the Project ROW (e.g., east of Mountain Springs Grade) as these areas do not contain true topsoil. Instead, plant nutrients are concentrated in "islands of fertility" (Garcia-Moya, 1970) around shrub bases in a matrix of low fertility materials. Soil nitrogen content decreases significantly as a function of radial distance from the center of the shrub canopy. This type of soil material will be left in place in areas of temporary disturbance. Shrubs will be trimmed to a low height or to the crown, and allowed to re-sprout using their existing mature root system. Additionally, annual plants will grow quickly in the relatively undisturbed high-nutrient island under the canopy of a shrub. These shrubs are generally the key species of these desert plant communities.

After completion of Project construction, the Maintenance Contractor will scarify the finished grade to a minimum depth of six inches and salvaged soil will be placed over the restoration area to the maximum depth based on availability of soil. The loose top soil will then be tamped into the scarified surface by track walking the area with a dozer or a sheep foot roller. Track walking should be perpendicular to the contours on any slope. Topsoil surfaces should be left in a roughened (scarified) condition suitable for planting.

3.2 POST-CONSTRUCTION ACTIVITIES

3.2.1 TRASH AND DEBRIS REMOVAL

After completion of Project construction activities, the Restoration Contractor will remove any trash and debris from the temporary impact area(s) to be restored. This includes all man-made materials and construction debris (e.g., concrete washout, wire, hardware, metal, plastic, glass, ceramic, rubber, etc.) that may be left onsite. Organic materials including wood debris, plant material, straw, sand, and minor amounts of rock or gravel base materials may be incorporated into the site soils prior to soil decompaction. The Restoration Contractor will be responsible for removal of all trash and debris from the restoration site to an approved waste disposal site (licensed landfill).

3.2.2 WEED REMOVAL

Weed control in the restoration areas will be conducted a minimum of 30 days before seeding activities are initiated. The restoration site(s) will be maintained in weed-free condition prior to seed installation. Weed control will use mechanical methods including removal by hand or string trimmers, or chemical herbicide application when recommended by the Restoration Contractor. The prescription for weed removal will include both methods because the success of chemical control methods may be increased by using one or more manual removal methods prior to herbicide application. Manufacturer specifications regarding the length of time which must pass following herbicide application prior to planting and seeding will be followed. The prescriptions for weed control discussed in this plan are adopted from and coincide with the Weed Control Plan for the SDG&E SRPL Project ([Weed Control Plan] Recon Environmental, Inc., 2009). Table 5 below displays the Project list for those species that must be controlled within Project restoration areas. The weed species list comes from direct observation of weed species occurring along the Project route as recorded by Recon Environmental during the rare plant survey and documented in the Rare Plant Survey Report (Recon, 2009). Weed species observed are presented below, with the associated California Invasive Plant Council (Cal-IPC) listing (Cal-IPC, 2006).

3.2.2.1 PHYSICAL REMOVAL METHODS

Physical weed control methods are labor intensive and will generally be utilized to control relatively small populations of weeds, or used in sensitive habitats where wildlife may be indirectly affected by weed removal activities. These weed control methods may provide an advantage in native habitats where desirable species are left in place while removing surrounding weeds. Recommended physical control methods are as follows:

- Dethatching, or removal of a layer of dead vegetation, will be utilized where dense plant litter may prevent native seed from germinating. Care will be taken when using this method because it can cause soil disturbance and thereby promote weed establishment;

- Hand pulling will be utilized to remove annual and biennial species in relatively small areas (e.g. less than one acre) prior to seed set and minimize soil disturbance;

- Cutting will be utilized to remove shrub and tree species. This method will require follow-up herbicide applications to kill the root system and prevent resprouting; and

- Mechanical removal will be utilized to remove weed infestations from large areas (e.g. greater than one acre) where few or no native plant species are present. This method will utilize a mower, weed whacker, or tiller.

3.2.2.2 CHEMICAL WEED REMOVAL METHODS

Chemical means of controlling weeds consists of the application of herbicides. Herbicides can be a very effective method in controlling weed species by killing or inhibiting plant growth. The appropriate

method of chemical application varies based on species and also with the degree of infestation, time of year, temperature, and environmental conditions. Herbicides will be used to control weeds by a qualified applicator licensed by the State of California Department of Pesticide Regulation and only where directed by the Restoration Contractor.

Table 5. Invasive Plant Species List[1]

Scientific Name	Common Name	CaI-IPC Rating[2]
Brassica tournefortii	Sahara mustard	Severe
Bromus madritensis	red brome	Severe
Bromus tectorum	cheat grass, downy brome	Severe
Cortaderia selloana	pampas grass	Severe
Foeniculum vulgare	Fennel	Severe
Tamarix ramosissima	salt cedar	Severe
Atriplex semibaccata	Australian saltbush	Moderate
Avena barbata	slender wild oat	Moderate
Avena fatua	wild oat	Moderate
Brassica nigra	black mustard	Moderate
Bromus diandrus	ripgut grass	Moderate
Carduus pycnocephalus	Italian thistle	Moderate
Centaurea melitensis	tocolote, star-thistle	Moderate
Cirsium vulgare	bull thistle	Moderate
Cynodon dactylon	Bermuda grass	Moderate
Dittrichia graveolens	stinkwort	Moderate
Hirschfeldia incana	short-pod mustard	Moderate
Lolium multiflorum	Italian ryegrass	Moderate
Nicotiana glauca	tree tobacco	Moderate
Oxalis pes-capre	bermuda buttercup	Moderate
Sisymbrium irio	London rocket	Moderate
Vulpia myuros	rattail fescue	Moderate
Brassica rapa	field mustard	Limited
Bromus hordeaceus	soft chess	Limited
Descurainia sophia	fine-leaf tansy-mustard	Limited
Erodium botrys	long-beak filaree	Limited
Helminthotheca echioides [*Picris echioides*]	bristly ox-tongue	Limited
Hypochaeris glabra	smooth cat's-ear	Limited
Marrubium vulgare	horehound	Limited
Medicago polymorpha	California bur clover	Limited
Polypogon monspeliensis	annual beard grass	Limited
Rumex crispus	curly dock	Limited
Salsola tragus	Russian thistle, tumbleweed	Limited
Schismus barbatus	Mediterranean schismus	Limited
Tamarix sp.	tamarisk	Limited

Notes

1 List developed by RECON for SRPL Project Weed Management Plan.

2 Species organized according to invasiveness rating by the California Invasive Plant Council (Cal-IPC, 2006).

Per the weed control plan adopted for this Project, SDG&E will designate a Weed Control Manager to oversee weed removal efforts and to approve any trained staff or certified pesticide applicators who will handle herbicides. The environmental risks of using herbicides will be minimized by using marker dyes to make the herbicide visible in areas where it has been applied. Higher visibility is desirable because it allows personnel to more effectively protect themselves against contamination; prevents unintended multiple application to a particular area or plant; ensures complete coverage of the target area and plants; and informs personnel of overspray and wind-drift issues, which protects non-target plants.

3.2.3 Soil Decompaction

Decompaction of soils following construction activities is anticipated to be required for portions of all stringing sites, as well as throughout all construction yards and temporary access road areas. Decompaction of soils will improve water infiltration and allow for plant root growth in restoration areas. These Project areas will be decompacted by ripping/cross ripping, to a depth of at least 12 inches when possible, with ripper teeth mounted to the back of a bulldozer, or disking and scarifying less compacted surfaces using farming implements including tillers and disks pulled by tractors. After the compacted soil surface is broken up, implements to smooth the rough surface and return it to its original contour (e.g., drag harrows with both spike-tines and flex-tines, or link-chain harrows) will be utilized. On temporary access roads, berms will be broken up and leveled to allow natural drainage of the area.

3.2.4 Soil Re-Contouring

Sites that require grading or that are partially or entirely located on slopes will be contour-graded to as close to the pre-impact condition as possible prior to the implementation of restoration activities. The following landform grading techniques will be incorporated during re-contouring to return the topography of the sites to a condition that blends with the surrounding undisturbed habitat areas:

- Varying slope ratios will be used to avoid the regularity and linearity of straight graded 2:1 slopes throughout the project site. Slope ratios will vary in the horizontal planes and both steep and flat gradients should be incorporated;
- Drainage devices, V-ditches, terrace drains, and benches will be constructed on an angle as inconspicuously as possible (i.e., with a backcut). Any portion of a drainage device that is visible from a distance will be tinted with an appropriate earthen tone color to be disguised with the surrounding habitat; and
- In areas where newly graded slopes meet the existing landform, the graded slope will transition in a manner that appears natural (i.e., contours will be smoothed rather than end abruptly at existing contours).

3.2.5 Restoration of Temporary Impacts to 'Waters'

The Project temporary impacts to 'waters' will be restored after Project construction is complete as closely as possible to pre-construction conditions. Information collected by biological monitors and

Restoration Specialists prior to and during the Project construction phase will be utilized to facilitate this restoration process. Restoration activities will generally include removal of fill material from 'waters', and restoration of previous grade and soil surface contours as described above.

Removal of fill, if applicable, in 'waters' will include excavation of road bed materials placed in drainages and/or removal of any temporary culverts. Where imported gabion or cobble was used as fill material, complete removal with machinery and by hand is anticipated to be completed. Where soil fill was used, the material will be excavated to the depth and width of the original stream or dry wash contours, as determined by measurements taken by biological monitors and/or restoration Specialists. The restored channel will be matched to the undisturbed upstream and downstream portions to approximate pre-project conditions. Following removal of any fill material, the grade and contours of channel banks at temporary impact sites will be restored.

3.2.6 SOIL TESTING

Following soil decompaction and re-contouring activities, the Restoration Specialist will determine if soil sampling should be conducted. A standard composite soil sampling method will be used to represent average soil conditions onsite and to reduce sampling effort and analytical cost. The proposed restoration site will be subdivided into areas of uniform soil based on soil color, slope, texture, and drainage. Each area with distinguishable soils within the restoration site and adjacent habitat will be sampled separately. Composite samples will consist of 2 to 10 randomly selected soil cores from areas with similar soils throughout the site. Each soil core will be taken from 0 to 4 inches below the surface and combined to make the composite sample. If most of the areas within the restoration site are uniform, two composite soil samples will suffice. The number of composite samples taken from each site will depend on local site conditions and will be determined by the Restoration Specialist. Samples will be sent to a soil lab for Standard Agricultural Suitability Analysis.

3.2.7 SOIL AMENDMENTS

To improve moisture and nutrient holding capacity and to improve conditions for root growth, the Restoration Specialist may recommend that organic soil amendments be added to the soil. Organic matter is not only a good source of nutrients, but also is beneficial for improving soil structure and soil quality for long-term plant growth. Based on the results of the soils analysis, the Restoration Specialist may recommend the addition of compost or other micronutrient supplements, such as phosphorus and potassium, to improve soils insufficient in nutrients. Soil amendments will be determined by field and lab soil tests conducted by the Restoration Specialist. Compost may also be added to a hydroseed mixture prior to application. Compost is a product produced by the controlled biological decomposition of organic matter that has been sanitized through the generation of heat and stabilized to be beneficial to plant growth. Compost is usually derived from chipped, shredded, or ground vegetation or clean, processed wood products.

3.3 SEED APPLICATION

3.3.1 SEED SOURCES

Seed material will be installed following the completion of all necessary soil preparation activities described above. The seed lists presented in Section 4 are composed of plant species known to occur in the Project impact areas and are based upon the results of plant surveys conducted for the Project. Species selected for seeding have been observed in habitats with similar conditions to those present onsite prior to construction activities, These Project-specific seed mixes are expected to return temporary Project impact areas to fully functional plant communities with the restoration timeframe.

3.3.2 SEED APPLICATION TIMING

To promote successful plant establishment, seeding will ideally occur between October 1 and March 15 annually to take advantage of winter rains and cooler, moderate temperatures. Project construction is anticipated to begin in Fall/Winter 2010, and continue through approximately 2012. Due to the large number of temporary impact sites to be restored and the fact that restoration will ultimately be driven by completion of the construction schedule in any given area, these seed application timing conditions may not always be met. The use of hydroseed with wood fiber and a binder, as prescribed in Table 6 below, will facilitate seed application outside of this seasonal window assuming the restoration site will not be subject to significant surface disturbance prior to the onset of the winter rain season in southern California. If the site(s) are disturbed after seed application, the Restoration Contractor will reapply the seed mix between October 1 and March 15.

3.3.3 MYCORRHIZAL INOCULATION

The restoration areas will receive granular mycorrhizal inoculum. The application of multi-species commercial inoculum will be avoided. The inoculum will contain only a single species of fungus to minimize the potential for persistence of non-native fungi. Note that native fungal species can typically return to a site naturally within one to three years if suitable host plants are available (St. John, 1998). Mycorrhizal inoculum provides symbiotic organisms that are often the key to the success of a restoration project. Natives require these organisms, and weeds typically do not. Their presence can sometimes make weeds less troublesome on a restoration project. The following conditions apply to the use of inoculum:

- Endo (arbuscular) mycorrhizal inoculum will be registered by the California Department of Food and Agriculture and consist of spores, mycelium, and mycorrhizal root fragments in a solid carrier suitable for handling by broadcast seeding, hydroseeding, or drill seeding. The carrier will be the material in which the inoculum was originally produced and may include organic materials, vermiculite, perlite, calcined clay, or other approved materials consistent with mechanical application and good plant growth;

- A single species inoculum will be used when available. However, if this is not feasible, for each endomycorrhizal inoculum the species *Glomus intraradicies* will be a minimum of 50 percent of the propagules. The inoculum will carry a supplier's guarantee of 80,000 propagules minimum per kg; the minimum propagule count will be shown on each label provided. If more than one fungal species is claimed by the supplier, the label will include a guarantee for each species claimed;
- Endomycorrhizal inoculum is a live material that will be stored, transported, and applied at temperatures of less than 90 degrees Fahrenheit (32°C). If temperatures will exceed 90 degrees Fahrenheit, the inoculum will be covered or incorporated within three hours of its application.

3.3.4 SEEDING METHODS

One or a combination of three available methods of seed application may be used depending upon the specific restoration site conditions. These include hydroseeding, broadcast (or hand-broadcast) seeding, and land imprinting. Where these specifications apply to only a single seeding method, they should be considered as applicable only if the Restoration Contractor selects the corresponding method.

3.3.5 HYDROSEEDING

Hydroseeding will be the primary application method chosen to apply the seed in all Project restoration areas. Hydroseeding is a conventional method of revegetation widely used in large scale revegetation efforts. The effective method of combining seed mixtures with the necessary agents including fertilizer, fiber mulch, tackifier, dyes, and other additives, allows for the quick germination of seeds, which can be spread over a large area using trucks and/or trailer mounted tanks. Hydroseed hoses typically do not exceed 300 feet, and application requires that water be provided for the slurry mixture by a water truck or other method. Therefore, hydroseeding will be effective in most areas of the Project where vehicle access is available within 300 feet or less of the restoration site.

3.3.5.1 HYDROSEEDING APPLICATION

The restoration areas will be seeded using a two-stage hydroseed application method. Preventive measures will be taken to avoid damage to adjacent, undisturbed vegetation. The hydroseed application should be conducted under the direction of the Restoration Contractor in accordance with the following requirements:

- All hydroseed mixing will be completed in a clean tank. The tank will be rinsed a minimum of three times. It is the Restoration Contractor's responsibility to locate a washout area where rinsing can be carried out legally. The hydroseeder will be equipped with a built-in continuous agitation and recirculation system of sufficient operating capacity to produce homogeneous slurry and a discharge system that will apply slurry to the designated areas at a continuous and uniform rate;

- The slurry preparation will take place within the Project ROW whenever possible and should be started by adding water to the tank with the engine running at half-throttle. Good recirculation will be established when the water level has reached the height of the agitator shaft. At this time, the seed and inoculum will be added. The fiber (first application) or tackifier (second application) will be added when the tank is at least 30 percent filled with water. The hydroseeding Restoration Contractor will commence spraying once the tank is full and a homogeneous slurry has been created;
- The hydroseeding Restoration Contractor will spray designated areas with the slurry in a sweeping motion and in an arched stream until a uniform coat is achieved, with no slumping or shadowing as the material is spread at the required rate;
- The hydroseed slurry must float down from the arched stream as opposed to being shot directly at the ground. During hydroseeding, adjacent plants will be protected from damage (including but not limited to coating with seed or tackifier, damage by direct spray, and damage by dragging the hose). The tanks will be emptied completely during each stage of hydroseeding. Excessive coating on adjacent plants will be removed before the end of the day;
- Any slurry mixture that has not been applied by the hydroseeding Restoration Contractor within one hour after mixing will be rejected and replaced at the Restoration Contractor's expense. In addition, no construction activity or vehicular or mechanical tracking will occur within the designated hydroseeded areas after hydroseed has been applied.

The hydroseed specifications for the first and second hydroseed application within all restoration areas are summarized below in Table 6.

Table 6. Hydroseed Application Specifications

First Hydroseed Application	Second Hydroseed Application (within 2 hours of first application)
Specified seed and suitable carrier	1,500 lbs/acre of long strand wood fiber
500 pounds lbs/acre of long-strand wood fiber	90 lbs/acre of M-Binder
60 lbs/acre of endomycorrhizal inoculum	N/A

3.3.5.2 Equipment and Supplies for Hydroseeding

Fiber Mulch

Fiber mulch used hydroseeding will only be 100 percent long-stranded wood fiber. Fiber will not contain recycled wood pulp products. The mulch will be applied at a rate of between 1,500 and 3,000 pounds per acre or per manufacturer's recommendation. The mulch may contain dyes to provide visual cues to which areas have and have not received seed.

Compost

Compost may be utilized in lieu of fiber mulch or combined with fiber mulch. It is a product produced by the controlled biological decomposition of organic matter that has been sanitized through the generation of heat and stabilized to be beneficial to plant growth. Compost is usually derived from chipped, shredded or ground vegetation or clean processed wood products and has numerous biological and physical benefits. Several commercial brands are available. In all cases, the manufacturer's application rate recommendation will be followed.

Binder

Tackifier forms a firm, resilient, re-absorbent membrane that fastens seed to the soil surface. Tackifier used hydroseeding will be Ecology Controls, M-Binder, or an equivalent product. The binder will to be applied at 90 pounds per acre or per manufacturer's recommendation.

Water

Water will be obtained by the Restoration Contractor in compliance with the Project water use plan and will be free of harmful impurities, excess chlorine, and salts.

3.3.6 BROADCAST SEEDING

Broadcast seeding will be utilized for guard areas and other very small restoration areas at the discretion of the Restoration Program Manager. Broadcast seeding involves the mechanical spreading of a seed mixture over the desired revegetation site.

3.3.6.1 SITE PREPARATION AND APPLICATION OF BROADCAST SEEDING

Adequate site preparation is recommended to allow for the germination of the seed mixture. Site preparation may involve scarifying or decompacting soils, debris removal, pre-watering to aid seed adhesion, and installation of site-specific BMPs, including drift fencing, straw wattles, and other materials and measures as needed.

- Seed will not be broadcast on a windy day;
- Clean seeds will be mixed with one to four parts of an inert carrier, such as moist sand or saw dust;
- The seeds will be broadcast dry to soil containing residual moisture within 0.25 inch of the soil surface. If the soil does not contain residual moisture, then, if possible, the site will be watered thoroughly with a water truck prior to sowing to adequately moisten the upper layer of the soil;
- Broadcast seeding will be followed immediately by raking and pressing the seeds into contact with the soil, using weighted rollers or other appropriate equipment. The roller may be weighted with water, depending on soil conditions;

- Seed also may be broadcast by hand over smaller sites. Seed will be mixed with a carrier as stated above, and divided into two equal parts. Half of the seed will then be hand-broadcast by walking across the entire site in a north-south orientation, or another linear orientation appropriate for the site. The remaining half of the seed will then be hand-broadcast by walking across the site in an east-west orientation, or perpendicular to the first application. This method ensures even distribution of seed throughout the site;

3.3.7 IMPRINT SEEDING

Land imprinting may be utilized in large areas with flat terrain (e.g., construction yards) at the discretion of the Restoration Program Manager. This method will be used on a grade of 2:1 slope or less and when soil conditions are such that the imprinter leaves an impression the full depth of the imprinter tooth. Land imprinting is used to create seed "safe sites" that collect water and shade seedlings to promote establishment.

3.3.7.1 SEEDBED PREPARATION AND TREATMENT FOR LAND IMPRINTING

- The soil may be imprinted when dry if it is soft enough to allow penetration of the imprinting teeth to their full depth and firm enough to permit the formation of smooth-walled, firm impressions. If the dry soil does not allow formation of quality impressions, it may not be imprinted until rainfall or irrigation leaves it in a suitable condition;
- Soil that is too hard to accept a pattern that conforms to performance specifications with a properly weighted imprinter will be ripped before imprinting. Adjustment of the imprinter ballast is preferred over ripping where feasible;
- Clay soil will not be imprinted while it is so wet that substantial quantities of soil stick to the roller. Shallow soils over bedrock also will not be imprinted.

3.3.7.2 VEGETATIVE COVER

The land imprinting operation will be utilized on bare earth or on land that has only a minimal vegetative cover, except as specified below. If the amount and nature of vegetative cover is sufficient to interfere with soil contact and the formation of quality impressions, such vegetation will be removed by raking, or other suitable means prior to imprinting.

3.3.7.3 OPERATING PROCEDURES

The optimum operating speed is three to four miles per hour. The imprinter will be pulled at a speed low enough to ensure that the full weight of the roller bears upon the soil at all times. If the impressions are longer than 10 inches, the long dimension of each imprint will lie parallel to the contour of the slope. If imprint length is 10 inches or less, the imprinter may be used in any orientation to the slope. The imprinting pattern will extend fully to the boundaries of the reseeding site. The area at the Project restoration area boundary may serve as a turn-around area and will be imprinted by a final pass along the Project perimeter. If conditions do not permit imprinting the perimeter, a turn-around area within

the Project restoration site will not be fully imprinted. Any unimprinted turn-around area on the Project boundary will be no wider than the smallest turning radius allowed by the equipment.

3.3.7.4 Equipment and Supplies for Land Imprinting

The characteristics of imprinting teeth will be:

- The height of the imprinting teeth will be a minimum of four inches. Imprinting teeth will be V-shaped in transverse section and may be rectangular or triangular in longitudinal section;
- The crest-to-crest spacing between teeth will be less than two feet, with one foot being optimum for restoration activities;
- The apical angle of the triangular cross section of the imprinting teeth will be 90 degrees or less, with acute teeth preferred for the steepest slopes.

The desired weight, pressure, and type of tractor are:

- The static pressure on the soil surface is measured by dividing the total weight of the imprinter, including any ballast, by the total area of tooth contact when the teeth have penetrated half way into the soil. The static pressure on the soil surface will be at least 12 pounds per square inch and less than 48 pounds per square inch. The lower weights are for softer soils and the higher weights for harder or drier soils;
- No more pressure will be used than that required to obtain a full-tooth imprint;
- No individual roller will be more than eight feet in length, except in the case of level, rock-free land that will not cause a long roller to leave unimprinted areas. More than one roller may be attached to a single imprinting device as long as each roller swivels independently over surface obstructions. In this case, the combined rollers may be any practical width;

The form of impressions for land imprinting will be:

- A minimum of 70 percent of the soil surface will bear impressions, apart from any peripheral turn-around area and areas rendered untreatable by rocks or other natural features;
- A minimum of 70 percent of the impressions will reach 90 percent of the full tooth depth;
- A minimum of 70 percent of the impressions will have smooth and firm soil for more than 70 percent of their surface area;
- No portion of the imprinted soil profile will exceed 80 percent compaction;
- In lieu of an imprinting machine, dozer track walking perpendicular to the site contours may also be used to create seed “safe sites” prior to hand-broadcasting or hydroseeding.

3.3.8 CONTAINER PLANTING

Container planting (with supplemental irrigation as discussed in Section 3.3.9 below) may be utilized where deemed necessary by the Restoration Program Manager. To the greatest extent possible, container plants will be propagated and/or grown from seed collected within or immediately adjacent to the Project ROW. If cuttings are obtained to be propagated for planting, they will be collected from within or immediately adjacent to the Project ROW as well. Propagation will be conducted by transferring collected seed or cuttings to a contract-grow nursery for germination, propagation, care, conditioning, and establishment in preparation for planting at restoration sites. The contract-grow nursery will be experienced in the germination, propagation, care, maintenance, conditioning, and establishment of native plants for installation into native habitats. Nursery staff will be proficient in the prevention, identification, and treatment of fungal diseases and other pest or weed infestations that may occur while the plants are under nursery care.

Standard one-gallon containers will be utilized for shrub and perennial herb species to ensure the plants have sufficient root establishment and growth to be resilient to planting shock or harsh conditions of the restoration site. This size container also allows for adequate time at the nursery to properly harden the plants prior to out-planting. Liner, plugs, 4-inch pots, or Deepots™ may be substituted for the one-gallon containers upon approval by the Restoration Program Manager.

It is anticipated that container plants will not be used as a general component of the restoration effort. However, container plants may be used in special circumstances (i.e. remedial measures) as approved by the Restoration Program Manager.

3.3.8.1 CONTAINER PLANT MATERIAL INSPECTION

The Restoration Specialist will be responsible for inspection of any and all container plants used at the restoration site(s). The plants may be inspected at the nursery immediately prior to shipment for delivery to the planting location, or immediately upon delivery. At least 10 percent of container plants will be inspected for plants with coiled roots (rootbound), disease infestation, insufficient root development, signs of micronutrient deficiencies, or other conditions less than favorable for out-planting. Plants found to be deficient will not be accepted for planting within the restoration sites. If any of these conditions are observed upon inspection, an additional 10 percent of the plant material will be inspected until the delivery is either accepted or rejected and returned to the nursery. Upon delivery to the restoration site, plants will be stored in a safe location, protected from adverse weather, browsing by herbivores, vandalism, or other conditions that may be detrimental to the plant prior to planting. Container plants will be delivered and maintained in a manner consistent with the following specifications:

- All plants will be hardened to frost/drought;
- All plant species that would normally host mycorrhizal fungi will be inoculated with mycorrhizal fungi;
- Plants will not be grown with excessive fertilization at the nursery;

- Plant root systems will fill the containers, but not be root-bound at time of delivery;
- Plant materials will be properly labeled as to genus, species, subspecies or variety, and source;
- Plant materials will be provided in quantities and sizes specified;
- Plants will be ready for planting during the specified planting period;
- No plants showing signs of serious pest infestation or disease will be accepted;
- All plant substitutions will require written approval from the Restoration Program Manager;
- Plants will not be subjected to breakage or desiccation during transport. Any broken or desiccated plants will be rejected;
- Plant materials will be inspected and approved by the Restoration Specialist prior to delivery;
- Upon delivery to the restoration site(s), plants will be stored in a safe location, evenly spaced, upright, and watered as needed until planting. All materials will be protected from adverse weather, vandalism, or other conditions that may be detrimental to the plant(s); and
- During unloading, plant containers will be placed on the ground and not be dropped from any height. Dropping a container on the ground may break the root mass holding the rootball together causing the rootball to fall apart during removal from the container and irreparably damaging the plant.

3.3.8.2 Container Plant Installation

Placement and spacing of planting will be distributed to mimic natural groupings and patterns of vegetation growing in similar habitats. Planting plans may (or may not) be available for each restoration site based on agency requirements. Placement of container plants will be approved by the Restoration Program Manager, Restoration Specialist, and Restoration Contractor prior to installation based on the planting plan or spacing to mimic natural groupings of plants. Installation of container plantings should be accomplished under the direct supervision of the Restoration Specialist.

At the designated planting location(s) the soil will be loosened to a minimum diameter of three times the width and slightly less than the height of the container. Within the loosened soil, planting holes will be slightly wider and slightly less than the depth of the plant container. Each planting hole will be filled with water and allowed to drain until no free moisture remains in the hole. Immediately after draining, the plant will be removed carefully from its container and the root volume loosened somewhat with gentle pressure on the sides of the root mass. Any observed kinked or girdling roots will be cut prior to planting. The plant will immediately be placed in the planting hole so that the top of the container surface is slightly higher than the original soil grade after planting. Soil removed during excavation will be firmed around the root mass to fill air voids and secure the plant in position in the hole. The soil surface may be pressed with a tool or foot to firm the plant into position. A watering basin will be

constructed four to six inches wider than the rootball of each plant and three to four inches high. After backfilling of the planting hole, the watering basin around the plant will be filled with water and allowed to drain completely. The basin will be refilled as many times as necessary to ensure that the water penetrates the soil down past the rootball into undisturbed soil. A soil probe or shovel will be used to check how deeply the water has penetrated. All steps will be completed without delays and while assuring that plants at no time show wilting or other indications of water stress. Container plants will be installed before seed is applied to a restoration site. Pruning of plantings will be limited only to that necessary to remove injured twigs and branches as a result of delivery to the restoration site or during planting.

3.3.9 WATERING AND IRRIGATION

Natural precipitation is anticipated to be the sole source of water for all restoration sites, and restoration sites that are seeded only will not be irrigated unless approved by the Restoration Program Manager. Container planting is not anticipated to be used except in special circumstances (i.e. remedial measures) so use of irrigation will only be in restoration sites where container plants have been installed. Supplemental irrigation methods may include an overhead spray system, a bubbler system, a combination thereof, and/or drip systems. Where standard electricity is not available, supplemental irrigation applications can be controlled with solar or battery operated controllers. Supplemental irrigation can also include the use of a time-release gel product, such as DriWater® or polyacrylamide gel, which aid in delivery of consistent water to plant roots. The supplemental irrigation method(s) will be determined by the Restoration Program Manager.

3.3.9.1 OVERHEAD SPRAY SYSTEM

An overhead spray system will only be utilized where water is available in sufficient quantities/volume and have a large planting area. An overhead system would include a high efficiency, water conserving, low precipitation sprinkler head, such as a MP Rotator providing overhead irrigation with an output measured in gallons per minute. Lateral and main line standard PVC piping or equivalent will be placed on grade.

3.3.9.2 BUBBLER SYSTEM

A bubbler system will be utilized in small restoration sites for irrigating individual containers, by providing a steady “drip” type of irrigation directly to the plant rootball with an output measured in gallons per hour. The type of bubbler head used will be of the pressure compensating type, (i.e., bubbler output that will not vary due to elevation). The same type of above grade irrigation lines can be used as in an overhead system.

3.3.9.3 COMBINATION OVERHEAD SPRAY/BUBBLER SYSTEM

In certain instances a combination overhead spray/bubbler system may be used. Where larger container plant material may require more water than the seeded material, bubblers, operating on a separate valve, can provide the necessary amount of water without overwatering the seeded plant material.

3.3.9.4 DRIP SYSTEM

A drip system may be utilized where a very high degree of irrigation efficiency is required and where wind may be an issue. Underground drip systems are highly efficient in that little water is lost to evaporation, and water is applied only where needed: in the root zone. Flexible tubing with built-in drippers that are pressure compensating, self flushing, and anti-siphoning, will be installed below the surface to deliver water with flow rates measured by gallons per hour. However, these systems generally require more maintenance than the overhead spray and bubbler systems.

3.3.9.5 HAND WATERING

Where municipal water sources are not available, irrigation systems may be designed to operate through gravity feed from above-ground, portable storage tanks that are filled by water truck as necessary. Other systems may be operated by a direct connection to a water truck with an auxiliary pump. Supplemental irrigation may also be provided from a water truck, towed water buffalo, or pick-up truck bladder with a garden hose.

3.3.9.6 TIME-RELEASE GEL PRODUCT

A time-release gel product, such as DriWater® or equivalent, may be utilized where a municipal water source is not available. Use of time-release gel products can be effective when accessing, transporting, storing or applying water to plants is not feasible yet container plants have been installed. It is an option that can deliver moisture directly to a plant's roots, making frequent or repeated watering unnecessary and saving labor and equipment costs. Additionally, no water is wasted, and a permanent water source is not needed.

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4. RESTORATION OF SENSITIVE VEGETATION COMMUNITIES

This section summarizes the approach for restoring each of the 22 sensitive vegetation communities within the Project temporary impact areas. Each sensitive vegetation community is characterized, and a generalized or community-specific seed palette is provided. Any sensitive wildlife species that may occur within the habitats provided by the vegetation community are noted. The specific restoration approach is then briefly discussed, including any applicable restoration practices.

4.1 CHAPARRAL VEGETATION

Chaparral vegetation within the impact areas is categorized into six distinct vegetation communities including chamise chaparral, northern mixed chaparral, red shank chaparral, scrub oak chaparral, semi-desert chaparral, and southern mixed chaparral. Each vegetation community is briefly characterized below. The Project impact areas for each vegetation community are summarized in Table A-1 in Appendix A.

4.1.1 COMMUNITY DESCRIPTIONS

4.1.1.1 CHAMISE CHAPARRAL

Chamise chaparral is characterized by sclerophyllous (thick, stiff, heavily cutinized evergreen leaves, and hard-woody stems) shrubs dominated by chamise, which has the widest range of any chaparral shrub. While chamise stands are often monotypic, common associates within this community may include birch-leaf mountain mahogany (*Cercocarpus betuloides* var. *betuloides*), black sage (*Salvia mellifera*), California sagebrush (*Artemisia californica*), chaparral candle (*Hesperoyucca whipplei*), mission manzanita (*Xylococcus bicolor*), and scrub oak (*Quercus berberidifolia*). Burned chamise chaparral, which also occurs within the Project temporary impact areas, is Chamise Chaparral that has not fully recovered from recent fire(s). An estimated total of 33.71 acres of chamise chaparral will be temporarily impacted by the Project and restored consistent with the RPSV within the Project ROW.

4.1.1.2 NORTHERN MIXED CHAPARRAL

Northern mixed chaparral is characterized by sclerophyllous shrubs forming thick, often impenetrable stands. Vegetation is dominated by scrub oak (*Q. berberidifolia*), chamise, various taxa of manzanita, and ceanothus. Plants within this community typically are deep rooted; and generally, little understory is present. Disturbed northern mixed chaparral has a high proportion of non-native plant species as a result of natural and/or anthropogenic disturbances. An estimated total of 51.40 acres of northern

mixed chaparral will be temporarily impacted by the Project and restored consistent with the RPSV within the Project ROW.

4.1.1.3 Redshank Chaparral

Redshank chaparral often forms pure stands of redshank that flower in mid-summer. Dominant shrubs in this community typically grow between 6 to 12 feet in height and form a somewhat open canopy. Other associates include chamise, mountain mahogany, and various taxa within the genus *Arctostaphylos*. An estimated total of 2.56 acres of redshank chaparral will be temporarily impacted by the Project and restored consistent with the RPSV within the Project ROW.

4.1.1.4 Scrub Oak Chaparral

Scrub oak chaparral is a dense, evergreen chaparral found at sites generally more mesic than other chaparral communities and typically includes some of the dominant plant species found within southern and northern mixed chaparral (e.g., chamise, birch-leaf mountain mahogany, and manzanita). Scrub oak chaparral is dominated by one of three scrub oak species within San Diego County: Nuttall's scrub oak (*Quercus dumosa*), scrub oak, or Muller's scrub oak (*Quercus cornelius-mulleri*). There typically are zones of hybridization between occurrences of these species. An estimated total of 1.16 acres of scrub oak chaparral will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.1.1.5 Semi-Desert Chaparral

Semi-desert chaparral is a structurally homogeneous vegetation community typically characterized by sclerophyllous species, such as scrub oak and chamise. However, some key species within this vegetation community are not sclerophyllous, such as juniper, buckwheat, and cacti. Dominant shrub species typically grow between four and six feet. This community most likely goes dormant during cold winters and during late summer and fall during droughts. An estimated total of 118.78 acres of semi-desert chaparral will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.1.1.6 Southern Mixed Chaparral

Southern mixed chaparral is a sclerophyllous shrub dominated vegetation community where the dominant plant species may include big-berry manzanita (*Arctostaphylos glauca*), black sage, California buckwheat (*Eriogonum fasciculatum*), chamise, chaparral whitethorn (*Ceanothus leucodermis*), coast spice bush (*Cneoridium dumosum*), giant stipa (*Achnatherum coronatum*), Nuttall's scrub oak, Ramona-lilac (*Ceanothus tomentosus*), scrub oak, sugar bush (*Rhus ovata*), toyon (*Heteromeles arbutifolia*), and Zaca Lake manzanita (*Arctostaphylos glandulosa* ssp. *zacaensis*). Where this vegetation community is found within the Project area, the dominant plant species are dependent upon slope, aspect, elevation, and edaphic factors. Disturbed southern mixed chaparral has a high proportion of non-native species as a result of natural and/or anthropogenic disturbances. Burned southern mixed chaparral has not fully

recovered from recent fire(s). An estimated total of 16.35 acres of southern mixed chaparral will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.1.2 SEED PALETTES

A generalized seed palette chaparral vegetation communities is provided in Table 7 below. The palette was developed based on chaparral plant species that were observed and recorded by a variety of SDG&E staff and contractors between 2008 and 2010 on or adjacent to the Project ROW. The seed palette is preliminary, and community-specific mixes with specified seed quantities and application rates per acre will be developed as seed collection progresses. A wide variety of native chaparral plant species are included on the general palette to provide the Restoration Program Manager and Restoration Specialists with options for designing final seed palettes that will reflect the natural diversity, species composition, and relative abundance of species within each Project temporary impact location. Final seed palettes will be developed following collection of reference site data within similar undisturbed habitats (CPUC and BLM, 2009).

Table 7. Chaparral Generalized Seed Palette

Species	Common Name	Annual/ Perennial	Life Form
Achnatherum coronatum	giant stipa	perennial	grass
Adenostoma fasciculatum	chamise	perennial	shrub
Adenostoma sparsifolium	red shank	perennial	shrub
Allophyllum glutinosum	blue false-gilia	Annual	herb
Amsinckia menziesii	rancher's fireweed	Annual	herb
Antirrhinum coulterianum	Coulter's snapdragon	annual	herb
Antirrhinum kelloggii	climbing snapdragon	annual	herb
Antirrhinum nuttallianum	Nuttall snapdragon	annual	herb
Artemisia californica	California sagebrush	perennial	shrub
Artemisia dracunculus	tarragon	perennial	shrub
Artemisia tridentata ssp. *tridentata*	big sagebrush	perennial	shrub
Asclepias californica	California milkweed	perennial	herb
Asclepias fascicularis	narrow-leaf milkweed	perennial	herb
Baccharis emoryi	chaparral broom	perennial	shrub
Baccharis pilularis	coyote brush	perennial	shrub
Baccharis sarothroides	broom baccharis	perennial	shrub
Bothriochloa barbinodis	cane bluestem	perennial	grass
Brickellia californica	California brickellbush	perennial	shrub
Bromus carinatus	California brome	annual	grass
Calandrinia ciliata	red maids	perennial	herb
Camissonia bistorta	California sun cup	annual	herb
Camissonia californica	false-mustard	annual	herb
Camissonia hirtella	field sun cup	annual	herb
Carex triquetra	triangular-fruited sedge	perennial	herb
Castilleja affinis ssp. *affinis*	coast paintbrush	annual	herb
Castilleja exserta	purple owl's clover	annual	herb
Castilleja foliolosa	woolly Indian paintbrush	annual	herb
Chaenactis artemisiifolia	white pincushion	annual	herb

Species	Common Name	Annual/ Perennial	Life Form
Chaenactis glabriuscula	yellow pincushion	annual	herb
Cirsium occidentale var. *occidentale*	cobwebby thistle	perennial	herb
Collinsia concolor	southern Chinese houses	annual	herb
Collinsia parviflora	blue-eyed mary	annual	herb
Cordylanthus rigidus	thread-leaved bird's-beak	annual	herb
Croton setigerus	dove weed	annual	herb
Cryptantha intermedia	nievitas cryptantha	annual	herb
Cryptantha muricata	forget-me-not	annual	herb
Daucus pusillus	rattlesnake weed	annual	herb
Deinandra fasciculata	golden tarplant	annual	herb
Descurainia pinnata	western tansy mustard	annual	herb
Dodecatheon clevelandii	shooting star, wild cyclamen	perennial	herb
Emmenanthe penduliflora	whispering bells	annual	herb
Encelia californica	common encelia	perennial	shrub
Eriogonum fasciculatum var. *fasciculatum*	coast California buckwheat	perennial	shrub
Eriogonum wrightii	Wright's buckwheat, bastard-sage	perennial	shrub
Eriophyllum confertiflorum	golden yarrow	perennial	herb
Gilia angelensis	grassland gilia	annual	herb
Grindelia camporum	gumplant	perennial	herb
Gutierrezia sarothrae	matchweed	perennial	herb
Hazardia squarrosa	saw-toothed goldenbush	perennial	shrub
Helianthemum scoparium	peak rush-rose	perennial	shrub
Helianthus annuus	common sunflower	annual	herb
Lessingia glandulifera	valley lessingia	annual	herb
Lupinus concinnus	bajada lupine	annual	herb
Lupinus excubitus	grape soda lupine	perennial	herb
Lupinus hirsutissimus	stinging lupine	annual	herb
Lupinus truncatea	collar lupine	annual	herb
Malacothamnus fasciculatus	chaparral mallow	perennial	shrub
Malosma laurina	laurel sumac	perennial	shrub
Mimulus aurantiacus	low bush monkey-flower	perennial	shrub
Mimulus brevipes	hillside monkey-flower	annual	herb
Mirabilis laevis	wishbone bush	perennial	herb
Paeonia californica	California peony	perennial	herb
Pectocarya linearis	comb-bur	annual	herb
Penstemon centranthifolius	scarlet bugler	perennial	herb
Penstemon clevelandii	Cleveland's beard-tongue	perennial	herb
Penstemon spectabilis	violet beard-tongue	perennial	herb
Phacelia cicutaria	caterpillar phacelia	annual	herb
Plantago erecta	dot-seed plantain	annual	herb
Salvia apiana	white sage	perennial	shrub
Salvia clevelandii	Cleveland sage, fragrant sage	perennial	shrub
Salvia columbariae	chia	annual	herb
Salvia mellifera	black sage	perennial	shrub
Trichostema parishii	mountain bluecurls	perennial	shrub

4.1.3 SENSITIVE WILDLIFE SPECIES

Sensitive wildlife species known to occur in the chaparral vegetation communities within or adjacent to the Project ROW include Quino Checkerspot Butterfly (*Euphydryas editha quino*), Coastal California Gnatcatcher (*Polioptila californica californica*), California Legless Lizard (*Anniella pulchra*), San Diego Horned Lizard (*Phrynosoma coronatum blainvilii*), Coastal Rosy Boa (*Charina trivirgata roseofusca*), San Diego Ring-Necked Snake (*Diadophus punctatus similus*), and Townsend's Big-Eared Bat (*Corynorhinus townsendii*). Special considerations for restoration activities are described below.

4.1.3.1 QUINO CHECKERSPOT BUTTERFLY HABITAT

Quino checkerspot butterfly habitat is present in openings within chaparral habitats throughout the Project ROW. The Quino checkerspot butterfly is associated with specific flora that serves as larval host plants (e.g., dot-seed plantain). The preferred habitats largely consist of herbs and forbs occurring on cryptogrammic crusts and within clay soils often associated with poor drainage. Onsite restoration as mitigation for temporary impacts to habitats that support the Quino checkerspot butterfly will be completed in kind, and will involve the replacement specific soil parameters onsite. Soil disturbance in Quino checkerspot butterfly habitat will be minimized and may include the use of construction mats to avoid soil compaction. Planting methods in Quino checkerspot butterfly habitat will be limited to seeding. Seeding will occur from October through January to avoid potential butterfly disturbance during the flight season.

4.1.3.2 COASTAL CALIFORNIA GNATCATCHER HABITAT

Although the coastal California gnatcatcher is closely associated with variations of coastal cage scrub, chaparral habitats also may support breeding pairs, especially where coastal sage scrub habitat is present nearby or forms a component of the chaparral habitat (Bontrager 1991). Onsite restoration as mitigation for temporary impacts to coastal California gnatcatcher habitat should be completed in kind, and involve the replacement of specific soil parameters onsite. Planting methods for coastal California gnatcatcher habitat may include planting and seeding, but these activities should be completed before breeding season, which generally begins around February 15. Weed control and other maintenance activities completed during nesting season should be conducted and monitored by a qualified biological monitor to avoid any disturbance to the coastal California gnatcatcher.

4.1.4 RESTORATION APPROACH

The restoration approach for chaparral vegetation communities will focus on preserving native shrubs to the extent possible prior to construction through application of crown pruning. Where possible, crushing chaparral vegetation with machinery or pruning to the base of the plants prior to construction will be utilized to preserve root systems and facilitate crown-sprouting during the restoration process. Many native shrubs in these communities are slow growing and may be difficult to establish from seed without the germination enhancing effects of fire, smoke, or other stratification methods. The focus will be on making extensive seed collections throughout the Project ROW to ensure maximum flexibility in designing effective community-specific seed palettes. The native chaparral communities to be restored

exhibit variable levels of plant species diversity, precipitation requirements, and fire tolerance, and these species assemblages will be represented within the community specific seed palettes to the maximum extent practicable. Restoration site preparation and hydroseed application will also be timed to avoid impacts to quino checkerspot butterfly and/or coastal California gnatcatcher in these native chaparral habitats. Additional community-specific restoration methods and target conditions are briefly discussed below.

4.1.4.1 Chamise Chaparral

An estimated total of 33.71 acres of chamise chaparral will be restored within the Project ROW. This community is dominated by native shrubs and typically has low species diversity and very low cover values for grasses, herbs, and trees. The seed palette for this community will be comprised of relatively few native shrub species. The community is anticipated to reach a relatively mature form within the 5-year maintenance, monitoring, and reporting period.

4.1.4.2 Northern Mixed Chaparral

An estimated total of 51.40 acres of northern mixed chaparral will be restored within the Project ROW. This community is dominated by slow growing native shrubs, and the seed palette for this community will be composed of similar shrub species to southern mixed chaparral, with fewer understory components. Due to the long temporal span required for many of the native shrubs to reach maturity, this community is anticipated to reach a moderately open form within the 5-year maintenance, monitoring , and reporting period and require over 20 years to achieve a fully mature form.

4.1.4.3 Redshank Chaparral

An estimated total of 2.56 acres of redshank chaparral will be restored within the Project ROW. This community is dominated by slow growing native shrubs, and the focus will be on crown pruning of redshank prior to construction impacts. The seed palette for this community will be composed of similar shrub species to scrub oak chaparral, with more understory components. Due to the long temporal span required for the dominant native shrubs to reach maturity, this community is anticipated to reach a moderately open form within the 5-year maintenance, monitoring , and reporting period and require over 20 years to achieve a fully mature form.

4.1.4.4 Scrub Oak Chaparral

An estimated total of 1.16 acres of scrub oak chaparral will be restored within the Project ROW. This community is also dominated by slow growing native shrubs, and the focus will be on crown pruning of scrub oak prior to construction impacts. The seed palette for this community will be composed of similar shrub species to redshank chaparral, with fewer understory components. Due to the long temporal span required for the dominant native shrubs to reach maturity, this community is anticipated to reach a moderately open form within the 5-year maintenance, monitoring , and reporting period and require over 20 years to achieve a fully mature form.

4.1.4.5 Semi-Desert Chaparral

An estimated total of 118.78 acres of semi-desert chaparral will be restored within the Project ROW. This community is dominated by a relatively sparse cover of slow growing native shrubs, succulents, and herbs. Due to the xeric nature of this community and the tendency to occur on soils with low fertility, the focus will be on pre-construction pruning of shrubs in semi-desert chaparral, minimization of soils impacts, heavy application of native seeds within the restoration areas, and vertical mulching. Due to the low available precipitation and long temporal span required for many of the native shrubs and succulents to reach maturity, this community is anticipated to remain in an open, immature form by the end of the 5-year maintenance, monitoring , and reporting period and require over 20 years to achieve a fully mature form.

4.1.4.6 Southern Mixed Chaparral

An estimated total of 16.35 acres of southern mixed chaparral will be restored within the Project ROW. This community is dominated by a mixture of slow and fast growing native shrubs, and the seed palette for this community will be composed of similar shrub species to northern mixed chaparral, with more diverse herb and shrub understory components. Due to the long temporal span required for many of the native shrubs to reach maturity, this community is anticipated to reach a moderately open form within the 5-year maintenance, monitoring , and reporting period and require up to 20 years to achieve a fully mature form.

4.2 Coastal and Montane Scrub Vegetation

Coastal and montane scrub vegetation within the impact areas is categorized into four distinct vegetation communities including big sagebrush scrub, Diegan coastal sage scrub, Diegan coastal sage scrub – inland form, and flat-topped buckwheat scrub. Each vegetation community is briefly characterized below. The Project impact areas for each vegetation community are summarized in Table A-2 in Appendix A.

4.2.1 Community Descriptions

4.2.1.1 Big Sagebrush Scrub

Big sagebrush scrub is mostly a treeless, soft-woody shrub-dominated community dominated by big sagebrush. Big sagebrush can form pure stands but often occurs with other shrubs, including bitterbrush (*Purshia tridentata*), rubber rabbitbrush (*Chrysothamnus nauseosus*), yellow rabbitbrush (*C. viscidiflorus*), black bush (*Coleogyne ramosissima*), Mormon-tea (*Ephedra viridis*), horsebrush (*Tetradymia canescens*), and hopsage (*Grayia spinosa*). Annual grasses and forbs also typically occur within Big Sagebrush Scrub and include cheatgrass (*Bromus tectorum*) and other nonnative grasses. An estimated total of 8.43 acres of big sagebrush scrub will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.2.1.2 Diegan Coastal Sage Scrub

Diegan coastal sage scrub is generally found on steep, xeric slopes with clay rich soils that slowly release stored water. Dominant plant species within Diegan coastal sage scrub communities are generally determined by soil type, slope, and aspect. This community generally intergrades with chaparrals at elevations over 3,000 feet. Typical species found within Diegan coastal sage scrub include coastal sagebrush, flat-topped buckwheat, laurel sumac (*Malosma laurina*), black sage (*Salvia melifera*) and lemonade berry (*Rhus integrifolia*). Disturbed Diegan coastal sage scrub has a high proportion of non-native plant species as a result of natural and/or anthropogenic disturbances. An estimated total of 21.92 acres of Diegan coastal sage scrub will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.2.1.3 Diegan Coastal Sage Scrub – Inland Form

Diegan coastal sage scrub –inland form is similar in structure to the coastal form but lower growing, and with a high proportion of non-native species as a result of natural and/or anthropogenic disturbances. This community generally occurs at elevations greater than 1,000 feet elevation. Foothill buckwheat (*Eriogonum wrightii* var. *membranaceum*) or white sages (*Salvia apiana*) are typically the dominant species within this community, with a general lack of California sagebrush. The inland form of this habitat type also may contain species such as matchweed (*Gutierrezia* spp.) and annual buckwheats (*Eriogonum* sp.). Disturbed coastal sage scrub iInland form is similar in structure to the coastal form but lower growing, and with a high proportion of non-native plant species as a result of natural and/or anthropogenic disturbances. This community generally occurs at elevations greater than 1,000 feet amsl. Foothill buckwheat (*Eriogonum wrightii* var. *membranaceum*) or white sage (*Salvia apiana*) are typically the dominant species within this community, with a general lack of California sagebrush. The inland form of this habitat type also may contain species such as matchweed (*Gutierrezia* spp.) and cheatgrass (*Bromus tectorum*). An estimated total of 6.97 acres of the inland form of Diegan coastal sage scrub will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.2.1.4 Flat-Topped Buckwheat Scrub

Flat-topped buckwheat scrub is characterized as a nearly monoculture community of flat-topped buckwheat. This community type usually results from disturbance and typically transitions to coastal sage scrub or chaparral over time. Site factors often include xeric disturbed areas in the coastal and foothill areas of San Diego County. Species characteristic of this community include flat-topped buckwheat and deerweed. An estimated total of 29.62 acres of flat-topped buckwheat scrub will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.2.2 Seed Palettes

A generalized seed palette for coastal and montane scrub vegetation communities is provided in Table 8 below. The palette was developed based on coastal and montane scrub plant species observed and recorded by SDG&E staff and contractors between 2008 and 2010 on or adjacent to the Project ROW.

The seed palette is preliminary, and community-specific mixes with specified seed quantities and application rates per acre will be developed as seed collection progresses. A wide variety of native coastal and montane scrub plant species are included on the general palette to provide the Restoration Program Manager and Restoration Specialists with options for designing final seed palettes that will reflect the natural diversity, species composition, and relative abundance of species within each Project temporary impact location. Final seed palettes will be developed following collection of reference site data within similar undisturbed habitats (CPUC and BLM, 2009).

Table 8. Coastal and Montane Scrub Generalized Seed Palette

Species	Common Name	Annual/ Perennial	Life Form
Achnatherum coronatum	giant stipa	perennial	Grass
Amsinckia menziesii	rancher's fireweed	annual	Herb
Artemisia californica	California sagebrush	perennial	Shrub
Artemisia dracunculus	tarragon	perennial	Shrub
Artemisia tridentata	big sagebrush	perennial	Shrub
Asclepias fascicularis	narrow-leaf milkweed	perennial	Herb
Astragalus trichopodus	coast locoweed	perennial	Herb
Baccharis pilularis	coyote brush	perennial	Shrub
Baccharis sarothroides	broom baccharis	perennial	Shrub
Camissonia bistorta	California sun cup	annual	Herb
Camissonia californica	false-mustard	annual	Herb
Castilleja exserta	purple owl's clover	annual	Herb
Cirsium occidentale	cobwebby thistle	perennial	Herb
Clarkia purpurea	four-spot	annual	Herb
Collinsia concolor	southern Chinese houses	annual	Herb
Collinsia heterophylla	Chinese houses	annual	Herb
Cordylanthus rigidus	thread-leaved bird's-beak	annual	Herb
Deinandra fasciculata	golden tarplant	annual	Herb
Emmenanthe penduliflora	whispering bells	annual	Herb
Encelia californica	common encelia	perennial	Shrub
Eriogonum fasciculatum	flat-topped buckwheat	perennial	Shrub
Gilia angelensis	grassland gilia	annual	Herb
Grindelia camporum	gumplant	perennial	Herb
Gutierrezia sarothrae	matchweed	perennial	Herb
Hazardia squarrosa	saw-toothed goldenbush	perennial	Shrub
Helianthus annuus	common sunflower	annual	Herb
Helianthus gracilentus	slender sunflower	perennial	Herb
Isocoma menziesii	coast goldenbush	perennial	Herb
Lasthenia gracilis	common goldenfields	annual	Herb
Leymus condensatus	giant wild rye	perennial	Grass
Leymus triticoides	beardless wildrye	perennial	Grass
Linanthus dianthiflorus	ground pink	annual	Herb

Species	Common Name	Annual/ Perennial	Life Form
Lotus scoparius	California broom, deerweed	Perennial	Herb
Lupinus truncatus	collar lupine	Annual	Herb
Malosma laurina	laurel sumac	Perennial	Shrub
Mimulus aurantiacus	low bush monkey-flower	Perennial	Shrub
Osmadenia tenella	osmadenia	Annual	Herb
Phacelia cicutaria	caterpillar phacelia	Annual	Herb
Sairocarpus coulterianus [*Antirrhinum oulterianum*]	Coulter's snapdragon	Annual	Herb
Sairocarpus nuttallianum [*Antirrhinum n.*]	Nuttall's snapdragon	Annual	Herb
Salvia apiana	white sage	Perennial	Shrub
Salvia clevelandii	Cleveland sage	Perennial	Shrub
Salvia columbariae	chia	Annual	Herb
Salvia mellifera	black sage	Perennial	Shrub
Scrophularia californica	California figwort	Perennial	Herb
Stipa cernua [*Nassella c.*]	nodding needlegrass	Perennial	Grass
Stipa pulchra [*Nassella p.*]	purple needlegrass	Perennial	Grass
Trichostema parishii	mountain bluecurls	Perennial	Shrub

4.2.3 Sensitive Wildlife Species

Sensitive wildlife species that are known to occur in the coastal and montane scrub vegetation communities within or adjacent to the Project ROW include Quino checkerspot butterfly, coastal California gnatcatcher, California Legless Lizard, coastal rosy boa, San Diego horned lizard, San Diego mountain kingsnake (*Lampropeltis zonata pulchra*), and Townsend's big-eared bat. Special considerations for restoration activities in coastal and montane scrub habitats for quino checkerspot butterfly and coastal California gnatcatcher are described below.

4.2.3.1 Quino Checkerspot Butterfly Habitat

Quino checkerspot butterfly habitat is present in openings within coastal and montane scrub habitats occurring in all Links. The Quino checkerspot butterfly is associated with specific flora that serves as larval host plants (e.g., dot-seed plantain, owl's clover). The preferred habitats largely consist of herbs and forbs occurring on cryptogrammic crust and within clay soils often associated with poor drainage. Onsite restoration as mitigation for temporary impacts to habitats that support the Quino checkerspot butterfly will be completed in kind, and will involve the replacement specific soil parameters onsite. Soil disturbance in Quino checkerspot butterfly habitat will be minimized and may include the use of construction mats to avoid soil compaction. Planting methods in Quino checkerspot butterfly habitat will be limited to seeding. Seeding will occur from October through January to avoid potential butterfly disturbance during the flight season.

4.2.3.2 Coastal California Gnatcatcher Habitat

Although the coastal California gnatcatcher is closely associated with variations of coastal sage scrub, chaparral habitats also may support breeding pairs, especially where coastal sage scrub habitat is present nearby or forms a component of the chaparral habitat (Bontrager 1991). Onsite restoration as mitigation for temporary impacts to coastal California gnatcatcher habitat will be completed in kind, and involve the replacement of specific soil parameters onsite. Planting methods for coastal California gnatcatcher habitat may include planting and seeding, but these activities will be completed before breeding season, which generally begins around February 15. Weed control and other maintenance activities completed during nesting season will be conducted and monitored by a qualified biological monitor to avoid any disturbance to the coastal California gnatcatcher.

4.2.4 Restoration Approach

The coastal and montane scrub communities in the Project ROW are exposed to more frequent and higher annual levels of precipitation than the chaparral communities, and therefore are anticipated to establish more quickly during the the 5-year maintenance, monitoring, and reporting period. The restoration approach for will focus on preserving native soils and their intact native seed banks to the extent possible prior to construction activities, and completion of frequent maintenance activities to control the establishment of non-native plant species after seed application. Where soil removal or blading may be necessary, the top three inches of soil will be collected and stored onsite prior to construction. The focus will be on making extensive seed collections throughout the Project ROW to ensure maximum flexibility in designing effective community-specific seed palettes. Restoration site preparation and hydroseed application will also be timed to avoid impacts to quino checkerspot butterfly and/or coastal California gnatcatcher in these native coastal and montane scrub habitats. Additional community-specific restoration methods and target conditions are briefly discussed below.

4.2.4.1 Big Sagebrush Scrub

An estimated total of 8.43 acres of big sagebrush scrub will be restored within the Project ROW. This community has low species diversity, high cover values, and is dominated by several relatively quick to establish plant species. The seed palette for this community will be composed of few species and have a relatively high applicatiion rate. The focus will be on soil salvage within big sagebrush scrub areas. The tendency for this community to occur within mesic areas facilitates relatively rapid growth, and this community is anticipated to reach maturity within the 5-year maintenance, monitoring , and reporting period.

4.2.4.2 Diegan Coastal Sage Scrub

An estimated total of 21.92 acres of Diegan coastal sage scrub will be restored within the Project ROW. This community has high species diversity, high cover values, and is dominated by several relatively quick to establish plant species. The seed palette for this community will be composed of many grass, herb, and shrub species. The focus will be on soil (and seedbank) salvage within temporary impact areas and completion of frequent maintenance activities to control the establishment of non-native plant

species after seed application within Diegan coastal sage scrub. The tendency for this community to occur within relatively mesic areas facilitates moderate growth, and this community is anticipated to reach a mature form within the 5-year maintenance, monitoring , and reporting period.

4.2.4.3 Diegan Cosatal Sage Scrub – Inland Form

An estimated total of 6.97 acres of inand Diegan coastal sage scrub will be restored within the Project ROW. This community has moderate species diversity and cover values when established, and is dominated by more drought-tolerant herbs and shrub specie than the coastal form. The seed palette for this community will resemble the coastal form with fewer grass and herb species. The focus will be on soil (and seedbank) salvage within temporary impact areas and completion of frequent maintenance activities to control the establishment of non-native plant species after seed application within inland Diegan coastal sage scrub. The tendency for this community to occur within relatively xeric areas results in slower growth than the coastal form, so this community is anticipated to reach a moderately mature form within the 5-year maintenance, monitoring , and reporting period.

4.2.4.4 Flat-Topped Buckwheat Scrub

An estimated total of 29.62 acres of flat-topped buckwheat scrub will be restored within the Project ROW. This community has very low species diversity and low cover values when mature. The seed palette for this community will be composed of few species and have a relatively high applicatiion rate. The focus will be on crown pruning of native shrubs and minimization of impacts to the typically thin soils that occur in this community. Flat-topped buckwheat scrub grows under xeric conditions, and is anticipated to reach a moderately mature form within the 5-year maintenance, monitoring , and reporting period.

4.3 Desert Scrub and Dune Vegetation

Desert scrub and dune vegetation within the impact areas is categorized into six distinct vegetation communities including Sonoran creosote bush scrub, Sonoran mixed woody and succulent scrub, Sonoran desert mixed scrub, Sonoran mixed woody scrub, Sonoran desert wash scrub, and Sonoran desert scrub. Each vegetation community is briefly characterized below. The Project impact areas for each vegetation community are summarized in Table A-3 in Appendix A.

4.3.1 Community Descriptions

4.3.1.1 Sonoran Creosote Bush Scrub

Sonoran creosote bush scrub occurs in well-drained soils of slopes, alluvial fans, and valleys rather than upland sites with thin residual soils. The dominant plant species occurring within this community type include creosote bush, white bursage, brittlebush (*Encelia farinosa*), and ocotillo. An estimated total of 117.40 acres of Sonoran creosote bush scrub will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.3.1.2 Sonoran Mixed Woody and Succulent Scrub

Sonoran mixed woody and succulent scrub is the only desert community with substantial dominance of cacti and other stem succulents. This community is made up of shrubs reaching nine feet tall and is similar to Sonoran creosote bush scrub and Sonoran mixed woody scrub but is more varied and usually denser. Most stands have desert agave (*Agave deserti*), brittlebush, ocotillo, indigo bush (*Peucephyllum schottii*), and Mohave yucca (*Yucca schidigera*) in varying proportions. Sonoran mixed woody and succulent scrub is found on rocky, well-drained slopes and alluvial fans, usually at the base of mountains. An estimated total of 6.72 acres of Sonoran mixed woody and succulent scrub will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.3.1.3 Sonoran Desert Mixed Scrub

Sonoran desert mixed scrub consist of shrubs up to three meters tall and is similar to Sonoran mixed woody and succulent scrub, but is less varied (does not contain the abundance of succulent species) and is usually more sparse. Most stands have brittlebush and indigo bush in varying proportions. Typical species include jojoba (Simmondsia chinensis), desert apricot (Prunus fremontii), burro bush, desert lavender (Hyptis emoryi), brittlebush, and limited amounts of succulent species such as ocotillo and cholla (Cylindropuntia spp.). An estimated total of 2.48 acres of Sonoran desert mixed scrub will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.3.1.4 Sonoran Mixed Woody Scrub

Sonoran mixed woody scrub communities consist primarily of shrubs up to nine feet tall. It is similar to Sonoran mixed woody and succulent scrub but less varied (does not contain the abundance of succulent species) and usually more sparse. Most stands have brittlebush and indigo bush in varying proportions. Typical species occurring within this community type include jojoba (*Simmondsia chinensis*), desert apricot (*Prunus fremontii*), white bursage, desert lavender (*Hyptis emoryi*), brittlebush, and limited amounts of succulent species, such as ocotillo and cholla (*Cylindropuntia* sp.). An estimated total of 11.59 acres of Sonoran mixed woody scrub will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.3.1.5 Sonoran Desert Wash Scrub

Sonoran desert wash scrub is characterized by the presence of arborescent, often spiny shrubs generally associated with intermittent streams (washes) or drier bajadas (alluvial deposits adjacent to washes). Plants of this vegetation community generally are taller and denser than those of surrounding desert habitats. Canopy species may include various species of mesquite (*Prosopis* sp.), smoketree (*Dalea spinosa*), and catclaw acacia (*Acacia greggii*). Representative subcanopy plants may include arrowweed (*Pluchea sericea*) and brittlebush, as well as a variety of forbs and grasses. An estimated total of 0.58 acre of Sonoran desert wahs scrub will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.3.1.6 SONORAN DESERT SCRUB

Sonoran desert scrub is a general category that contains elements of Sonoran creosote bush scrub, Sonoran mixed woody and succulent scrub, Sonoran mixed woody scrub, and Sonoran wash scrub. When a vegetation community did not discretely fit into one of the five categories described above, it was labeled Sonoran desert scrub. An estimated total of 3.47 acres of Sonoran desert scrub will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.3.2 SEED PALETTES

A generalized seed palette coastal and montane scrub vegetation communities is provided in Table 9 below. The palette was developed based on desert scrub plant species that were observed and recorded by SDG&E staff and contractors between 2008 and 2010 on or adjacent to the Project ROW. The seed palette is preliminary, and community-specific mixes with specified seed quantities and application rates per acre will be developed as seed collection progresses. A wide variety of native desert scrub plant species are included on the general palette to provide the Restoration Program Manager and Restoration Specialists with options for designing final seed palettes that will reflect the natural diversity, species composition, and relative abundance of species within each Project temporary impact location. Final seed palettes will be developed following collection of reference site data within similar undisturbed habitats (CPUC and BLM, 2009).

Table 9. Coastal and Montane Scrub Generalized Seed Palette

Species	Common Name	Annual/ Perennial	Life Form
Abronia villosa	desert sand-verbena	perennial	herb
Achyronychia cooperi	onyx flower	annual	herb
Ambrosia acanthicarpa	annual bur-sage	annual	herb
Ambrosia dumosa	burro-weed	perennial	shrub
Ambrosia salsola [*Hymenoclea s.*]	burrobrush	perennial	shrub
Atriplex canescens	fourwing saltbush	perennial	shrub
Atriplex hymenelytra	desert-holly	perennial	shrub
Atriplex lentiformis	big saltbush	perennial	shrub
Baileya pauciradiata	short-ray desert marigold	annual	herb
Bebbia juncea	rush sweetbush	perennial	shrub
Camissonia boothii	desert lantern	annual	herb
Camissonia claviformis	Peirson's evening primrose	annual	herb
Chaenactis artemisiifolia	white pincushion	annual	herb
Chaenactis fremontii	desert pincushion	annual	herb
Croton californicus	California croton	perennial	herb
Cryptantha micrantha	redroot cryptantha	annual	herb
Dalea mollissima	silk dalea	perennial	herb
Encelia actoni	Acton's encelia	perennial	shrub
Encelia farinosa	brittlebush, incienso	perennial	shrub
Encelia frutescens	rayless encelia	perennial	shrub
Ephedra californica	desert tea	perennial	shrub
Ephedra nevadensis	Nevada ephedra	perennial	shrub

Species	Common Name	Annual/ Perennial	Life Form
Eriastrum eremicum	desert woolly-star	annual	herb
Eriogonum inflatum	desert trumpet	perennial	herb
Eriophyllum wallacei	Wallace's woolly daisy	annual	herb
Erodium texanum	Texas filaree	annual	herb
Eschscholzia minutiflora	pygmy gold-poppy	annual	herb
Fagonia laevis	California fagonia	perennial	shrub
Geraea canescens	desert sunflower	annual	herb
Hesperocallis undulate	desert lily	perennial	herb
Hilaria rigida [*Pleuraphis r.*]	big galleta	perennial	grass
Hyptis emoryi	desert lavender	perennial	shrub
Justicia californica	chuparosa, beloperone	perennial	shrub
Keckiella antirrhinoides	desert bush penstemon	perennial	shrub
Krameria erecta	pima rhatany, purple-heather	perennial	shrub
Langloisia setosissima	bristly langloisia	annual	herb
Larrea tridentata	creosote bush	perennial	shrub
Lepidospartum squamatum	scalebroom	perennial	shrub
Loeseliastrum schottii	Schott's calico	annual	herb
Malacothrix glabrata	smooth desert dandelion	annual	herb
Monoptilon bellioides	Mohave desert star	perennial	herb
Nicotiana obtusifolia	desert tobacco	perennial	herb
Palafoxia arida	Spanish needles	annual	herb
Pectis papposa	cinchweed	annual	herb
Pectocarya setosa	bristly pectocarya	annual	herb
Perityle emoryi	Emory's rock daisy	annual	herb
Petalonyx thurberi	sandpaper plant	perennial	shrub
Psorothamnus emoryi	white dalea	perennial	shrub
Psorothamnus schottii	indigo bush	perennial	shrub
Senecio mohavensis	Mojave groundsel	annual	herb
Simmondsia chinensis	jojoba, goat nut	perennial	shrub
Sphaeralcea ambigua	apricot mallow	perennial	herb
Stillingia linearifolia	linear-leaf stillingia	perennial	herb
Tiquilia plicata	plicate coldenia	perennial	herb
Trixis californica	California trixis	annual	shrub
Uropappus lindleyi	silver puffs	annual	herb

4.3.3 SENSITIVE WILDLIFE SPECIES

Sensitive wildlife species that are known to occur in the desert scrub and dune communities within or adjacent to the Project ROW include Quino checkerspot butterfly, flat-tailed horned lizard (*Phrynosoma mcallii*), coastal rosy boa, and Peninsular bighorn sheep (*Ovis canadensis nelsoni*). Special considerations for restoration activities in desert scrub and dune habitats for Quino checkerspot butterfly and peninsular bighorn sheep are described below.

4.3.3.1 Quino Checkerspot Butterfly Habitat

Quino checkerspot butterfly habitat is present in some openings within desert scrub habitats occurring in the Project ROW. The Quino checkerspot butterfly is associated with specific flora that serves as larval host plants (e.g., dot-seed plantain). The preferred habitats largely consist of herbs and forbs occurring on cryptogrammic crust and within clay soils often associated with poor drainage. Onsite restoration as mitigation for temporary impacts to habitats that support the Quino checkerspot butterfly will be completed in kind, and will involve the replacement specific soil parameters onsite. Soil disturbance in Quino checkerspot butterfly habitat will be minimized and may include the use of construction mats to minimize soil compaction. Planting methods in Quino checkerspot butterfly habitat will be limited to seeding. Seeding will occur before January to avoid potential butterfly disturbance during the flight season.

4.3.3.2 Peninsular Bighorn Sheep Habitat

The peninsular bighorn sheep resides primarily on or near steep and rocky mountainous terrain above the desert floor. This species can also be found in washes and canyons from 400 to 4,000 feet in elevation. Restoration of desert habitats within or adjacent to occupied peninsular bighorn sheep habitat will be completed in a manner consistent with avoidance and minimization measures provided for this species as set forth in the MMCRP (CPUC and BLM, 2009). Onsite restoration as mitigation for temporary impacts to these habitats will be completed in kind.

4.3.4 Restoration Approach

The restoration approach for desert scrub and dune vegetation communities will focus on coordination with the BLM restoration staff to achieve the goals for desert restoration on BLM lands, and achieving consistency with the desert bioregion revegetation/restoration guidance. The primary goal of the restoration activities in desert scrub communities is to minimize and avoid soil disturbance to the maximum extent practicable, through any means required. Utilization of temporary construction mats, or installation of mulch, rock, or sand to minimize machinery impacts and the resulting area requiring restoration after construction activities have ceased will be the primary goal in these delicate communities. The focus also will be on making extensive seed collections throughout the Project ROW to ensure maximum flexibility in designing effective community-specific seed palettes. The native desert scrub communities exhibit variable levels of plant species diversity, but all are subject to infertile soils and extremes in average precipitation and temperature. Vertical mulch installation and application of suitable erosion control materials to control erosion during seasonal flooding events will also be important elements for successful restoration in desert scrub and dune communities. Additional community-specific restoration methods and target conditions are briefly discussed below.

4.3.4.1 Sonoran Creosote Bush Scrub

An estimated total of 117.40 acres of Sonoran creosote bush scrub will be restored within the Project ROW. This community has very low species diversity and cover values when established, and is expected to develop very slowly within restoration sites. The seed palette for this community will

resemble Sonoran desert mixed scrub with fewer perennial herbs and shrubs and more abundant annual herb species. The xeric nature of this community results in slow growth, so the community is anticipated to remain extremely open with low diversity through the 5-year maintenance, monitoring , and reporting period. The majority of desert scrub community restoration occurs within this vegetation community.

4.3.4.2 Sonoran Mixed Woody and Succulent Scrub

An estimated total of 6.75 acres of Sonoran mixed woody and succulent scrub will be restored within the Project ROW. This community has moderate species diversity and cover values when established, and is expected to develop very slowly within restoration sites. The seed palette for this community will resemble Sonoran desert mixed scrub with more perennial herbs and shrubs and less abundant annual herb species. The focus will not be on replacement of succulent plant species, but will be on heavy seed application and early establishment of the native shrub species in this community. Vertical mulch will be an important component in this vegetation community. The xeric nature of this community results in slow growth, so the community is anticipated to remain extremely open with low diversity through the 5-year maintenance, monitoring , and reporting period.

4.3.4.3 Sonoran Desert Mixed Scrub

An estimated total of 2.48 acres of Sonoran desert mixed scrub will be restored within the Project ROW. This community has moderate species diversity and cover values when established, and is expected to develop very slowly within restoration sites. The seed palette for this community will contain many annual and perennial herbs and shrubs. The focus will be on replacement of succulent plant species, but will focus on heavy seed application and early establishment of as many of the native herb and shrub species in this community as possible. The xeric nature of this community results in slow growth, so the community is anticipated to remain extremely open with low diversity through the 5-year maintenance, monitoring , and reporting period.

4.3.4.4 Sonoran Mixed Woody Scrub

An estimated total of 11.59 acres of Sonoran mixed woody scrub will be restored within the Project ROW. This community has low species diversity and cover values when established, and is expected to develop very slowly within restoration sites. The seed palette for this community will contain many perennial shrubs and annual herbs, and vertical mulch will be an important component in this vegetation community. The xeric nature of this community results in slow growth, so the community is anticipated to remain extremely open with low diversity through the 5-year maintenance, monitoring , and reporting period.

4.3.4.5 Sonoran Desert Wash Scrub

An estimated total of 0.58 acres of Sonoran desert wash scrub will be restored within the Project ROW. This community has moderate species diversity but low cover values when established, and is expected to develop moderately slowly within restoration sites. The seed palette for this community will contain

many annual and perennial herbs and shrubs. The focus will be on crown pruning on any mature shrubs, heavy seed application for early establishment of as many of the native herb and shrub species in this community as possible, and application of erosion control materials. The xeric nature of this community, which is also prone to rapid seasonal flooding, results in rapid annual growth along the channel edge and slow growth elsewhere in the community, so the community is anticipated to remain moderately open with low diversity through the 5-year maintenance, monitoring , and reporting period.

4.3.4.6 Sonoran Desert Scrub

An estimated total of 3.47 acres of Sonoran desert scrub will be restored within the Project ROW. This community has moderate species diversity but low cover values when established, and is expected to develop very slowly within restoration sites. The seed palette for this community will contain many annual and perennial herb and shrub species, and vertical mulch will be an important component in this vegetation community. The xeric nature of this community results in slow growth, so the community is anticipated to remain extremely open with low diversity through the 5-year maintenance, monitoring , and reporting period.

4.4 Grassland and Meadow vegetation

Grassland and meadow vegetation within the impact areas is limited to non-native grassland. Each vegetation community is briefly characterized below. The Project impact areas for non-native vegetation are summarized in Table A-4 in Appendix A.

4.4.1 Community Descriptions

4.4.1.1 Non-Native Grassland

Non-Native Grassland communities are characterized as being dominated by non-native, annual grasses typically of Mediterranean origin. This vegetation community typically occurs on disturbed sites. Dominant species may include ripgut grass (*Bromus diandrus*), red brome, slender wild oat, Italian ryegrass (*Lolium multiflorum*), and black mustard (*Brassica nigra*). Many of these species are invasive and displace desirable native grass species and increase fire-frequency and soil erosion (Cal-IPC, 2010). An estimated total of 48.31 acres of non-native grassland will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.4.2 Seed Palettes

A generalized seed palette grassland and meadow vegetation communities is provided in Table 10 below. The palette was developed based on native grassland plant species observed and recorded by SDG&E staff and contractors between 2008 and 2010 on or adjacent to the Project ROW. The seed palette is preliminary, and community-specific mixes with specified seed quantities and application rates per acre will be developed as seed collection progresses. A wide variety of native grassland and meadow plant species are included on the general palette to provide the Restoration Program Manager and Restoration Specialists with options for designing final seed palette that will reflect the natural

diversity, species composition, and relative abundance of species within each Project temporary impact location. A final seed palette will be developed following collection of reference site data within similar undisturbed habitats (CPUC and BLM, 2009).

Table 10. Grassland and Meadow Generalized Seed Palette

Species	Common Name	Annual/ Perennial	Life Form
Achillea millefolium	yarrow, milfoil	perennial	herb
Achnatherum coronatum	giant stipa	perennial	grass
Asclepias californica	California milkweed	perennial	herb
Bromus carinatus	California brome	annual	grass
Calandrinia ciliata	red maids	perennial	herb
Carex praegracilis	cluster field sedge	perennial	grass
Castilleja exserta	purple owls clover	annual	herb
Delphinium parryi	blue larkspur	perennial	herb
Gutierrezia sarothrae	broom snakeweed, matchweed	perennial	herb
Hordeum brachyantherum	meadow barley	perennial	grass
Lasthenia gracilis	common goldenfields	annual	herb
Layia glandulosa	white layia	annual	herb
Lupinus bicolor	miniature lupine	annual	herb
Muhlenbergia rigens	Deergrass	perennial	grass
Plantago erecta	dot-seed plantain	annual	herb
Potentilla glandulosa	sticky cinquefoil	perennial	Herb
Rumex salicifolius	willow dock	perennial	Herb
Sidalcea malviflora	Checkerbloom	perennial	Herb
Stipa cernua [*Nassella c.*]	nodding needlegrass	perennial	Grass
Stipa lepida [*Nassella l.*]	foothill needlegrass	perennial	Grass
Stipa pulchra [*Nassella p.*]	purple needlegrass	perennial	Grass
Thysanocarpus curvipes	lace pod	annual	Herb
Trifolium ciliolatum	tree clover	annual	Herb
Tropidocarpum gracile	slender dobie-pod	perennial	Herb
Uropappus lindleyi	silver puffs	annual	Herb
Wyethia ovata	southern mule's ear	perennial	Herb

4.4.3 SENSITIVE WILDLIFE SPECIES

Sensitive wildlife species that are known to occur in the grassland and meadow communities within or adjacent to the Project ROW include quino checkerspot butterfly, southwestern pond turtle (*Clemmys marmorata pallida*), California legless lizard, San Diego horned lizard, San Diego ring-necked snake, townsend's big-eared bat, and pallid bat (*Antrozous pallidus*). Special considerations for restoration activities in desert scrub and dune habitats for quino checkerspot butterfly are described below.

4.4.3.1 Quino Checkerspot Butterfly Habitat

Quino checkerspot butterfly habitat is present in some openings within grassland and meadow habitats occurring in the Project ROW. The Quino checkerspot butterfly is associated with specific flora that serves as larval host plants (e.g., dot-seed plantain). The preferred habitats largely consist of herbs and forbs occurring on cryptogrammic crust and within clay soils often associated with poor drainage. Onsite restoration as mitigation for temporary impacts to habitats that support the Quino checkerspot butterfly will be completed in kind, and will involve the replacement specific soil parameters onsite. Soil disturbance in Quino checkerspot butterfly habitat will be minimized and may include the use of construction mats to minimize soil compaction. Planting methods in Quino checkerspot butterfly habitat will be limited to seeding. Seeding will occur before January.

4.4.4 Restoration Approach

Non-native grassland occurs throughout the Project ROW, and is dominated by non-native, annual grasses mainly of Mediterranean origin. This vegetation community typically occurs on disturbed sites, and many of the grassland species are invasive and displace desirable native grass species, increase fire-frequency, and increase soil erosion (Cal-IPC, 2010). Because of these ecologically damaging characteristics, non-native grassland areas will be re-vegetated with native annual and perennial grasses and forbs, and success criteria have been modified to account for the high cover of non-native species prior to Project impacts. The focus will be on heavy application of a highly diverse native grass and herb seed mix, and frequent and thorough maintenance treatments of non-native grass and herb species.

4.4.4.1 Non-Native Grassland

An estimated total of 48.31 acres of non-native grassland will be restored within the Project ROW. This community has moderate species diversity and high non-native plant species cover values when established. These areas will be restored with a grassland and meadow seed mix intended to promote species diversity, with many legume species that can help develop more fertile site soils over time. This community is expected to develop relatively quickly within restoration sites and is anticipated to have a relatively high cover of non-native plant species (approximately 20 percent) by the end of the the 5-year maintenance, monitoring , and reporting period due to the presence of well-developed non-native plant seed bank on the site soils.

4.5 Herbaceous Wetlands, Freshwater, and Stream Vegetation

Herbaceous wetlands, freshwater, and stream vegetation communities within the impact areas are limited to un-vegetated stream channels. This community is briefly characterized below. The Project impact areas for non-vegetated stream channels are summarized in Table A-5 in Appendix A.

4.5.1 COMMUNITY DESCRIPTIONS

4.5.1.1 NON-VEGETATED CHANNEL

Non-vegetated channel, as mapped within the Project ROW, refers to ephemeral stream channels or desert dry washes where infrequent water presence and/or frequent scour during seasonal precipitation events within the channel or wash limits the establishment of perennial and/or annual plant species. An estimated total of 2.37 acres of non-vegetated channel will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.5.2 SEED PALETTES

Seed palettes for restoring temporary impacts to dry washes and non-vegetated stream channels are presented below in Tables 11, 12, and 13. The seed palettes have been developed based on native plant species observed and recorded by SDG&E staff and contractors between 2008 and 2010 on or adjacent to the Project ROW. The seed palettes are subject to change, and specified seed quantities and application rates per acre will be developed for these palettes as seed collection progresses. The seed palettes will be verified and finalized following collection of reference site data within similar undisturbed habitats (CPUC and BLM, 2009).

The hydroseed mixes below will be applied within Project temporary impact areas to dry washes, and ephemeral and intermittent stream channels. The seed mixes are designed to provide rapid erosion control within the first growing season, where possible, and re-introduce native grasses, herbs, and/or shrubs to the edges of the channel and the stream banks where the jurisdictional areas transition into upland vegetation communities. Three distinct seed mixes have been designed for various portions of the Project ROW, which are identified by milepost in the following tables. These seed mixes will be applied by hydroseed as described in Section 2 (where possible), or by hand broadcasting in temporary impact areas of the Project ROW where hydroseed equipment cannot gain access. The mixes are intended to be applied to the stream banks and adjacent upland areas extending approximately 10 to 15 feet outward from the top of bank on both sides of the stream channel or dry wash.

4.5.3 SENSITIVE WILDLIFE SPECIES

Sensitive wildlife species that are known to occur in the herbaceous wetland, freshwater, and stream communities within or adjacent to the Project ROW include arroyo toad (*Bufo californicus*), southwestern pond turtle (*Clemmys marmorata pallida*), California legless lizard, San Diego ring-necked snake, and two-striped garter snake (*Thamnophus hammondii*). Special considerations for restoration activities in non-vegetated channel habitats for arroyo toad are described below.

Table 11. Desert Dry Wash Seed Palette (MP 0-34)

Species	Common Name	Annual/ Perennial	Life Form
Ambrosia dumosa	burrobush	perennial	Shrub
Camissonia boothii	Booth's evening primrose	annual	Herb
Cryptantha muricata	Redroot cryptantha	perennial	Herb
Geraea canescens	desert sunflower	annual	Herb
Plantago patagonica	wooly plantain	annual	Herb
Pleuraphis rigida	big galleta grass	perennial	Grass

Table 12. Interior Mountain Non-Vegetated Channel Seed Palette (MP 34-92)

Species	Common Name	Annual/ Perennial	Life Form
Artemisia douglasiana	Douglas' mugwort	perennial	herb
Chaenactis artemisifolia	white pincushion	annual	herb
Elymus trachycaulis ssp. trachycaulis	slender wheatgrass	perennial	grass
Gutierrezia californica	California matchweed	perennial	shrub
Mimulus bicolor	yellow monkeyflower	Annual	herb
Sisrynchium bellum	blue-eyed grass	perennial	herb

Table 13. Coastal Slope and Foothill Non-Vegetated Channel Seed Palette (MP 92-117)

Species	Common Name	Annual/ Perennial	Life Form
Bromus carinatus	California brome	perennial	Grass
Escholtzia californica	California poppy	annual	Herb
Platago erecta	dotseed plantain	perennial	Herb
Lotus scoparia	deerweed	perennial	Shrub
Muhlenbergia rigens	deergrass	perennial	Grass
Phacelia distans	common phaecilia	annual	Herb

4.5.3.1 ARROYO TOAD HABITAT

Amphibian species such as the arroyo toad can be found in washes, streams, and arroyos within moist, shaded deciduous forests and oak woodlands. Arroyo toads prefer sandy streambanks within riparian woodlands dominated by willow, cottonwood, sycamore, mule fat, and/or coast live oak. The arroyo toad breeds in shallow, sandy/gravelly riverine pools with low silt content (USFWS, 1993) from March through July. Mitigation for impacts to arroyo toad habitat is addressed in the HMP (TAIC 2010).

4.5.4 RESTORATION APPROACH

This vegetation type includes federal- and state-jurisdictional waters, and wetlands. The majority of temporary Project impacts to 'waters' disturb portions of stream channels or desert dry washes with ephemeral stream hydrology. The most common temporary Project impacts in these areas will be "fill," or placement of soil or rock in a waterway in order to create a stable road bed or base for construction equipment. In several instances, culverts may be placed in waterways, and these are also considered "fill". When rock or other materials will be brought from offsite locations to facilitate construction activities in and adjacent to 'waters', only clean fill materials will be allowed. In some Project areas, it may be necessary for construction crews to perform excavation within jurisdictional areas. Excavations may destroy portions of the stream banks where present, and these will also be restored after Project construction is completed. Due to the sensitivity of the watershed associated within herbaceous wetlands, freshwater and stream habitats, restoration site preparation activities will consist of placing BMPs, soil testing, and hand weeding. Proper BMPs (e.g., sandbags, silt fencing) should be in place prior to any type of restoration activities in order to protect jurisdictional areas. Avoidance and minimization measures as outlined in project permits and the MMCRP should be followed (CPUC and BLM, 2009). Additional community-specific restoration methods and target conditions are briefly discussed below.

4.5.4.1 NON-VEGETATED CHANNEL

An estimated total of 2.37 acres of non-vegetated channel will be restored within the Project ROW. This community has moderate species diversity and cover values when established. These areas will be restored with regional seed mixes intended to provide rapid erosion control (within one growing season) and a native plant buffer along the stream channel edge. This community is expected to develop slowly in the desert dry washes, and relatively quickly within the coastal slope and foothill restoration sites. The focus will be on matching the stream grade and channel dimensions after construction to the undistrubed upstream and downstream sections of the channel or dry wash, and on installtion of erosion control materials and BMPs to maintain favorable surface hydrology conditions. Unvegetated channels are anticipated to be well-developed by the end of the 5-year maintenance, monitoring, and reporting period.

4.6 WOODLAND AND FOREST VEGETATION

Woodland and forest vegetation within the impact areas includes coast live oak woodland and peninsular juniper woodland and scrub. Each vegetation community is briefly characterized below. The Project impact areas for woodland and forest vegetation are summarized in Table A-6 in Appendix A.

4.6.1 COMMUNITY DESCRIPTIONS

4.6.1.1 COAST LIVE OAK WOODLAND

Coast live oak woodland is an evergreen woodland community, dominated by coast live oak that may reach a height of 35 to 80 feet. The shrub layer may consist of toyon, Mexican elderberry (*Sambucus mexicana*), fuchsia-flowered gooseberry (*Ribes speciosum*), and poison oak (*Toxicodendron diversilobum*). A dense herbaceous understory is often present with miner's lettuce (*Claytonia perfoliata* var. *perfoliata*) and chickweed (*Stellaria media*) as potential dominant species. This community occurs along the coastal foothills of the Peninsular Ranges, typically on north-facing slopes and in shaded ravines. An estimated total of 3.60 acres of coast live oak woodland will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.6.1.2 PENINSULAR JUNIPER WOODLAND AND SCRUB

Peninsular juniper woodland and scrub is relatively xeric, dense woodland dominated by California juniper (*Juniperus californica*) with lesser components within the vegetation community comprised of honey mesquite, sugar bush, silver cholla, and California buckwheat. This community is located on alluvial fans and desert slopes. An estimated total of 0.32 acre of peninsular juniper woodland and scrub will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.6.2 SEED PALETTES

Seed palettes for both coast live oak woodland and peninsular juniper woodland and scrub are presented below in Tables 14 and 15. The seed palettes have been developed based on native woodland and forest plant species observed and recorded by SDG&E staff and contractors between 2008 and 2010 on or adjacent to the Project ROW. The seed palettes are subject to change, and specified seed quantities and application rates per acre will be developed for these palettes as seed collection progresses. The seed palettes will be verified and finalized following collection of reference site data within similar undisturbed habitats (CPUC and BLM, 2009).

4.6.3 SENSITIVE WILDLIFE SPECIES

Sensitive wildlife species that are known to occur in coast live oak woodland and peninsular juniper woodland and scrub are habitats include bald eagle (*Haliaeetus leucocephalus*), California spotted owl (*Strix occidentalis occidentalis*), large-blotched salamander (*Ensatina eschscholtzii klauberi*), California legless lizard, San Diego horned lizard, San Diego mountain kingsnake (*Lampropeltis zonata pulchra*), San Diego ring-necked snake, two-striped garter snake, Townsend's big-eared bat, pallid bat, western red bat (*Lasiurus blossevillii*). Special considerations for restoration activities in coast live oak woodland for arroyo toad and peninsular bighorn sheep in peninsular juniper woodland and scrub are described below.

Table 14. Coast Live Oak Woodland Seed Palette

Species	Common Name	Annual/ Perennial	Life Form
Artemisia douglasiana	mugwort	perennial	herb
Allophyllum gilioides	straggling false-gilia	annual	herb
Allophyllum glutinosum	blue false-gilia	annual	herb
Bromus carinatus	California brome	annual	grass
Cirsium occidentale	cobwebby thistle	perennial	herb
Claytonia perfoliata	miner's lettuce	perennial	herb
Collinsia parviflora	blue-eyed Mary	annual	herb
Elymus glaucus	blue wildrye	perennial	grass
Emmenanthe penduliflora	whispering bells	annual	herb
Eriogonum fasciculatum	flat-topped buckwheat	perennial	shrub
Galium andrewsii	moss-leaf bedstraw	perennial	herb
Galium aparine	goose grass	annual	herb
Gilia capitata	ball gilia	annual, perennial	herb
Keckiella ternate	summer bush penstemon	perennial	shrub
Leptosiphon floribundus	summer snow	annual	herb
Lessingia glandulifera	valley lessingia	annual	herb
Lupinus bicolor	miniature lupine	annual	herb
Nemophila menziesii	baby blue-eyes	annual	herb
Pectocarya setosa	bristly pectocarya	annual	herb
Penstemon spectabilis	violet beard-tongue	perennial	herb
Phacelia minor	wild Canterbury-bell	annual	herb
Scutellaria tuberosa	Danny's skullcap	perennial	herb
Viola purpurea	golden violet	perennial	herb

Table 15. Peninsular Juniper Woodland Seed Palette

Species	Common Name	Annual/ Perennial	Life Form
Allophyllum gilioides	straggling false-gilia	annual	herb
Allophyllum glutinosum	blue false-gilia	annual	herb
Cirsium occidentale	cobwebby thistle	perennial	herb
Cryptantha intermedia	nievitas cryptantha	annual	herb
Emmenanthe penduliflora	whispering bells	annual	herb
Encelia actonii	Acton's encelia	perennial	shrub
Ericameria pinifolia	pine-bush	perennial	shrub
Eriogonum fasciculatum	flat-topped buckwheat	perennial	shrub
Gilia capitata	ball gilia	annual, perennial	herb
Lessingia glandulifera	valley lessingia	annual	herb
Lupinus bicolor	miniature lupine	annual	herb
Pectocarya setosa	bristly pectocarya	annual	herb
Penstemon spectabilis	violet beard-tongue	perennial	herb
Phacelia minor	wild Canterbury-bell	annual	herb

4.6.3.1 Arroyo Toad Habitat

Amphibian species such as the arroyo toad can be found in washes, streams, and arroyos within moist, shaded deciduous forests and oak woodlands. Arroyo toads prefer sandy streambanks within riparian woodlands dominated by willow, cottonwood, sycamore, mule fat, and/or coast live oak. The arroyo toad breeds in shallow, sandy/gravelly riverine pools with low silt content (USFWS, 1993) from March through July. Mitigation for impacts to arroyo toad habitat is addressed in the HMP (TAIC 2010).

4.6.3.2 Bighorn Sheep Habitat

The peninsular bighorn sheep resides primarily on or near steep and rocky mountainous terrain above the desert floor. This species can also be found in washes and canyons from 400 to 4,000 feet amsl in elevation. Restoration of desert habitats within or adjacent to occupied peninsular bighorn sheep habitat should be completed in a manner consistent with avoidance and minimization measures provided for this species as set forth in the MMCRP (CPUC and BLM 2009). Onsite restoration as mitigation for temporary impacts to these habitats should be completed in kind.

4.6.4 Restoration Approach

The Project is not anticipated to result in impacts individual oak trees within coast live oak woodland vegetation communities. Temporary impacts will result to the understory of this community only, so restoration of temporary impacts will focus on the native understory of the woodland areas. If individual trees are impacted in these areas, the trees will be mitigated consistent with the SRPL Native Tree Habitat Restoration Plan (SDGE 2010a) in designated tree restoration areas. Additional community-specific restoration methods and target conditions are briefly discussed below.

4.6.4.1 Coast Live Oak Woodland

An estimated total of 3.60 acres of coast live oak woodland will be restored within the Project ROW. This community has moderate species diversity and plant species cover values when established. The focus will be on avoidance of root zone impacts to coast live oak trees during construction activities, and restoration of understory species with a diverse mix of annual and perennial grasses, herbs, and shrubs. This community occurs in relatively mesic areas and is expected to develop relatively quickly within restoration sites. The restored understory areas are anticipated to be well-developed by the end of the the 5-year maintenance, monitoring , and reporting period.

4.6.4.2 Peninsuar Juniper Woodland and Scrub

An estimated total of 0.32 acres of peninsular juniper woodland and scrub will be restored within the Project ROW. This community has low species diversity and cover values when established. The focus will be on crown pruning of mature juniper shrubs/trees in impact areas to promote crown sprouting during the restoration period, and heavy seed application of native herb and shrub understory components of juniper woodland and scrub. This community is expected to develop slowly within

restoration sites and is anticipated to remain moderately open by the end of the 5-year maintenance, monitoring , and reporting period.

4.7 RIPARIAN WOODLAND AND FOREST VEGETATION

4.7.1 COMMUNITY DESCRIPTIONS

4.7.1.1 SOUTHERN COAST LIVE OAK RIPARIAN FOREST

Southern coast live oak riparian forest varies from dense to open, evergreen riparian forest dominated by coast live oak and a variety of willow species. Subdominant species may include western sycamore (*Platanus racemosa*), poison oak, mule fat, Mexican elderberry, and Douglas' mugwort (*Artemisia douglasiana*). Common associates in the canopy of this vegetation community include Fremont's cottonwood (*Populus fremontii*), black willow (*Salix gooddingii*), and arroyo willow (*Salix lasiolepis*). This community occurs along the outer floodplains of canyons and valleys on fine-textured alluvial soils associated with larger creeks (Holland, 1986). This community is typically richer in herbaceous species in the understory rather than shrub species (Holland, 1986). An estimated total of 0.08 acre of southern coast live oak riparian forest will be temporarily impacted by the Project and restored consistent with this RPSV within the Project ROW.

4.7.2 SEED PALETTE

A seed palette for southern coast live oak riparian forest is presented below in Table 16. The seed palette has been developed based on native riparian woodland and forest plant species observed and recorded by SDG&E staff and contractors between 2008 and 2010 on or adjacent to the Project ROW. The seed palettes is subject to change, and specified seed quantities and application rates per acre will be developed for the palette as seed collection progresses. The seed palette will be verified and finalized following collection of reference site data within similar undisturbed habitats (CPUC and BLM, 2009).

Table 16. Southern Coast Live Oak Riparian Forest Seed Palette

Species	Common Name	Annual/ Perennial	Life Form
Artemisia douglasiana	mugwort	perennial	shrub
Baccharis salicifolia	mule fat	perennial	shrub
Bromus carinatus	California brome	annual	grass
Carex praegracilis	cluster field sedge	perennial	grass
Mimulus guttatus	common monkey-flower	annual	herb
Rosa californica	California rose	perennial	shrub
Rubus ursinus	California blackberry	perennial	vine
Stachys ajugoides	hedge nettle	perennial	herb
Toxicodendron diversilobum	poison oak	perennial	vine, shrub
Urtica dioica	hoary nettle	perennial	herb

4.7.3 SENSITIVE WILDLIFE SPECIES

Sensitive wildlife species that are known to occur in southern coast live oak riparian forest include least Bell's vireo (*Vireo bellii pusillus*), southwestern willow flycatcher (*Empidonax traillii extimus*), bald eagle (*Haliaeetus leucocephalus*), California spotted owl (*Strix occidentalis occidentalis*), arroyo toad, southwestern pond turtle, large-blotched salamander (*Ensatina eschscholtzii klauberi*), California legless lizard, San Diego horned lizard, San Diego ring-necked snake, San Diego mountain kingsnake, two-striped garter snake, townsend's big-eared bat, pallid bat, and western red bat (*Lasiurus blossevillii*). Special considerations for restoration activities in southern coast live oak riparian forest and woodland for arroyo toad are described below.

4.7.3.1 LEAST BELL'S VIREO AND SOUTHWESTERN WILLOW FLYCATCHER HABITAT

Sensitive bird species such as the least Bell's vireo and southwestern willow flycatcher are known to use riparian woodland and forest habitats for nesting and foraging. Least Bell's vireo prefers to nest in low, dense, scrubby vegetation in early successional areas and is particularly dependent on corridors of willow dominated habitat along rivers and streams. The southwestern willow flycatcher is known to breed in a variety of riparian habitats with multi-tiered canopies and saturated soils or surface water present (Grinnell and Miller, 1944). Planting methods for riparian woodland and forest or riparian scrub habitats may include planting and seeding, but these activities should be completed before or after the nesting season (typically from mid-March to September). Weed control and other maintenance activities completed during nesting season should be monitored by a biological monitor to avoid any disturbance to sensitive bird species.

4.7.3.2 ARROYO TOAD HABITAT

Amphibian species such as the arroyo toad can be found in washes, streams, and arroyos within moist, shaded deciduous forests and oak woodlands. Arroyo toads prefer sandy streambanks within riparian woodlands dominated by willow, cottonwood, sycamore, mule fat, and/or coast live oak. The arroyo toad breeds in shallow, sandy/gravelly riverine pools with low silt content (USFWS, 1993) from March through July. Container planting methods within riparian forest and woodland habitats should be completed in the winter months before the breeding season. Mitigation for impacts to arroyo toad habitat will be addressed in the Project HMP (TAIC 2010).

4.7.4 RESTORATION APPROACH

The Project is not anticipated to result in impacts to individual oak, willow, cottonwood, sycamore, or ash trees within southern coast live oak riparian woodland vegetation communities. Temporary impacts will result to the understory of this community only, so restoration of temporary impacts will focus on the native understory of the riparian woodland areas. If individual trees are impacted in these areas, the trees will be mitigated consistent with the SRPL Native Tree Habitat Restoration Plan (SDGE 2010a) in designated tree restoration areas. Additional community-specific restoration methods and target conditions are briefly discussed below.

4.7.4.1 SOUTHERN COAST LIVE OAK RIPARIAN FOREST

An estimated total of 0.08 acre of southern coast live oak riparian forest will be restored within the Project ROW. This community has moderate species diversity and plant species cover values when established. The focus will be on avoidance of root zone impacts to coast live oak and other tree species during construction activities, and restoration of understory species with a diverse mix of annual and perennial grasses, herbs, and shrubs. This community occurs in relatively mesic areas and is expected to develop relatively quickly within restoration sites. The restored understory areas are anticipated to be well-developed by the end of the 5-year maintenance, monitoring , and reporting period.

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5. MAINTENANCE, MONITORING, AND REPORTING REQUIREMENTS

This section describes the maintenance, monitoring, and reporting requirements that apply to the restored sites.

5.1 MAINTENANCE, MONITORING, AND REPORTING PERIOD

The maintenance, monitoring, and reporting period will begin with implementation of the restoration work (as specified in Sections 3 and 4 above) at each of the Project's temporary impact sites, and will continue for a minimum of five years, or until the specified success criteria have been achieved. Each restoration site will have an initial 120-day installation period, inclusive of the 5-year maintenance, monitoring, and reporting period. The 120-day period is a standard review period to ensure that restoration activities at all sites have been implemented by the maintenance and/or Restoration Contractors consistent with all Program specifications. Note that because the Project construction activities will occur in a phased manner between 2010 and 2012 (estimated), maintenance, monitoring, and reporting for each of the Project restoration sites will also occur in overlapping time periods. The Restoration Program Manager will develop and manage a master maintenance, monitoring, and reporting schedule that will document the periods for each site.

Table 17 provides a generalized schedule for maintenance, monitoring, and reporting tasks.

5.2 AS-BUILT ASSESSMENT

At the conclusion of the 120-day installation period, an As-Built assessment report will be submitted by the Restoration Program Manager to the CPUC (and the BLM and USFS on their managed lands, where applicable). The As-Built report will document what preparation activities were implemented for each site, specify the quantities, types, and dates of hydroseed installed, and provide photographs taken from pre-designated points at each site. The Restoration Specialist will keep records of site preparation activities and restoration activities. In addition, any substantial problems encountered, or necessary changes made to the Program in the field will be recorded and included in the As-Built assessment report. Recommendations for corrective measures, if any, will be made by the Restoration Specialist immediately upon conclusion of the onsite As-Built assessment. The Restoration Program Manager will determine the individual restoration sites included in each As-Built assessment report.

Table 17. Generalized Program Maintenance, Monitoring, and Reporting Schedule

Task	Year 1	Year 2	Year 3	Year 4	Year 5
Restoration Site Installation	Begins 120-day and 5-year periods when complete.				
As-Built Report[1]	120 Days After Restoration Installation				
Restoration Site Maintenance[2]	Begins upon Installation and continues a minimum of monthly during 120-day period, quarterly after (or as needed to meet performance standards)	Quarterly (or as needed to meet performance standards)	Quarterly (or as needed to meet performance standards)	Quarterly (or as needed to meet performance standards)	Quarterly (or as needed to meet performance standards)
Maintenance Monitoring/Report[1]	Monthly for 12—day period, quarterly for remainder of Year 1	Quarterly	Quarterly	Quarterly	Quarterly
Performance Monitoring/Report[1]	Annually (on anniversary of restoration installation)	Annually	Annually	Annually	Annually
Reference Photos[1]	Beginning and end of 120-Day Period and end of Year 1	Annually	Annually	Annually	Annually
Remedial/Contingency Measures[2]	As needed at end of 120-day period or throughout Year 1 to meet performance standards	As needed to meet performance standards	As needed to meet performance standards	As needed to meet performance standards	As needed to meet performance standards

Notes

1 To be conducted by the Restoration Specialists.

2 To be conducted by the Restoration/Maintenance Contractors.

5.3 MAINTENANCE ACTIVITIES

Maintenance activities will be conducted concurrent with the installation of the hydroseed materials in the restoration areas, and will continue throughout the initial 120-day establishment period, concluding a minimum of five years from the date of installation. The Restoration/Maintenance Contractors maintenance activities on the site will be conducted monthly during the 120-day establishment period, quarterly during the remainder of year one of the project, and quarterly or as directed by the Restoration Specialist during years two through five. Recommendations for maintenance efforts will be based upon qualitative site observations and will include maintenance items listed below.

5.3.1 NON-NATIVE/INVASIVE PLANT REMOVAL

Non-native and invasive plant (weed) control will begin with the 120-day establishment period and continue at a minimum throughout the five-year maintenance, monitoring, and reporting period as needed. The Restoration Specialist will monitor physical and/or chemical herbicide applications within the restoration areas and provide recommendations for additional weed control if necessary. Weed control will consist of the complete removal of selected non-native vegetation (i.e., seed heads, stems, roots), and all debris and slash generated from weed removal activities will be disposed of offsite in a legally acceptable manner.

Weed control measures may include direct physical or mechanical removal (e.g., cutting with weed whip machines, mowing) and herbicide application. Weeding will be performed as recommended by the Restoration Specialist to keep any weeds establishing on the restoration sites at manageable levels. The species presented in Section 3 will be removed before seed-set (other species that appear may be added to this list if deemed necessary by the Restoration Specialist). All Program weed control activities will be implemented according to the Project's Weed Control Plan (RECON, 2010).

5.3.2 TRASH/DEBRIS REMOVAL

Trash will be removed from the restoration areas by hand during monthly (120-day installation period) and quarterly maintenance visits. Trash consists of all man-made materials, equipment, or debris dumped, thrown, washed, blown, and left within the restoration areas. Deadwood and leaf litter of native trees and shrubs will not be removed. The Restoration/Maintenance Contractors will be responsible for prompt trash and debris removal. Following each site inspection, the Restoration Specialists will communicate any additional trash and debris removal requirements to the Restoration Contractor.

5.3.3 EROSION CONTROL

The Restoration Specialists will monitor the sites at each visit for erosion. The Restoration/Maintenance Contractors are responsible for preventing erosion through the installation and maintenance of best management practices (BMPs) where required. In addition to the establishment of native vegetation, which will minimize erosion, non-vegetative erosion control measures may be used as prescribed by the Restoration Specialist or Restoration Program Manager. Such erosion control measures, or BMPs, may include certified weed-free straw mulch application, jute netting, sandbags, soil binders, trenches, or dissipaters. Any such measures must preclude the introduction of weed species into the seed bank of areas where native vegetation either occurs or is to be restored. Drainage and sedimentation control devices will be routinely cleaned, maintained, and repaired prior to and during the rainy season by the Restoration/Maintenance Contractor. All repairs to these systems will be executed immediately to offset erosion problems.

5.3.4 ACCESS RESTRICTION

The Restoration/Maintenance Contractors will install, at the direction of the Restoration Specialist or Restoration Program Manger, temporary fencing and/or signage restricting access to the restoration areas when determined that pedestrian traffic or vandalism has become problematic at a site. Vertical mulch (described below) may also be used to restrict access to restoration areas.

5.3.5 VERTICAL MULCHING

Vertical mulching involves installing plants or dead and downed plant materials into the ground to discourage unwanted entry into restoration areas. This practice may be used at construction yards, stringing areas, or other areas in which public access is not permissible and fencing is not the preferred method of restricting unwanted entry. Vertical mulch is often used in desert environments; however,

this approach may be used within other habitats as determined necessary by the Restoration Specialist or Restoration Program Manager. Placing vertical mulch (shrubs, cacti, grasses, and other plant material either dead or alive) helps obscure closed roads or barren ROWs, which is especially important at former access roads or staging areas to prevent trespass. Replanted plants for vertical mulch will not be irrigated, are not subject to restoration success criteria, and may be allowed to expire. Vertical mulch can also reduce wind speed, facilitate deposition of blowing soil and organic litter, and can create safe sites for plant establishment. Any cactus or yucca species that were beyond the suitable range for transplanting can be installed as vertical mulch within the Project ROW.

5.4 MONITORING AND REPORTING ACTIVITIES

Maintenance and performance monitoring are required and must be reported. Maintenance monitoring will be conducted by the Restoration Specialists to determine the effectiveness of maintenance activities on each restoration site and prescribe any additional maintenance activities that may be required. Performance monitoring will be completed by the Restoration Specialists to document restoration site progress relative to the established performance criteria, and prescribe any remedial measures that may be required to ensure that each restoration site ,eets the performance criteria within the 5-year maintenance, monitoring, and reporting period.

5.4.1 MAINTENANCE MONITORING

The Restoration Specialists will perform regular maintenance inspections according to the monitoring schedule provided in Table 17 above. Qualitative monitoring will be conducted during each maintenance monitoring visit to assess seedling recruitment from native hydroseed and natural sources, native plant vigor and development, soil moisture content, presence/absence of plant pests or diseases, erosion and/or drainage conditions onsite, presence/absence of non-native or invasive plant species, trash or debris accumulation, wildlife presence/absence, and project fencing and signage condition (where applicable). The Restoration Specialists will also monitor the installation and maintenance of all best management practices (BMPs) outlined in accordance with the restoration standards of the CPUC, BLM, USDA Forest Service, and all other respective agencies. Qualitative monitoring will also require establishment of photo points to visually document restoration site progress. A series of fixed photo points will be established by the Restoration Specialist within each restoration site. A minimum of four photo points per site will be established to allow visual evaluation of the site. Photo points will be keyed to permanent features unlikely to change or disappear during the monitoring periods. Where no such feature is available, a monument will be marked by GPS coordinates and or a 2-foot (0.6 m) length of 0.5-inch (1.2 cm) rebar will be driven into the ground with 2 inches (5 cm) left exposed above the ground. All photo points will be marked on an aerial photograph showing GPS coordinates and permanent landscape features. Photos will be taken during all maintenance monitoring site visits by the Restoration Specialists. Following each maintenance inspection, the Restoration Specialists will submit maintenance monitoring reports to the Restoration Contractor and to SDG&E via the Restoration Program Manager.

5.4.2 MAINTENANCE MONITORING REPORTS

Following each maintenance inspection, the Restoration Specialist will submit a maintenance monitoring report to the Restoration/Maintenance Contractors and to SDG&E via the Restoration Program Manager. The Restoration Program Manager will provide a standardized report form that Restoration Specialists will utilize for maintenance monitoring and reporting. The ultimate purpose of the maintenance monitoring reports is to advise all parties whether sufficient progress is being made to ensure on-schedule, successful completion of the Program. All qualitative monitoring visits to the restoration sites will be documented with a monitoring report, which will be submitted to the Restoration/Maintenance Contractors via the Restoration Program Manger. Any restoration site deficiencies will be noted in the monitoring report, with accompanying recommendations for maintenance and/or remedial actions. Maintenance monitoring and reporting will be performed monthly during the 120-day period, and quarterly throughout the remaining 5-Year maintenance, monitoring, and reporting period, or until performance standards are met.

5.4.3 PERFORMANCE MONITORING

Performance monitoring will include quantification of vegetative cover and the establishment of a series of fixed photo-points throughout the restoration area. Annual performance monitoring will be completed by the Restoration Specialists one year after hydroseed application (or broadcast seeding or land imprinting, where applicable) and will continue, at a minimum, annually throughout the five-year maintenance, monitoring, and reporting period, or until the restoration sites have met the established performance standards. Quantitative monitoring will be conducted to determine total bare ground cover, total native species cover and composition, total non-native species cover and composition, vertical stratification of native herb, shrub, and tree species on each restoration site, and overall plant species diversity. All quantitative monitoring will be conducted using permanent vegetation transects or quadrats (see Table 18 below).

Table 18. Sensitive Habitat Restoration Program Performance Monitoring Standards

Project Area	Performance Monitoring Method	Target Sampling Area (% of Restoration Site)
Access Roads	Quantitative monitoring using up to 10 randomly placed 10 square-meter quadrats. Number of quadrats will be adjusted based on actual disturbance area.	2%
Guard Areas	Qualitative monitoring	N/A
Construction Yards	Quantitative monitoring using up to 30 and no fewer than 2 randomly placed 5-meter wide point-intercept transects, with a maximum length of 50 meters. Number and length of transects will be adjusted based on actual disturbance area.	2%
Stringing Sites	Quantitative monitoring using up to 3 randomly placed 5-meter wide point-intercept transects, with a maximum length of 25 meters. Length and number of transects will be adjusted based on actual disturbance area.	2%
Work Areas	Quantitative monitoring using up to 10 randomly placed 5 square-meter quadrats. Number of quadrats will be adjusted based on actual disturbance area.	2%

Permanent vegetation transects will be utilized within larger restoration sites and will be marked with Global Positioning System (GPS) coordinates, and the direction of each transect will be recorded using a compass. The starting point for each transect will be determined by overlaying a grid onto aerial photographs of the Project route and randomly selecting transect locations that do not overlap. The permanent vegetation transects will be sampled using the point-intercept method (Canfield 1941), and adapted by California Native Plant Society (CNPS, 2001). A transect tape will be run between two posts either 25 or 50 meters apart, and a vegetative intercept line will be visually projected above and below the tape at every half-meter mark. Each plant within the herb, shrub, or tree strata that intercepts the projected line will be recorded, by species. In addition, all plant species present within the five-meter wide "species richness" portion of the transect will be recorded by species. All data will be utilized to determine total percent bare ground, percent native plant cover, percent non-native plant cover, overall species richness and diversity, and percent Quino host/nectar plant (where required). The percent cover for each species (including bare ground) will be 100 times the number of observations of that species, divided by the total number of sample points.

Permanent vegetation quadrats (5 square meters) will be utilized within smaller restoration sites, and the center point for each quadrat will be marked with Global Positioning System (GPS) coordinates. The position for each quadrat will be determined by overlaying a grid onto aerial photographs of the Project route and randomly selecting locations that do not overlap. Every plant species in each quadrat will be recorded by number and estimated cover. All data will be averaged to determine total percent bare ground, percent native plant cover, percent non-native plant cover, overall species richness and diversity, and percent Quino host/nectar plant (where required). The same quadrats will be re-sampled each year to reduce the likelihood that changes detected from year to year will be due to chance alone. All field data will be recorded on standardized data sheets.

5.4.4 Performance Monitoring Reports

The data collected for all Project restoration sites within a given year will be compiled and included in an annual monitoring report. Due to the large number of individual restoration sites, the Restoration Program Manager will determine how annual reports will be structured by the Restoration Contractor to meet agency requirements and facilitate a thorough and timely review. Annual monitoring reports will be completed submitted to the CPUC, BLM, and USFS during the five-year maintenance, monitoring, and reporting period of the Program. Annual performance reports outlining the results of the restoration performance monitoring will be submitted at the anniversary of the installation date each year. The performance reports will describe the existing conditions of the restoration sites derived from quantitative data collection. The reports will provide a comparison of annual success criteria with field conditions, identify any shortcomings of the restoration sites, and recommend remedial measures necessary for the successful completion of the Program. Each yearly report will provide a summary of the accumulated data.

5.5 PERFORMANCE CRITERIA

Performance criteria have been established for each of the 22 vegetation communities to be restored for the Program, and are presented below in Table 19. The performance criteria are based upon the expected development of the intended vegetation communities for each onsite restoration area from hydroseed (or broadcast seeding or land imprinting, where applicable) without supplemental irrigation. The Program will not utilize supplemental irrigation or container planting, with the exception of specific restoration areas where rare plant species may be translocated (see the Project's RPSP). Therefore, native cover is anticipated to develop relatively slowly within all restoration sites, because supplemental irrigation will not be used (excepting as a remedial measure), and because many of the Project temporary impact areas are located in arid areas where seasonal rainfall is minimal. Although most vegetation communities are likely to develop more slowly under these conditions, when site preparation and seed application is implemented according to the Program specifications, all vegetation communities would be expected to reach the performance criteria in Table 19 within the 5-Year maintenance, monitoring, and reporting period.

The performance criteria include total percent of bare ground within the site, percent absolute cover of native plant species cover within the site, percent absolute cover of non-native (includes invasive species) plant species cover in the site, plant species diversity expressed as a percentage of the species in the original seed mix for the site, and percent of native cover composed of the host and nectar plants for the quino checkerspot butterfly (*Euphydryas editha quino*). This last performance criterion is applicable only where the impacted area was identified as quino habitat prior to project construction, and only occurs within certain vegetation communities as shown in Table 19.

These performance criteria will be utilized to assess the annual progress of the restoration sites, and are regarded as interim Program objectives designed to achieve the final goals. Fulfillment of these performance criteria will indicate that the restoration sites are progressing toward the vegetation communities (and habitat types) that constitute the long-term goals of the Program. If restoration efforts fail to meet the performance standards listed below in any one year, the Restoration Specialist will recommend remedial actions to be implemented (e.g., supplemental seeding, weeding, etc.) that will enhance the restoration site(s) to a level in conformance with these standards.

5.6 REMEDIAL MEASURES

If at any time the restoration areas do not meet the performance standards, the Restoration Specialists will be responsible to notify the Restoration/Maintenance Contractors, who can implement any additional maintenance activities and restore Program compliance with the performance standards. The Restoration Specialists will continue to employ measures after the five-year period if the monitoring success criteria have not been achieved. In addition, the Restoration Specialists may continue the successful techniques and/or employ adaptive management protocols and recommendations to ensure the successful revegetation of each restoration area (Aspen Environmental Group, 2008).

All remedial measures will comply with the maintenance and monitoring requirements in accordance with the CPUC, BLM, USFS, and applicable state and federal agencies for habitat restoration in the State of California (Aspen Environmental Group, 2008). Remedial measures may include additional seeding, erosion control, weeding, or other measures to comply with the maintenance and monitoring requirements of the CPUC, BLM, and USFS.

5.6.1 Initiating Procedures for Remedial Measures

If performance criteria are not met for any portion of the Program, the Restoration Specialists and Restoration Program Manager will prepare an analysis of the cause(s) of failure within the appropriate annual report and propose remedial actions for agency approval. If the any of the restoration sites have not met the performance criteria by the end of the 5-year maintenance, monitoring, and reporting period, SDG&E's maintenance, monitoring, and reporting obligations will continue until remedial measures are negotiated and implemented to bring the restoration site(s) into compliance with the established standards or until the agencies grant final Program compliance/approval.

5.6.2 Adaptive Management

Adaptive management will be implemented in the event of unforeseen or probable but unpredictable circumstances. Adaptive management is defined, for the purposes of this Program, as a flexible, iterative approach to the long-term management of restoration sites that is directed over time by the results of ongoing monitoring activities and direct observation of environmental stressors that are producing adverse results within the restoration site(s). Adaptive management will include the utilization of regular quantitative assessments and rapid qualitative assessment data gathered in the field during the Program to assess the health and vigor of all vegetation communities and restoration sites. Following an event that causes damage to all or part of the restoration site(s), these data will be used in part to drive management considerations for repair of the damaged areas. Achieving the performance criteria of the Program through establishment of self-sustaining native vegetation communities in temporary project impact areas will be the focus of all adaptive management decisions. Individual environmental stressors are discussed below along with an anticipated range of management responses to correct any damage that may occur to the restoration sites.

5.6.3 Excessive Browse

Grazing and browsing by native mammals is expected to occur within the majority of restoration sites. The plant palettes for each vegetation community have been designed to incorporate a moderate level of plant browsing. If browse levels should become elevated on any site(s) (i.e., if significant plant mortality and cover reduction occurs) as indicated by qualitative or quantitative monitoring of the restoration site(s), remedial measures will be implemented. Browse guards (plastic fencing) may be installed around the base of young shrubs in affected areas to reduce plant mortality, or around portions of the restoration site(s). In addition, remedial seeding may be necessary depending upon the stage of the restoration project. The hydroseed mix may be adjusted prior to re-application to include species that are less palatable to browsing mammals in the area. Each of these options would require the use of Program contingency funds to restore affected areas.

Table 19
Sensitive Vegetation Community Restoration Program Five-Year Performance Criteria

Vegetation Communities and Performance Criteria [1, 2]	Year 1					Year 2					Year 3					Year 4					Year 5				
	% Bare Ground[3]	% Native Cover[4]	% Non-Native Cover[5]	%Species Diversity[6]	%Quino Host Plant Cover[7]	% Bare Ground[3]	% Native Cover[4]	% Non-Native Cover[5]	%Species Diversity[6]	%Quino Host Plant Cover[7]	% Bare Ground[3]	% Native Cover[4]	% Non-Native Cover[5]	%Species Diversity[6]	%Quino Host Plant Cover[7]	% Bare Ground[3]	% Native Cover[4]	% Non-Native Cover[5]	%Species Diversity[6]	%Quino Host Plant Cover[7]	% Bare Ground[3]	% Native Cover[4]	% Non-Native Cover[5]	%Species Diversity[6]	%Quino Host Plant Cover[7]
Chaparral																									
Chamise Chaparral	70	20	10	20	tbd	60	30	10	30	tbd	45	45	10	45	tbd	35	60	5	60	tbd	20	75	5	70	tbd
Northern Mixed Chaparral	65	25	10	25	tbd	55	35	10	35	tbd	40	50	10	50	tbd	30	65	5	65	tbd	20	75	5	80	tbd
Redshank Chaparral	80	15	5	20	tbd	70	25	5	30	tbd	60	35	5	5	tbd	50	45	5	60	tbd	45	50	5	70	tbd
Scrub Oak Chaparral	80	15	5	20	tbd	70	25	5	30	tbd	60	35	5	5	tbd	50	45	5	60	tbd	45	50	5	70	tbd
Semi-Desert Chaparral	80	15	5	20	tbd	70	25	5	30	tbd	60	35	5	5	tbd	50	45	5	60	tbd	45	50	5	70	tbd
Southern Mixed Chaparral	65	25	10	25	tbd	55	35	10	35	tbd	40	50	10	10	tbd	30	65	5	65	tbd	20	75	5	80	tbd
Coastal and Montane Scrub																									
Big Sagebrush Scrub	70	25	5	20	tbd	60	35	5	35	tbd	45	50	5	45	tbd	30	65	5	60	tbd	20	75	5	70	tbd
Diegan Coastal Sage Scrub	65	25	10	25	tbd	55	35	10	35	tbd	45	45	10	50	tbd	40	55	5	60	tbd	35	60	5	80	tbd
Diegan Coastal Sage Scrub – Inland Form	75	15	10	20	tbd	70	20	10	35	tbd	60	30	10	45	tbd	55	40	5	60	tbd	50	45	5	70	tbd
Flat-Topped Buckwheat Scrub	75	15	10	20	tbd	70	20	10	35	tbd	65	25	10	45	tbd	60	35	5	60	tbd	55	40	5	70	tbd
Desert Scrub and Dune																									
Sonoran Creosote Bush Scrub	88	2	10	20	tbd	85	5	10	25	tbd	82	8	10	35	tbd	78	12	10	45	tbd	75	15	10	50	tbd
Sonoran Mixed Woody and Succulent Scrub	83	2	15	25	tbd	80	5	15	35	Tbd	77	8	15	45	tbd	78	12	10	55	tbd	75	15	10	60	tbd
Sonoran Desert Mixed Scrub	83	2	15	20	tbd	80	5	15	25	Tbd	77	8	15	35	tbd	78	12	10	45	tbd	75	15	10	50	tbd
Sonoran Mixed Woody Scrub	83	2	15	20	tbd	80	5	15	25	tbd	77	8	15	35	tbd	78	12	10	45	tbd	75	15	10	50	tbd
Sonoran Desert Wash Scrub	88	2	10	20	tbd	85	5	10	25	tbd	82	8	10	35	tbd	78	12	10	45	tbd	75	15	10	50	tbd
Sonoran Desert Scrub	88	2	10	20	tbd	85	5	10	25	tbd	82	8	10	35	tbd	78	12	10	45	tbd	75	15	10	50	tbd
Grassland and Meadow																									
Non-Native Grassland	50	25	25	25	tbd	45	35	25	50	tbd	35	45	20	70	tbd	25	55	20	80	tbd	20	60	20	90	tbd
Herbaceous Wetland, Freshwater Marsh, and Streams																									
Non-Vegetated Channel	75	20	5	20	N/A	70	25	5	30	N/A	65	30	5	40	N/A	60	35	5	50	N/A	55	40	5	60	N/A
Woodland and Forest																									
Coast Live Oak Woodland	65	25	10	25	N/A	60	30	10	40	N/A	55	35	10	55	N/A	55	40	5	70	N/A	50	45	5	85	N/A
Peninsular Juniper Woodland and Scrub	90	5	5	20	N/A	85	10	5	30	N/A	80	15	5	40	N/A	75	20	5	50	N/A	70	25	5	60	N/A
Riparian Woodlands and Forests																									
Southern Coast Live Oak Riparian Forest	65	25	10	25	N/A	60	30	10	40	N/A	55	35	10	55	N/A	55	40	5	70	N/A	50	45	5	85	N/A

Notes

[1] – This table subject to revision based upon reference site data (when collected).
[2] – All performance criteria will be quantified for each restoration site (excepting guard areas) on an annual basis via square meter frame quadrats or point-intercept transects as described in Section 4.7.3.1 above.
[3] – Bare ground is the total percentage of area within each restoration site that does not contain plants. Rock, litter, and soil all are bare ground categories that will be quantified during annual performance monitoring.
[4] – Native cover is the absolute cover percentage of native plant species in each restoration site including all strata – tree, shrub, herb, and/or vine.

[5] – Non-native cover is the absolute cover percentage of non-native or invasive plant species in each restoration site including all strata – tree, shrub, herb, and/or vine.
[6] – Species diversity is the percentage of native species present in the restoration site from the original hydroseed mix (e.g., 5 of 7 species = 71 percent). Additional native plant species not from the mixes will be recorded and reported in this total percentage.
[7] – Quino checkerspot butterfly host plant cover is applicable to these vegetation communities only. The percent cover of *Plantago erecta*, *P. patogonica*, *Antirrhinum coulteranium*, *Cordylanthus rigidus*, and/or *Castilleja exserta* will be quantified and reported relative to other native and non-native species within each applicable restoration site where quino habitat was present prior to Project construction.

5.6.4 FIRES

Periodic fire is important to the regeneration of many of the chaparral and coastal and montane scrub vegetation communities within the Program restoration sites and can help to maintain high levels of bio-diversity. Fire at intervals of more than 20 years are often necessary to maintain these vegetation communities in optimal condition, but more frequent fires due to natural or human-induced causes may result in decreased shrub regeneration, increased invasion by non-native grasses, and an over-all decrease in bio-diversity. Fire can be managed on the restoration sites to the extent that human induced fires may be prevented, but naturally occurring wildfires are expected to occur within these vegetation communities on and adjacent to the Program restoration sites. If fire destroys any portion of a restoration site or sites prior to achieving the performance criteria, the site(s) will be qualitatively monitored at more frequent intervals, to be determined by the Restoration Specialists and Restoration Program Manager, and remedial measures will be incorporated as necessary. The seed palettes for these communities have been designed with as many fire-resistant native plant species as possible and are expected to recover within several growing seasons after a fire event. Fire within other vegetation communities (e.g., woodlands and forests, riparian woodland and forests) may produce more long-lasting damage to woody canopy species and may require remedial seeding as directed by the Restoration Specialist, and potentially extending the 5-year maintenance, monitoring, and reporting period to allow the restoration site(s) to achieve the Program performance criteria. Depending upon the degree of damage, slash removal, container planting, and supplemental watering may also need to be considered in these areas (if possible), subject to approval by the Restoration Program Manager who would authorize the use of program contingency funds.

5.6.5 FLOODING

Flooding is anticipated to occur in many of the restoration sites for the Program, especially within the desert and dune vegetation communities in eastern Imperial and extreme western San Diego Counties where broad desert dry washes are prevalent in and adjacent to the Program restoration sites. In addition, many of the ephemeral stream channels temporarily impacted by the Project in the remaining vegetation communities in San Diego County may be subject to periodic flooding. The seed mixes for these areas have been designed to provide erosion control with native grass, herb, and shrub species to the greatest extent feasible, and target cover values for these areas have been adjusted to factor in the relatively high disturbance rates that may occur due to seasonal flooding. Flooding is anticipated to periodically reduce overall plant cover within and adjacent to stream channels and desert dry washes, but with application of erosion control materials at all Program restoration sites in conformance with the Project SWPPP, seasonal flooding is not anticipated to reduce cover below a level in conformance with the Program performance standards. If qualitative and/or quantitative monitoring of the dry wash or stream channel areas indicates that cover is being reduced below tolerable levels, re-contouring of restoration sites within the first two years after seed application, installation of addition erosion control materials, and/or remedial seeding may be recommended by the Restoration Specialists. These remedial measures would be subject to approval by the Restoration Program Manager, who would authorize the use of program contingency funds.

5.6.6 PROLONGED DROUGHT

Seasonal drought is anticipated to occur within all of the Program restoration sites annually, and all vegetation community seed palettes have been designed with drought-tolerant native plant species that are capable of withstanding drastic seasonal fluctuations in available moisture onsite. Drought conditions are anticipated to be most extreme in the desert portion of the Project, including the Imperial Valley, Mountain Springs Grade, and Jacumba area restoration sites. All program sites are anticipated to be restored with seed application only and without supplemental irrigation, so target cover values for all vegetation communities have been adjusted based on the Program specifications and expected temporal development in each Project area. However, an extended drought could potentially occur during any portion or all of the Program 5-year maintenance, monitoring, and reporting period including low seasonal rainfall and prolonged high temperatures that may negatively affect any of the Program restoration site(s) (*e.g.,* lower plant cover, higher plant mortality, increased potential for pest infestations onsite, *etc*.). Since supplemental irrigation is not possible in most Program restoration areas (either by fixed irrigation system or hand watering), remedial measures for prolonged drought would be limited to remedial seeding prior to any anticipated precipitation, extension of the 5-year maintenance, monitoring, and reporting period, and/or negotiation with the resource agencies to adjust the Program performance criteria for expected vegetation community development under extended drought conditions. These remedial measures will be recommended as required by the Restoration Specialists and would be subject to approval by the Restoration Program Manager, who would authorize the use of program contingency funds.

5.6.7 REMEDIAL MEASURE FUNDING MECHANISMS

The same funding source available for the Program, as established by the SDG&E, will be available for any additional planning, implementation, maintenance, monitoring, and/or reporting of any remedial measures that may be required to achieve the Program performance criteria.

5.7 COMPLETION OF ONSITE RESTORATION PROGRAM

5.7.1 NOTIFICATION OF COMPLETION

The Restoration Program Manager will notify the CPUC, BLM, USFS, and any other applicable regulatory agencies upon submitting the annual report for the final year that the Program performance criteria have been met, and request acceptance of the Program restoration sites and release from the agency permit conditions. Early release will not be possible per the SRPL FEIR/EIS.

5.7.2 REGULATORY AGENCY CONFIRMATION

Following receipt of the notification of completion, the CPUC, BLM, USFS, and any other applicable regulatory agencies may designate personnel visit the restoration sites to confirm the successful completion of the Program and will issue formal letters of success prior to acceptance.

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APPENDIX A

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Table A-1. Temporary Project Impacts to Chaparral Vegetation Communities

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
MS-031	Chaparrals	Semi-desert Chaparral	String Site	MP-33	EP244	0.448	0.448
			Work Area		EP244	0.647	0.647
					EP246	0.274	0.274
MS-031 Total						1.368	1.368
MS-032	Chaparrals	Semi-desert Chaparral	Guard_Areas	MP-33	EP243	0.003	0.003
				MP-34	EP243	0.007	0.007
			String Site Area	MP-33	EP243	1.238	1.238
					EP244	0.339	0.339
				MP-34	EP243	0.510	0.510
			Work Area		EP243	0.007	0.007
		Semi-desert Chaparral - Disturbed	Construction Yard		EP242	15.358	15.358
					EP243	0.007	0.007
			String Site		EP243	0.001	0.001
			Work Area		EP243	0.372	0.372
MS-032 Total						17.842	17.842
MS-033	Chaparrals	Semi-desert Chaparral	Guard_Areas	MP-35	EP236-1	0.007	0.007
					EP239-1	0.003	0.003
			String Site		EP237-1	2.316	2.316
MS-033 Total						2.326	2.326
MS-	Chaparrals	Semi-desert Chaparral	Guard_Areas	MP-36	EP233-1	0.007	0.007
MS-034 Total						0.007	0.007
MS-035	Chaparrals	Semi-desert Chaparral	Guard_Areas	MP-37	EP228	0.008	0.008
				MP-38	EP225-1	0.003	0.003
					EP226-1	0.003	0.003
			String Site Area		EP225-1	0.761	0.761
					EP226-1	0.715	0.715
		Semi-desert Chaparral -	Guard_Areas	MP-37	EP228	0.002	0.002
MS-035 Total						1.492	1.492
MS-036	Chaparrals	Redshank Chaparral	Access Road	MP-39	EP220-1	0.189	0.189
			String Site		EP220-1	1.468	1.468
		Semi-desert Chaparral	Access Road		EP220-1	0.270	0.270
			Guard_Areas		EP221-2	0.007	0.007
			String Site Area		EP220-1	0.312	0.312
					EP221-2	0.059	0.059
			Work Area		EP220-1	0.137	0.137
MS-036 Total						2.441	2.441
MS-037	Chaparrals	Northern Mixed Chaparral	Guard_Areas	MP-39	EP219-1	0.007	0.007
			String Site		EP219-1	1.557	1.557
			Work Area		EP219-1	0.646	0.646

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
		Semi-desert Chaparral	Guard_Areas		EP219-1	0.002	0.002
			String Site Area		EP219-1	0.303	0.303
				MP-40	EP219-1	1.788	1.788
			Work Area	MP-39	EP219-1	0.000	0.000
					EP220-1	0.436	0.436
MS-037 Total						4.738	4.738
MS-038	Chaparrals	Chamise Chaparral	Work Area	MP-40	EP215	0.035	0.035
		Northern Mixed Chaparral			EP217-1	0.629	0.629
					EP218-1	0.421	0.421
		Semi-desert Chaparral	Guard_Areas		EP215	0.000	0.000
			String Site		EP215	0.242	0.242
			Work Area		EP214	0.094	0.094
					EP215	0.310	0.310
MS-038 Total						1.732	1.732
MS-039	Chaparrals	Chamise Chaparral	Work Area	MP-41	EP213	0.005	0.005
		Semi-desert Chaparral	Guard_Areas		EP211	0.003	0.003
			Work Area	MP-40	EP214	0.004	0.004
				MP-41	EP211	0.497	0.497
MS-039 Total						0.510	0.510
MS-040	Chaparrals	Northern Mixed	Guard_Areas	MP-41	EP209-1	0.002	0.002
		Semi-desert Chaparral - Disturbed	Construction	MP-42	EP206-1	10.093	10.093
			Work Area		EP207	0.223	0.223
					EP208	0.091	0.091
MS-040 Total						10.410	10.410
MS-041	Chaparrals	Semi-desert Chaparral	Access Road	MP-43	EP203-3	0.001	0.001
					EP204-3	0.071	0.071
			Construction	MP-42	EP205-2	1.755	1.755
			Guard_Areas		EP206-1	0.002	0.002
			String Site Area	MP-43	EP203-3	0.984	0.984
					EP204-3	1.589	1.589
			Work Area	MP-42	EP204-3	0.536	0.536
					EP205-2	0.606	0.606
					EP206-1	0.199	0.199
				MP-43	EP203-3	0.330	0.330
		Semi-desert Chaparral - Disturbed	Construction Yard	MP-42	EP205-2	0.161	0.161
					EP206-1	29.090	29.090
			Guard_Areas		EP205-2	0.003	0.003
					EP206-1	0.001	0.001
			Work Area		EP206-1	0.366	0.366
MS-041 Total						35.696	35.696
MS-	Chaparrals	Semi-desert Chaparral	Guard_Areas	MP-43	EP201-3	0.007	0.007

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
042			Work Area		EP200A-1	0.665	0.665
					EP201-3	0.594	0.594
					EP202-3	0.638	0.638
					EP203-3	0.275	0.275
		Semi-desert Chaparral -			EP201-3	0.015	0.015
MS-042 Total						2.193	2.193
MS-043	Chaparrals	Redshank Chaparral	Work Area	MP-44	EP200-3	0.104	0.104
		Semi-desert Chaparral	Guard_Areas		EP197-2	0.003	0.003
					EP198-3	0.003	0.003
			Work Area		EP196-1	0.460	0.460
					EP197-2	0.579	0.579
					EP198-3	0.485	0.485
		Semi-desert Chaparral -			EP200-3	0.377	0.377
MS-043 Total						2.012	2.012
MS-044	Chaparrals	Redshank Chaparral	String Site Area	MP-45	EP193-1	0.483	0.483
		Semi-desert Chaparral			EP192-1	1.158	1.158
					EP193-1	1.417	1.417
			Work Area		EP192-1	0.446	0.446
					EP193-1	0.044	0.044
MS-044 Total						3.547	3.547
MS-045	Chaparrals	Redshank Chaparral	Work Area	MP-46	EP191-1	0.315	0.315
		Semi-desert Chaparral	Guard_Areas		EP190-2	0.007	0.007
			Work Area		EP190-2	0.655	0.655
					EP191-1	0.329	0.329
MS-045 Total						1.305	1.305
MS-046	Chaparrals	Scrub Oak Chaparral	Work Area	MP-47	EP186-1	0.649	0.649
		Semi-desert Chaparral	Access Road	MP-46	EP187-2	0.001	0.001
			String Site Area		EP187-2	1.409	1.409
				MP-47	EP187-2	1.706	1.706
MS-046 Total						3.764	3.764
MS-047	Chaparrals	Chamise Chaparral	Work Area	MP-48	EP181	0.471	0.471
		Scrub Oak Chaparral		MP-47	EP184-1	0.341	0.341
		Semi-desert Chaparral	Guard_Areas		EP184-1	0.003	0.003
			Work Area		EP184-1	0.278	0.278
					EP185-1	0.593	0.593
				MP-48	EP181	0.106	0.106
					EP182	0.595	0.595
		Semi-desert Chaparral -	Guard_Areas	MP-47	EP184-1	0.003	0.003
MS-047 Total						2.391	2.391
MS-	Chaparrals	Chamise Chaparral	Construction	MP-49	EP178	0.009	0.009
			String Site		EP177	1.152	1.152

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
048			Work Area		EP177	0.281	0.281
		Northern Mixed Chaparral			EP176	0.563	0.563
					EP177	0.315	0.315
		Semi-desert Chaparral	Access Road		EP178	0.541	0.541
			Construction		EP178	28.872	28.872
			String Site		EP178	1.409	1.409
			Work Area	MP-48	EP180	0.579	0.579
				MP-49	EP178	0.527	0.527
					EP179	0.404	0.404
MS-048 Total						34.652	34.652
MS-049	Chaparrals	Northern Mixed Chaparral	Guard_Areas	MP-50	EP173-1	0.005	0.005
			Work Area		EP171	0.001	0.001
					EP172	0.527	0.527
					EP173-1	0.606	0.606
					EP174	0.625	0.625
					EP175	0.623	0.623
MS-049 Total						2.388	2.388
MS-050	Chaparrals	Northern Mixed Chaparral	String Site	MP-51	EP170	5.240	5.240
			Work Area		EP170	0.485	0.485
					EP171	0.528	0.528
MS-050 Total						6.252	6.252
MS-051	Chaparrals	Northern Mixed Chaparral	String Site	MP-54	EP141	1.982	1.982
			Work Area		EP141	0.190	0.190
MS-051 Total						2.172	2.172
MS-052	Chaparrals	Northern Mixed Chaparral	Guard_Areas	MP-54	EP138-2	0.007	0.007
					EP139-1	0.007	0.007
				MP-55	EP138-2	0.005	0.005
		Northern Mixed		MP-54	EP138-2	0.001	0.001
MS-052 Total						0.020	0.020
MS-053	Chaparrals	Northern Mixed Chaparral	Construction Yard	MP-56	EP130-1	17.939	17.939
					EP131	1.289	1.289
			Guard_Areas		EP130-1	0.005	0.005
			String Site		EP131	2.350	2.350
			Work Area		EP130-1	1.501	1.501
					EP131	1.513	1.513
MS-053 Total						24.596	24.596
MS-054	Chaparrals	Chamise Chaparral	Access Road	MP-58	EP124	0.011	0.011
					EP125	0.000	0.000
			Guard_Areas		EP124	0.003	0.003
					EP125	0.003	0.003
			String Site		EP125	1.239	1.239

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
		Northern Mixed	Work Area	MP-57	EP127	1.506	1.506
MS-054 Total						2.763	2.763
MS-055	Chaparrals	Chamise Chaparral	Guard_Areas	MP-59	EP119-2	0.003	0.003
					EP120-4	0.007	0.007
		Southern Mixed			EP119-2	0.002	0.002
MS-055 Total						0.012	0.012
MS-056	Chaparrals	Chamise Chaparral	Guard_Areas	MP-59	EP116-1	0.002	0.002
			String Site	MP-60	EP113-4	2.193	2.193
			Work Area		EP114-2	0.756	0.756
MS-056 Total						2.951	2.951
MS-057	Chaparrals	Chamise Chaparral	String Site	MP-62	EP107-3	0.147	0.147
		Northern Mixed Chaparral	Access Road		EP107-3	0.000	0.000
			Guard_Areas		EP107-3	0.007	0.007
			String Site Area	MP-61	EP107-3	0.572	0.572
					EP108-2	3.785	3.785
				MP-62	EP106-3	1.075	1.075
MS-057 Total						5.585	5.585
MS-058	Chaparrals	Chamise Chaparral	Work Area	MP-62	EP103-2	1.554	1.554
					EP104-2	1.507	1.507
MS-058 Total						3.061	3.061
MS-059	Chaparrals	Chamise Chaparral	Guard_Areas	MP-63	EP99-2	0.007	0.007
			String Site		EP99-2	1.778	1.778
			Work Area		EP99-2	1.472	1.472
MS-059 Total						3.257	3.257
MS-060	Chaparrals	Chamise Chaparral	Work Area	MP-64	EP95	1.526	1.526
		Southern Mixed Chaparral	Guard_Areas		EP94	0.007	0.007
					EP96	0.006	0.006
MS-060 Total						1.539	1.539
MS-061	Chaparrals	Chamise Chaparral	Guard_Areas	MP-65	EP91	0.001	0.001
			String Site		EP91	0.287	0.287
			Work Area		EP91	0.485	0.485
					EP93	0.292	0.292
		Northern Mixed			EP93	0.319	0.319
		Southern Mixed Chaparral	Guard_Areas		EP91	0.003	0.003
			String Site		EP91	1.666	1.666
			Work Area		EP91	0.295	0.295
					EP93	0.731	0.731
MS-061 Total						4.080	4.080
MS-062	Chaparrals	Chamise Chaparral	String Site Area	MP-65	EP89-1	1.574	1.574
					EP91	1.392	1.392
			Work Area		EP89-1	0.089	0.089

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
					EP91	0.081	0.081
		Northern Mixed Chaparral	Guard_Areas		EP91	0.005	0.005
			String Site	MP-66	EP89-1	0.177	0.177
			Work Area	MP-65	EP89-1	0.729	0.729
					EP91	0.165	0.165
		Southern Mixed Chaparral	Guard_Areas	MP-66	EP84	0.003	0.003
			String Site	MP-65	EP91	0.000	0.000
			Work Area		EP91	0.261	0.261
MS-062 Total						4.476	4.476
MS-	Chaparrals	Northern Mixed	String Site	MP-67	EP83	0.419	0.419
MS-063 Total						0.419	0.419
MS-064	Chaparrals	Chamise Chaparral	Guard_Areas	MP-69	EP77	0.003	0.003
		Northern Mixed		MP-68	EP79	0.003	0.003
		Scrub Oak Chaparral	String Site		EP78	0.097	0.097
		Southern Mixed	Guard_Areas		EP79	0.001	0.001
MS-064 Total						0.104	0.104
MS-065	Chaparrals	Southern Mixed Chaparral	Guard_Areas	MP-69	EP74-1	0.003	0.003
					EP75-2	0.007	0.007
				MP-70	EP74-1	0.003	0.003
MS-065 Total						0.014	0.014
MS-066	Chaparrals	Chamise Chaparral	String Site	MP-71	EP67	0.195	0.195
		Northern Mixed	Work Area		EP69	1.469	1.469
		Southern Mixed	String Site		EP67	0.007	0.007
MS-066 Total						1.671	1.671
MS-067	Chaparrals	Chamise Chaparral	Guard_Areas	MP-71	EP66	0.007	0.007
			String Site		EP67	2.495	2.495
			Work Area		EP67	1.384	1.384
		Northern Mixed Chaparral	String Site		EP67	0.352	0.352
			Work Area		EP67	0.016	0.016
		Southern Mixed	String Site		EP67	0.000	0.000
MS-067 Total						4.255	4.255
MS-068	Chaparrals	Northern Mixed Chaparral	Guard_Areas	MP-73	EP58-2	0.003	0.003
					EP62A-1	0.003	0.003
MS-068 Total						0.007	0.007
MS-069	Chaparrals	Southern Mixed Chaparral - Burned	Guard_Areas	MP-74	EP51-1	0.003	0.003
					EP53-2	0.007	0.007
				MP-75	EP51-1	0.004	0.004
MS-069 Total						0.015	0.015
MS-070	Chaparrals	Southern Mixed Chaparral - Burned	Access Road	MP-75	EP47-2	0.000	0.000
			String Site Area		EP47-2	1.582	1.582
					EP48	0.498	0.498

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
MS-070 Total						**2.080**	**2.080**
MS-071	Chaparrals	Southern Mixed Chaparral - Burned	Guard_Areas	MP-77	EP42	0.003	0.003
					EP43-1	0.003	0.003
			String Site Area	MP-78	EP41	0.001	0.001
					EP42	1.040	1.040
			Work Area		EP42	1.373	1.373
MS-071 Total						**2.421**	**2.421**
MS-072	Chaparrals	Chamise Chaparral -	Work Area	MP-78	EP39-1	0.730	0.730
		Southern Mixed			EP39-1	0.691	0.691
MS-072 Total						**1.421**	**1.421**
MS-073	Chaparrals	Chamise Chaparral - Burned	Guard_Areas	MP-79	EP36-1	0.006	0.006
			String Site		EP36-1	1.733	1.733
			Work Area		EP36-1	1.354	1.354
MS-073 Total						**3.093**	**3.093**
MS-075	Chaparrals	Chamise Chaparral	Guard_Areas	MP-80	EP32-1	0.007	0.007
			String Site	MP-81	EP30-2	0.293	0.293
			Work Area	MP-80	EP32-1	0.660	0.660
				MP-81	EP30-2	0.949	0.949
MS-075 Total						**1.909**	**1.909**
MS-	Chaparrals	Chamise Chaparral	Guard_Areas	MP-82	EP27-1	0.007	0.007
MS-076 Total						**0.007**	**0.007**
MS-077	Chaparrals	Chamise Chaparral	Guard_Areas	MP-82	EP24-1	0.003	0.003
					EP25-2	0.003	0.003
		Southern Mixed			EP24-1	0.000	0.000
MS-077 Total						**0.007**	**0.007**
MS-078	Chaparrals	Chamise Chaparral	Access Road	MP-83	EP22-1	0.318	0.318
					EP23-2	0.015	0.015
			Guard_Areas		EP23-2	0.001	0.001
					EP24-1	0.005	0.005
			String Site Area		EP22-1	0.326	0.326
					EP23-2	0.736	0.736
		Southern Mixed Chaparral	Guard_Areas		EP24-1	0.001	0.001
			String Site		EP22-1	0.001	0.001
MS-078 Total						**1.402**	**1.402**
MS-079	Chaparrals	Chamise Chaparral	String Site Area	MP-86	EP12-3	1.322	1.322
					EP9-1	1.065	1.065
		Southern Mixed Chaparral	Guard_Areas		EP10-2	0.016	0.016
			String Site Area		EP12-3	0.476	0.476
					EP9-1	0.824	0.824
MS-079 Total						**3.704**	**3.704**
MS-	Chaparrals	Chamise Chaparral	Work Area	MP-89	EP1-3	0.193	0.193

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
080		Northern Mixed			EP1-3	0.171	0.171
		Scrub Oak Chaparral			EP1-3	0.076	0.076
		Southern Mixed			EP1-3	0.491	0.491
MS-080 Total						0.931	0.931
MS-082	Chaparrals	Northern Mixed Chaparral	String Site	MP-92	CP96-1	0.069	0.069
			Work Area	MP-92	CP95-1	0.931	0.931
					CP96-1	0.056	0.056
		Southern Mixed Chaparral		MP-91	CP100-1	0.637	0.637
				MP-92	CP98-1	0.634	0.634
					CP99-2	0.524	0.524
MS-082 Total						2.852	2.852
MS-	Chaparrals	Southern Mixed	Construction	MP-96	CP87-1	1.270	1.270
MS-083 Total						1.270	1.270
MS-084	Chaparrals	Southern Mixed Chaparral	Access Road	MP-98	CP88-1	0.009	0.009
			Guard_Areas	MP-99	CP83	0.002	0.002
			String Site	MP-98	CP88-1	0.943	0.943
			Work Area		CP87-1	0.010	0.010
					CP88-1	0.310	0.310
MS-084 Total						1.274	1.274
MS-085	Chaparrals	Southern Mixed Chaparral	Guard_Areas	MP-101	CP70-3	0.003	0.003
					CP71	0.014	0.014
MS-085 Total						0.018	0.018
MS-087	Chaparrals	Southern Mixed Chaparral - Burned	Access Road	MP-106	CP55	0.062	0.062
			String Site		CP55	1.670	1.670
MS-087 Total						1.732	1.732
MS-090	Chaparrals	Southern Mixed Chaparral	Guard_Areas	MP-107	CP47-2	0.007	0.007
				MP-108	CP46-2	0.016	0.016
MS-090 Total						0.023	0.023
MS-091	Chaparrals	Southern Mixed Chaparral	Guard_Areas	MP-108	CP44-1	0.007	0.007
					CP45-1	0.010	0.010
					CP46-2	0.003	0.003
				MP-109	CP44-1	0.007	0.007
MS-091 Total						0.027	0.027
MS-092	Chaparrals	Chamise Chaparral	Access Road	MP-110	CP41-2	0.156	0.156
			Guard_Areas	MP-109	CP42-1	0.007	0.007
					CP43-1	0.002	0.002
			String Site Area		CP42-1	0.549	0.549
				MP-110	CP40-2	0.352	0.352
					CP41-2	0.469	0.469
MS-092 Total						1.535	1.535
MS-	Chaparrals	Chamise Chaparral	Guard_Areas	MP-111	CP36-1	0.005	0.005

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
093		Southern Mixed		MP-110	CP37-2	0.003	0.003
MS-093 Total						0.008	0.008
MS-097	Chaparrals	Southern Mixed Chaparral	String Site	MP-117	SSDE1	0.013	0.013
			Work Area		SSDE1	0.034	0.034
MS-097 Total						0.047	0.047
MS-	Chaparrals	Southern Mixed	Work Area	MP-117	SSDE1	0.000	0.000
MS-098 Total						0.000	0.000
MS-100	Chaparrals	Southern Mixed	Work Area	(blank)	SSDE1	0.039	0.039
		Southern Mixed			SSDE1	0.060	0.060
MS-100 Total						0.099	0.099
MS-	Chaparrals	Southern Mixed	Work Area	(blank)	SSDE1	0.003	0.003
MS-101 Total						0.003	0.003
MS-	Chaparrals	Southern Mixed	Work Area	MP-117	SSDE1	0.048	0.048
MS-102 Total						0.048	0.048
Grand Total						223.973	223.973

Table A-2. Temporary Project Impacts to Coastal and Montane Scrub vegetation Communities

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
Map							
MS-037	Coastal and Montane Scrub Habitats	Big Sagebrush Scrub	Guard_Areas	MP-39	EP219-1	0.002	0.002
					EP220-1	0.007	0.007
			String Site		EP220-1	0.126	0.126
MS-037 Total						0.135	0.135
MS-038	Coastal and Montane Scrub Habitats	Diegan Coastal Sage Scrub - Inland Form	Access Road	MP-40	EP215	0.130	0.130
			Guard_Areas		EP215	0.006	0.006
			String Site		EP215	1.034	1.034
			Work Area		EP214	0.215	0.215
					EP215	1.071	1.071
					EP218-1	0.220	0.220
		Diegan			EP214	0.063	0.063
MS-038 Total						2.740	2.740
MS-039	Coastal and Montane Scrub Habitats	Diegan Coastal Sage Scrub - Inland Form	Guard_Areas	MP-41	EP211	0.003	0.003
			Work Area	MP-40	EP214	0.128	0.128
				MP-41	EP210	0.533	0.533
					EP211	0.038	0.038
					EP213	0.612	0.612
		Diegan		MP-40	EP214	0.050	0.050
MS-039 Total						1.365	1.365
MS-040	Coastal and Montane Scrub Habitats	Diegan Coastal Sage	Guard_Areas	MP-41	EP209-1	0.003	0.003
			Work Area	MP-42	EP208	0.545	0.545
		Diegan Coastal Sage			EP207	0.388	0.388
					EP208	0.001	0.001
MS-040 Total						0.937	0.937
MS-041	Coastal and Montane Scrub Habitats	Flat-topped Buckwheat	Construction Yard	MP-42	EP204-3	10.160	10.160
					EP205-2	16.486	16.486
		Flat-topped			EP205-2	1.171	1.171
MS-041 Total						27.818	27.818
MS-	Coastal and	Diegan	Work Area	MP-44	EP199-3	0.607	0.607
MS-043 Total						0.607	0.607
MS-044	Coastal and Montane Scrub Habitats	Diegan Coastal Sage Scrub - Inland Form	String Site	MP-45	EP193-1	0.025	0.025
			Work Area		EP192-1	0.004	0.004
					EP193-1	0.445	0.445
MS-044 Total						0.473	0.473
MS-	Coastal and	Flat-topped	Work Area	MP-49	EP179	0.165	0.165
MS-048 Total						0.165	0.165
MS-	Coastal and	Diegan	Work Area	MP-60	EP114-2	0.846	0.846
MS-056 Total						0.846	0.846
MS-	Coastal and	Big	Access Road	MP-67	EP83	0.476	0.476

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
063	Montane Scrub Habitats	Sagebrush Scrub	Guard_Areas	MP-66	EP84	0.002	0.002
			String Site Area	MP-67	EP84	0.003	0.003
					EP83	3.489	3.489
					EP84	3.236	3.236
			Work Area	MP-66	EP84	0.153	0.153
				MP-67	EP84	0.937	0.937
MS-063 Total						8.296	8.296
MS-	Coastal and	Flat-topped	String Site Area	MP-68	EP78	1.414	1.414
MS-064 Total						1.414	1.414
MS-067	Coastal and Montane	Flat-topped Buckwheat	String Site Area	MP-71	EP67	0.011	0.011
			Work Area		EP67	0.053	0.053
MS-067 Total						0.064	0.064
MS-074	Coastal and Montane	Diegan Coastal Sage	Guard_Areas	MP-80	EP34-1	0.003	0.003
					EP35-1	0.003	0.003
MS-074 Total						0.007	0.007
MS-075	Coastal and Montane	Diegan Coastal Sage	Guard_Areas	MP-80	EP32-1	0.007	0.007
			Work Area		EP32-1	0.889	0.889
MS-075 Total						0.896	0.896
MS-081	Coastal and Montane	Diegan Coastal Sage	Access Road	MP-89	SSDE2	0.029	0.029
			Construction		SSDE2	9.792	9.792
MS-081 Total						9.821	9.821
MS-	Coastal and	Flat-topped	String Site Area	MP-92	CP95-1	0.165	0.165
MS-082 Total						0.165	0.165
MS-083	Coastal and Montane	Diegan	Construction Yard	MP-96	CP87-1	0.680	0.680
		Diegan			CP87-1	1.213	1.213
MS-083 Total						1.893	1.893
MS-084	Coastal and Montane Scrub Habitats	Diegan Coastal Sage Scrub	Guard_Areas	MP-98	CP85-1	0.003	0.003
					CP86	0.011	0.011
				MP-99	CP83	0.004	0.004
					CP84	0.007	0.007
			Work Area	MP-98	CP87-1	0.031	0.031
					CP88-1	0.008	0.008
MS-084 Total						0.064	0.064
MS-085	Coastal and Montane	Diegan Coastal Sage	Guard_Areas	MP-101	CP70-3	0.003	0.003
					CP71	0.001	0.001
MS-085 Total						0.005	0.005
MS-086	Coastal and Montane Scrub Habitats	Diegan Coastal Sage Scrub - Disturbed	Access Road	MP-103	CP64-2	0.679	0.679
					CP65-1	0.228	0.228
			String Site Area		CP64-2	0.140	0.140
					CP65-1	1.499	1.499
MS-086 Total						2.546	2.546

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
MS-088	Coastal and Montane Scrub Habitats	Diegan Coastal Sage Scrub	Access Road	MP-107	CP50-1	0.628	0.628
			Guard_Areas	MP-106	CP53-1	0.003	0.003
			String Site Area	MP-107	CP50-1	0.185	0.185
					CP51-2	0.020	0.020
		Diegan	Guard_Areas	MP-106	CP54-1	0.000	0.000
MS-088 Total						0.835	0.835
MS-090	Coastal and Montane Scrub Habitats	Diegan Coastal Sage Scrub	Access Road	MP-107	CP49-1	0.211	0.211
					CP50-1	0.403	0.403
			String Site Area		CP49-1	1.114	1.114
					CP50-1	0.227	0.227
MS-090 Total						1.955	1.955
MS-	Coastal and	Diegan	Guard_Areas	MP-109	CP43-1	0.008	0.008
MS-092 Total						0.008	0.008
MS-093	Coastal and Montane	Diegan Coastal Sage	Guard_Areas	MP-110	CP37-2	0.003	0.003
				MP-111	CP36-1	0.002	0.002
MS-093 Total						0.006	0.006
MS-094	Coastal and Montane Scrub Habitats	Coastal Sage-	Guard_Areas	MP-112	CP28-1	0.007	0.007
		Diegan Coastal Sage Scrub		MP-111	CP33A	0.003	0.003
				MP-112	CP31-2	0.002	0.002
					CP33A	0.003	0.003
			String Site Area		CP31-2	1.003	1.003
			Work Area		CP31-2	1.105	1.105
MS-094 Total						2.124	2.124
MS-095	Coastal and Montane Scrub Habitats	Coastal Sage-Chaparral Scrub	Guard_Areas	MP-113	CP24-1	0.003	0.003
				MP-114	CP22-1	0.002	0.002
			String Site Area	MP-113	CP23	0.107	0.107
MS-095 Total						0.113	0.113
MS-096	Coastal and Montane Scrub Habitats	Coastal Sage-Chaparral Scrub	Access Road	MP-115	CP15-1	0.023	0.023
			Guard_Areas		CP14	0.002	0.002
					CP15-1	0.003	0.003
			String Site Area		CP14	0.091	0.091
					CP15-1	0.498	0.498
			Work Area		CP14	0.055	0.055
					CP15-1	0.631	0.631
MS-096 Total						1.303	1.303
MS-097	Coastal and Montane Scrub Habitats	Coastal Sage-Chaparral Scrub	Guard_Areas	MP-117	CP6-1	0.007	0.007
			String Site Area		CP2	0.009	0.009
					SSDE1	0.082	0.082
			Work Area		CP2	0.015	0.015
					CP3	0.016	0.016
					SSDE1	0.112	0.112

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
MS-097 Total						0.241	0.241
MS-	Coastal and	Coastal Sage-	Work Area	MP-117	SSDE1	0.019	0.019
MS-098 Total						0.019	0.019
MS-099	Coastal and Montane	Coastal Sage-Chaparral	String Site Area	MP-117	SSDE1	0.028	0.028
			Work Area		SSDE1	0.041	0.041
MS-099 Total						0.069	0.069
MS-	Coastal and	Coastal Sage-	Work Area	(blank)	SSDE1	0.005	0.005
MS-100 Total						0.005	0.005
MS-	Coastal and	Coastal Sage-	Work Area	(blank)	SSDE1	0.002	0.002
MS-101 Total						0.002	0.002
MS-	Coastal and	Coastal Sage-	Work Area	MP-117	SSDE1	0.003	0.003
MS-102 Total						0.003	0.003
MS-	Coastal and	Coastal Sage-	Work Area	(blank)	(blank)	0.001	0.001
MS-103 Total						0.001	0.001
Grand Total						66.939	66.939

Table A-3. Temporary Project Impacts to Desert Scrub and Dune Vegetation Communities

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
MS-001	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub	Access Road	MP-1	EP361	0.317	0.317
			Construction		EP361	4.965	4.965
			Guard_Areas	MP-0	EP363-1	0.005	0.005
			Work Area		EP362-1	0.636	0.636
					EP363-1	0.624	0.624
				MP-1	EP361	0.631	0.631
MS-001 Total						7.177	7.177
MS-002	Desert Scrub and	Sonoran Creosote Bush Scrub	Work Area	MP-1	EP359	0.628	0.628
					EP360	0.624	0.624
MS-002 Total						1.252	1.252
MS-003	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub	Access Road	MP-3	EP356	0.001	0.001
			String Site Area		EP355	1.384	1.384
					EP356	0.377	0.377
			Work Area	MP-2	EP356	0.629	0.629
					EP357	0.629	0.629

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
					EP358	0.629	0.629
		Sonoran Creosote Bush Scrub - Disturbed	Access Road	MP-3	EP356	0.078	0.078
			String Site		EP356	0.048	0.048
MS-003 Total						3.776	3.776
MS-004	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub	String Site	MP-3	EP355	0.486	0.486
			Work Area		EP354	0.620	0.620
					EP355	0.641	0.641
MS-004 Total						1.747	1.747
MS-005	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub	Work Area	MP-3	EP353	0.625	0.625
				MP-4	EP351	0.478	0.478
					EP352	0.559	0.559
		Sonoran Desert Scrub		MP-3	EP353	0.016	0.016
MS-005 Total						1.678	1.678
MS-006	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub	Access Road	MP-5	EP349	0.010	0.010
			String Site		EP349	2.632	2.632
			Work Area	MP-4	EP351	0.100	0.100
				MP-5	EP349	0.625	0.625
MS-006 Total						3.366	3.366
MS-007	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub	Guard_Areas	MP-5	EP348	0.002	0.002
			Work Area		EP348	0.619	0.619
		Sonoran Creosote Bush	Guard_Areas		EP348	0.005	0.005
MS-007 Total						0.626	0.626
MS-	Desert	Sonoran Creosote Bush	Construction	MP-6	EP346	9.932	9.932
MS-008 Total						9.932	9.932
MS-009	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub	Guard_Areas	MP-6	EP344	0.003	0.003
			String Site Area	MP-7	EP343	0.287	0.287
					EP344	0.279	0.279
MS-009 Total						0.569	0.569
MS-010	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub	Guard_Areas	MP-7	EP342	0.003	0.003
			String Site		EP343	0.006	0.006
			Work Area		EP341	0.606	0.606
					EP342	0.485	0.485
		Sonoran Creosote Bush			EP342	0.097	0.097
MS-010 Total						1.198	1.198
MS-011	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub	Work Area	MP-8	EP338	0.017	0.017
					EP339	0.245	0.245
					EP340	0.245	0.245
MS-011 Total						0.508	0.508
MS-012	Desert Scrub and	Sonoran Creosote Bush Scrub	Work Area	MP-9	EP336	0.246	0.246
					EP337	0.305	0.305
MS-012 Total						0.552	0.552

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
MS-013	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub	Work Area	MP-10	EP332	0.638	0.638
					EP333	0.638	0.638
					EP334	0.644	0.644
				MP-9	EP335	0.558	0.558
MS-013 Total						2.478	2.478
MS-014	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub - Disturbed	Construction	MP-11	EP330-1	17.472	17.472
			Guard_Areas		EP330-1	0.014	0.014
					EP331	0.003	0.003
			String Site		EP330-1	4.007	4.007
			Work Area		EP330-1	0.565	0.565
					EP331	0.620	0.620
		Sonoran Mixed Woody Scrub - Disturbed	Guard_Areas		EP329-1	0.011	0.011
			Work Area		EP329-1	0.082	0.082
MS-014 Total						22.775	22.775
MS-016	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub	Access Road	MP-13	EP323-1	0.378	0.378
			String Site		EP323-1	0.217	0.217
			Work Area		EP322-1	0.020	0.020
MS-016 Total						0.615	0.615
MS-018	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub - Disturbed	Guard_Areas	MP-15	EP316-2	0.007	0.007
			String Site	MP-16	EP313	0.431	0.431
			Work Area	MP-15	EP316-2	0.620	0.620
MS-018 Total						1.058	1.058
MS-019	Desert Scrub and	Sonoran Creosote Bush Scrub - Disturbed	String Site	MP-16	EP313	0.653	0.653
			Work Area		EP313	0.535	0.535
MS-019 Total						1.188	1.188
MS-020	Desert Scrub and Dune Habitats	Sonoran Desert Scrub	Access Road	MP-18	EP306-1	0.088	0.088
			String Site Area	MP-17	EP307-1	0.012	0.012
				MP-18	EP306-1	1.725	1.725
					EP307-1	0.439	0.439
			Work Area	MP-17	EP307-1	0.612	0.612
				MP-18	EP306-1	0.573	0.573
MS-020 Total						3.449	3.449
MS-021	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub	Guard_Areas	MP-18	EP303-2	0.004	0.004
			Work Area	MP-19	EP303-2	0.528	0.528
		Sonoran Creosote Bush Scrub - Disturbed	Guard_Areas		EP302-1	0.007	0.007
			Work Area		EP302-1	0.572	0.572
MS-021 Total						1.111	1.111
MS-022	Desert Scrub and Dune Habitats	Sonoran Creosote Bush	Work Area	MP-20	EP300-1	0.014	0.014
		Sonoran Creosote Bush Scrub - Disturbed	Access Road	MP-19	EP301	0.000	0.000
			String Site		EP301	1.905	1.905
		Sonoran Desert Wash	Work Area	MP-20	EP300-1	0.011	0.011

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
MS-022 Total						**1.931**	**1.931**
MS-023	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub	Work Area	MP-20	EP298	0.646	0.646
					EP299	0.638	0.638
					EP300-1	0.606	0.606
		Sonoran Desert Wash			EP300-1	0.014	0.014
MS-023 Total						**1.905**	**1.905**
MS-024	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub	Construction	MP-21	EP296	29.727	29.727
			Work Area		EP295	0.564	0.564
					EP296	0.638	0.638
					EP297	0.646	0.646
MS-024 Total						**31.575**	**31.575**
MS-025	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub	String Site	MP-22	EP292-1	0.553	0.553
			Work Area		EP292-1	0.203	0.203
					EP293	0.431	0.431
					EP294	0.638	0.638
		Sonoran Desert Wash Scrub			EP292-1	0.347	0.347
					EP293	0.207	0.207
		Sonoran Mixed Woody and Succulent Scrub	String Site		EP292-1	0.707	0.707
			Work Area		EP292-1	0.043	0.043
MS-025 Total						**3.130**	**3.130**
MS-026	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub	String Site Area	MP-22	EP291-1	0.382	0.382
					EP292-1	0.026	0.026
			Work Area		EP291-1	0.447	0.447
		Sonoran Desert Mixed Scrub			EP291-1	0.130	0.130
				MP-23	EP290	0.545	0.545
		Sonoran Mixed Woody	String Site	MP-22	EP292-1	0.002	0.002
MS-026 Total						**1.531**	**1.531**
MS-027	Desert Scrub and	Sonoran Desert Mixed	String Site	MP-27	EP269-1	1.382	1.382
		Sonoran Mixed Woody	Guard_Areas		EP269-1	0.007	0.007
MS-027 Total						**1.389**	**1.389**
MS-028	Desert Scrub and Dune Habitats	Sonoran Mixed Woody and Succulent Scrub	Construction	MP-30	EP257	4.880	4.880
			Work Area		EP257	0.159	0.159
		Sonoran Mixed Woody Scrub			EP257	0.348	0.348
					EP258-3	0.626	0.626
		Sonoran Mixed Woody			EP257	0.051	0.051
MS-028 Total						**6.064**	**6.064**
MS-029	Desert Scrub and Dune Habitats	Sonoran Mixed Woody Scrub	Guard_Areas	MP-30	EP255-2	0.007	0.007
					EP256	0.003	0.003
				MP-31	EP252-1	0.001	0.001
					EP255-2	0.003	0.003
			String Site	MP-30	EP255-2	0.670	0.670

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
			Area		EP256	1.529	1.529
				MP-31	EP255-2	3.217	3.217
			Work Area	MP-30	EP256	0.641	0.641
				MP-31	EP252-1	0.539	0.539
					EP254-3	0.664	0.664
					EP255-2	0.523	0.523
MS-029 Total						7.799	7.799
MS-030	Desert Scrub and Dune Habitats	Sonoran Mixed Woody and Succulent Scrub	Guard_Areas	MP-32	EP250	0.005	0.005
			Work Area		EP250	0.649	0.649
		Sonoran Mixed Woody Scrub	Guard_Areas	MP-31	EP252-1	0.004	0.004
				MP-32	EP248	0.007	0.007
			Work Area		EP248	0.554	0.554
					EP249	0.601	0.601
					EP251	0.592	0.592
MS-030 Total						2.411	2.411
MS-031	Desert Scrub and Dune Habitats	Sonoran Mixed Woody	Work Area	MP-33	EP246	0.301	0.301
		Sonoran Mixed Woody Scrub	Guard_Areas	MP-32	EP247	0.002	0.002
					EP248	0.000	0.000
			Work Area	MP-33	EP245-1	0.572	0.572
					EP246	0.071	0.071
					EP247	0.261	0.261
		Sonoran Mixed Woody	Guard_Areas	MP-32	EP248	0.001	0.001
MS-031 Total						1.209	1.209
MS-032	Desert Scrub and Dune Habitats	Sonoran Creosote Bush Scrub	Construction	MP-34	EP242	16.849	16.849
			Work Area		EP242	0.510	0.510
		Sonoran Creosote Bush			EP240	0.481	0.481
MS-032 Total						17.840	17.840
MS-	Desert	Sonoran Desert Mixed	String Site	MP-35	EP237-1	0.421	0.421
MS-033 Total						0.421	0.421
Grand Total						142.260	142.260

Table A-4. Temporary Project Impacts to Grasslands and Meadow Vegetation Communities

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
MS-	Grasslands	Non-native Grassland -	String Site	MP-39	EP220-1	0.091	0.091
MS-037 Total						0.091	0.091
MS-039	Grasslands and	Non-native Grassland	Guard_Areas	MP-41	EP209-1	0.003	0.003
					EP210	0.003	0.003
MS-039 Total						0.007	0.007

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
MS-	Grasslands	Non-native Grassland	Work Area	MP-41	EP209-1	0.645	0.645
MS-040 Total						0.645	0.645
MS-056	Grasslands and Meadows	Non-native Grassland	Guard_Areas	MP-59	EP116-1	0.005	0.005
			String Site	MP-60	EP113-4	1.229	1.229
			Work Area		EP114-2	0.010	0.010
MS-056 Total						1.244	1.244
MS-062	Grasslands and Meadows	Non-native Grassland	Guard_Areas	MP-65	EP89-1	0.006	0.006
			String Site		EP89-1	1.868	1.868
			Work Area		EP89-1	0.745	0.745
MS-062 Total						2.619	2.619
MS-067	Grasslands and	Non-native Grassland	String Site	MP-71	EP67	0.834	0.834
			Work Area		EP67	0.009	0.009
MS-067 Total						0.842	0.842
MS-075	Grasslands and	Non-native Grassland	String Site	MP-81	EP30-2	1.168	1.168
			Work Area		EP30-2	0.600	0.600
MS-075 Total						1.768	1.768
MS-077	Grasslands and Meadows	Non-native Grassland	Access Road	MP-82	EP26-1	0.023	0.023
			Construction		EP26-1	15.867	15.867
			Guard_Areas		EP27-1	0.007	0.007
MS-077 Total						15.897	15.897
MS-	Grasslands	Non-native Grassland	Construction	MP-89	SSDE2	0.986	0.986
MS-081 Total						0.986	0.986
MS-086	Grasslands and	Non-native Grassland	Access Road	MP-103	CP66-2	0.069	0.069
			Construction		CP66-2	0.820	0.820
MS-086 Total						0.889	0.889
MS-088	Grasslands and	Non-native Grassland	Access Road	MP-107	CP51-2	0.132	0.132
			String Site		CP51-2	0.037	0.037
MS-088 Total						0.170	0.170
MS-089	Grasslands and	Non-native Grassland	Access Road	MP-106	CP54-1	0.440	0.440
			Construction		CP54-1	20.972	20.972
MS-089 Total						21.412	21.412
MS-095	Grasslands and	Non-native Grassland	Access Road	MP-113	CP23	0.061	0.061
			String Site		CP23	0.209	0.209
MS-095 Total						0.270	0.270
MS-097	Grasslands and	Non-native Grassland	String Site	MP-117	SSDE1	1.561	1.561
			Work Area		SSDE1	0.000	0.000
MS-097 Total						1.561	1.561
MS-	Grasslands	Non-native Grassland	Work Area	(blank)	(blank)	0.004	0.004
MS-103 Total						0.004	0.004
Grand Total						48.406	48.406

Table A-5. Temporary Project Impacts to Herbaceous Wetland, Freshwater, and Stream Vegetation Communities

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
MS-005	Herbaceous Wetlands,	Non-vegetated Channel	Work Area	MP-4	EP351	0.036	0.036
					EP352	0.086	0.086
MS-005 Total						0.121	0.121
MS-006	Herbaceous Wetlands, Freshwater, and	Non-vegetated Channel	String Site	MP-5	EP349	0.057	0.057
			Work Area	MP-4	EP350	0.032	0.032
					EP351	0.000	0.000
MS-006 Total						0.090	0.090
MS-007	Herbaceous Wetlands,	Non-vegetated Channel	Work Area	MP-5	EP347	0.047	0.047
				MP-6	EP346	0.020	0.020
MS-007 Total						0.067	0.067
MS-	Herbaceous	Non-vegetated Channel	Construction	MP-5	EP347	0.003	0.003
MS-008 Total						0.003	0.003
MS-009	Herbaceous Wetlands,	Non-vegetated Channel	Work Area	MP-6	EP344	0.015	0.015
					EP345	0.002	0.002
MS-009 Total						0.017	0.017
MS-010	Herbaceous Wetlands,	Non-vegetated Channel	Work Area	MP-7	EP341	0.024	0.024
					EP343	0.006	0.006
MS-010 Total						0.030	0.030
MS-011	Herbaceous Wetlands, Freshwater, and Streams	Non-vegetated Channel	String Site	MP-8	EP338	0.015	0.015
			Work Area		EP338	0.115	0.115
					EP339	0.010	0.010
					EP340	0.051	0.051
MS-011 Total						0.191	0.191
MS-	Herbaceous	Non-vegetated Channel	Work Area	MP-9	EP335	0.078	0.078
MS-013 Total						0.078	0.078
MS-	Herbaceous	Non-vegetated Channel	Work Area	MP-12	EP326	0.031	0.031
MS-015 Total						0.031	0.031
MS-016	Herbaceous Wetlands,	Non-vegetated Channel	Access Road	MP-13	EP323-1	0.025	0.025
			String Site		EP323-1	0.032	0.032
MS-016 Total						0.057	0.057
MS-017	Herbaceous Wetlands, Freshwater, and	Non-vegetated Channel	Work Area	MP-14	EP318-1	0.024	0.024
					EP320-1	0.107	0.107
					EP321-1	0.007	0.007
MS-017 Total						0.138	0.138
MS-	Herbaceous	Non-vegetated Channel	String Site	MP-16	EP313	0.082	0.082
MS-018 Total						0.082	0.082
MS-019	Herbaceous Wetlands, Freshwater, and	Non-vegetated Channel	String Site	MP-16	EP313	0.059	0.059
			Work Area		EP312	0.000	0.000
					EP313	0.112	0.112
MS-019 Total						0.170	0.170

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
MS-020	Herbaceous Wetlands, Freshwater, and Streams	Non-vegetated Channel	Access Road	MP-18	EP306-1	0.002	0.002
			String Site Area	MP-17	EP307-1	0.011	0.011
				MP-18	EP306-1	0.036	0.036
					EP307-1	0.069	0.069
			Work Area		EP306-1	0.026	0.026
MS-020 Total						0.144	0.144
MS-021	Herbaceous Wetlands,	Non-vegetated Channel	Work Area	MP-19	EP302-1	0.004	0.004
					EP303-2	0.025	0.025
MS-021 Total						0.029	0.029
MS-	Herbaceous	Non-vegetated Channel	Construction	MP-21	EP296	0.282	0.282
MS-024 Total						0.282	0.282
MS-025	Herbaceous Wetlands,	Non-vegetated Channel	String Site	MP-22	EP292-1	0.029	0.029
			Work Area		EP292-1	0.047	0.047
MS-025 Total						0.075	0.075
MS-026	Herbaceous Wetlands,	Non-vegetated Channel	String Site	MP-22	EP292-1	0.005	0.005
			Work Area		EP291-1	0.070	0.070
MS-026 Total						0.075	0.075
MS-029	Herbaceous Wetlands, Freshwater, and Streams	Non-vegetated Channel	Guard_Areas	MP-31	EP252-1	0.001	0.001
			String Site Area	MP-30	EP255-2	0.172	0.172
				MP-31	EP255-2	0.008	0.008
			Work Area		EP252-1	0.073	0.073
MS-029 Total						0.254	0.254
MS-	Herbaceous	Non-vegetated Channel	Work Area	MP-32	EP251	0.044	0.044
MS-030 Total						0.044	0.044
MS-031	Herbaceous Wetlands, Freshwater,	Non-vegetated Channel	Guard_Areas	MP-32	EP247	0.001	0.001
					EP248	0.001	0.001
			Work Area	MP-33	EP247	0.071	0.071
MS-031 Total						0.073	0.073
MS-035	Herbaceous Wetlands,	Non-vegetated Channel	Guard_Areas	MP-38	EP226-1	0.001	0.001
			String Site		EP226-1	0.080	0.080
MS-035 Total						0.081	0.081
MS-	Herbaceous	Non-vegetated Channel	String Site	MP-39	EP220-1	0.023	0.023
MS-036 Total						0.023	0.023
MS-	Herbaceous	Non-vegetated Channel	String Site	MP-40	EP219-1	0.002	0.002
MS-037 Total						0.002	0.002
MS-	Herbaceous	Non-vegetated Channel	String Site	MP-40	EP215	0.001	0.001
MS-038 Total						0.001	0.001
MS-	Herbaceous	Non-vegetated Channel	Work Area	MP-42	EP208	0.001	0.001
MS-040 Total						0.001	0.001
MS-041	Herbaceous Wetlands,	Non-vegetated Channel	Construction	MP-42	EP205-2	0.010	0.010
			Work Area		EP204-3	0.029	0.029

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
MS-041 Total						0.039	0.039
MS-043	Herbaceous Wetlands,	Non-vegetated Channel	Work Area	MP-44	EP198-3	0.005	0.005
					EP199-3	0.010	0.010
MS-043 Total						0.015	0.015
MS-047	Herbaceous Wetlands,	Non-vegetated Channel	Work Area	MP-47	EP184-1	0.003	0.003
					EP185-1	0.007	0.007
MS-047 Total						0.010	0.010
MS-	Herbaceous	Non-vegetated Channel	Construction	MP-49	EP178	0.014	0.014
MS-048 Total						0.014	0.014
MS-	Herbaceous	Non-vegetated Channel	Work Area	MP-50	EP173-1	0.003	0.003
MS-049 Total						0.003	0.003
MS-	Herbaceous	Non-vegetated Channel	Guard_Areas	MP-56	EP130-1	0.000	0.000
MS-053 Total						0.000	0.000
MS-063	Herbaceous Wetlands,	Non-vegetated Channel	String Site	MP-67	EP83	0.006	0.006
			Work Area	MP-66	EP84	0.003	0.003
MS-063 Total						0.009	0.009
MS-064	Herbaceous Wetlands,	Non-vegetated Channel	Guard_Areas	MP-68	EP77	0.000	0.000
			String Site		EP78	0.012	0.012
MS-064 Total						0.013	0.013
MS-	Herbaceous	Non-vegetated Channel	Work Area	MP-71	EP69	0.010	0.010
MS-066 Total						0.010	0.010
MS-	Herbaceous	Non-vegetated Channel	String Site	MP-75	EP48	0.001	0.001
MS-070 Total						0.001	0.001
MS-	Herbaceous	Non-vegetated Channel	String Site	MP-86	EP9-1	0.000	0.000
MS-079 Total						0.000	0.000
MS-082	Herbaceous Wetlands,	Non-vegetated Channel	String Site	MP-92	CP96-1	0.001	0.001
			Work Area		CP95-1	0.030	0.030
MS-082 Total						0.031	0.031
MS-	Herbaceous	Non-vegetated Channel	Guard_Areas	MP-98	CP85-1	0.000	0.000
MS-084 Total						0.000	0.000
MS-	Herbaceous	Non-vegetated Channel	Guard_Areas	MP-101	CP71	0.000	0.000
MS-085 Total						0.000	0.000
MS-086	Herbaceous Wetlands, Freshwater,	Non-vegetated Channel	Access Road	MP-103	CP64-2	0.001	0.001
					CP66-2	0.026	0.026
			String Site		CP64-2	0.000	0.000
MS-086 Total						0.027	0.027
MS-	Herbaceous	Non-vegetated Channel	Access Road	MP-106	CP55	0.001	0.001
MS-087 Total						0.001	0.001
MS-088	Herbaceous Wetlands,	Non-vegetated Channel	Access Road	MP-107	CP50-1	0.005	0.005
			String Site		CP50-1	0.003	0.003
MS-088 Total						0.008	0.008

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
MS-090	Herbaceous Wetlands, Freshwater, and Streams	Non-vegetated Channel	Access Road	MP-107	CP49-1 CP50-1	0.001 0.012	0.001 0.012
			Guard_Areas	MP-108	CP46-2	0.001	0.001
			String Site Area	MP-107	CP49-1 CP50-1	0.005 0.010	0.005 0.010
MS-090 Total						0.029	0.029
MS-	Herbaceous	Non-vegetated Channel	Guard_Areas	MP-108	CP44-1	0.000	0.000
MS-091 Total						0.000	0.000
MS-	Herbaceous	Non-vegetated Channel	Guard_Areas	MP-109	CP43-1	0.001	0.001
MS-092 Total						0.001	0.001
MS-	Herbaceous	Non-vegetated Channel	Guard_Areas	MP-110	CP37-2	0.000	0.000
MS-093 Total						0.000	0.000
Grand Total						2.370	2.370

Table A-6. Temporary Project Impacts to Woodland and Forest Vegetation Communities

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
MS-	Woodlands	Peninsular Juniper	Guard_Areas	MP-31	EP255-2	0.003	0.003
MS-029 Total						0.003	0.003
MS-031	Woodlands and Forests	Peninsular Juniper Woodland Scrub	Guard_Areas	MP-32	EP247	0.004	0.004
					EP248	0.001	0.001
			Work Area	MP-33	EP247	0.299	0.299
MS-031 Total						0.304	0.304
MS-	Woodlands	Peninsular Juniper	Guard_Areas	MP-37	EP228	0.009	0.009
MS-035 Total						0.009	0.009
MS-041	Woodlands and	Coast Live Oak Woodland - Disturbed	Construction Yard	MP-42	EP204-3	0.183	0.183
					EP205-2	0.981	0.981
MS-041 Total						1.165	1.165
MS-	Woodlands	Coast Live Oak	Work Area	MP-44	EP198-3	0.013	0.013
MS-043 Total						0.013	0.013
MS-051	Woodlands and	Coast Live Oak Woodland	String Site	MP-54	EP141	0.003	0.003
			Work Area		EP141	1.092	1.092
MS-051 Total						1.095	1.095
MS-	Woodlands	Coast Live Oak	Guard_Areas	MP-59	EP119-2	0.001	0.001
MS-055 Total						0.001	0.001
MS-	Woodlands	Coast Live Oak	Guard_Areas	MP-66	EP85-2	0.007	0.007
MS-062 Total						0.007	0.007
MS-063	Woodlands and Forests	Coast Live Oak Woodland	Guard_Areas	MP-66	EP84	0.001	0.001
			Work Area		EP84	0.004	0.004
				MP-67	EP84	0.123	0.123
MS-063 Total						0.128	0.128
MS-064	Woodlands and	Coast Live Oak	Guard_Areas	MP-68	EP77	0.003	0.003
		Coast Live Oak	String Site		EP78	0.018	0.018
MS-064 Total						0.021	0.021
MS-	Woodlands	Coast Live Oak	Guard_Areas	MP-75	EP51-1	0.002	0.002
MS-069 Total						0.002	0.002
MS-086	Woodlands and	Coast Live Oak Woodland	Access Road	MP-103	CP66-2	0.023	0.023
			Construction	MP-102	CP66-2	0.705	0.705
MS-086 Total						0.729	0.729
MS-	Woodlands	Coast Live Oak	Guard_Areas	MP-106	CP54-1	0.004	0.004
MS-088 Total						0.004	0.004
MS-	Woodlands	Coast Live Oak	String Site	MP-112	CP31-2	0.441	0.441
MS-094 Total						0.441	0.441
Grand Total						3.922	3.922

Table A-7. Temporary Project Impacts to Riparian Woodland and Forest Vegetation Communities

Map Book Page	Vegetation Type	Vegetation Community	Work Area	Milepost	Engineering/Structure Number	Temporary Impact	Total Impact
MS-	Riparian	Riparian Woodland	Guard_Areas	MP-35	EP239-1	0.003	0.003
MS-033 Total						0.003	0.003
MS-	Riparian	Southern Cottonwood-	Guard_Areas	MP-59	EP119-2	0.003	0.003
MS-055 Total						0.003	0.003
MS-064	Riparian Forests	Southern Coast Live Oak Riparian Forest	Guard_Areas	MP-68	EP77 EP79	0.003 0.002	0.003 0.002
MS-064 Total						0.005	0.005
MS-	Riparian	Southern Coast Live Oak	Work Area	MP-92	CP95-1	0.059	0.059
MS-082 Total						0.059	0.059
MS-085	Riparian Forests	Southern Coast Live Oak Riparian Forest	Guard_Areas	MP-101	CP70-3 CP71	0.003 0.005	0.003 0.005
MS-085 Total						0.008	0.008
MS-088	Riparian Forests	Southern Coast Live Oak Riparian Forest	Guard_Areas	MP-106	CP53-1 CP54-1	0.003 0.003	0.003 0.003
MS-088 Total						0.007	0.007
Grand Total						0.086	0.086

Appendix B. Summary of Baseline CRAM Results

APPENDIX B – Summary of Baseline CRAM Results

1.0 INTRODUCTION

Implementation of the Sunrise Powerlink Project (SRPL) is expected to result in impacts to Waters of the U.S. (WOUS), Waters of the State (WOS), and other areas such as riparian zones under state jurisdiction. A complete HMMP requires that a functional assessment be performed for impact sites to determine the extent of impacts to wetland function that may occur as a result of the project. Functional assessments were also performed at mitigation sites to assess baseline conditions prior to mitigation work. Working in conjunction with Southern California regulatory agencies, it was determined that the California Rapid Assessment Method (CRAM) for wetlands should be used as a functional assessment methodology.

1.1 CRAM Methodology

CRAM provides a rapid, cost-effective, scientifically robust method to evaluate the condition of wetlands and waters. This method was developed mainly by the San Francisco Estuary Institute (SFEI) in cooperation with the United States Environmental Protection Agency (USEPA), and the use of this method is gradually being implemented by regulatory agencies throughout the State. CRAM is considered a "Level 2" assessment according to the USEPA's 3-tiered framework for assessing and monitoring surface waters (USEPA 2006). A Level 2 approach consists of rapid, field-based assessments of the overall condition or functional capacity of wetlands and/or their likely stressors. Level 2 results can be used to cost-effectively survey the overall condition of wetlands across landscapes, watersheds, and regions (CWMW 2009).

The CRAM method relies on rating wetlands with regard to four main attributes:

- Buffer and Landscape Context
- Hydrology
- Physical Structure
- Biotic Structure

Each of these four main attributes is divided into several key functional components or metrics. Each metric provides a score which is used in calculating an overall CRAM score for the wetland. These metrics are described below.

CRAM uses a scoring system of A, B, C, or D to rate the various metrics. These ratings are then transferred to a numeric value (A=12 points, B=9 points, C=6 points, and D=3 points) for purposes of calculating averages and final scores. The "A" rating corresponds to the highest value and highest functioning state for the particular metric it is describing, whereas the "D" rating reflects a degraded, poorly functioning, or highly altered metric. The overall score is expressed as a percentage, with the highest possible score being 100%.

CRAM has undergone significant calibration studies to evaluate the most appropriate ways to weight and combine metric scores to give a reasonable assessment of overall wetland function. The statewide CRAM "calibration average" can be used as a basis to compare CRAM scores from a particular site to scores that may be expected from similar habitats throughout California. Calibration scores for several wetland types, along with scores from hundreds of individual assessment sites, are available on the CRAM website (2010). Scoring guidelines are expected

to produce scores which can be used to compare wetland function for features throughout the state.

The CRAM Technical Bulletin (CWMW 2009) suggests that CRAM metric scores of the same wetland type in the same area can be averaged, and that these average metric scores can be used to calculate average attribute and overall scores, for the area being assessed. However, the Technical Bulletin cautions that the most reliable way to interpret results is to compare individual metric scores from individual sites to calibration averages, since many different combinations of high and low scores from multiple sites could result in the same average score.

1.1.1 Wetland Definitions

CRAM uses the definition of "wetlands" provided by the U.S. Fish & Wildlife Service's (USFWS) National Wetland Inventory (NWI):

> *"Wetlands are lands transitional between terrestrial and aquatic systems, where the water table is usually at or near the surface or the land is covered by shallow water. For the purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is not a soil and is saturated with water or covered by shallow water at some time during the growing season of each year."*
>
> (Cowardin *et al.* 1979).

This wetland definition is notably different from the guidance used to identify "jurisdictional" wetlands for State and Federal regulatory purposes by the U.S. Army Corps of Engineers (referred to as "Corps wetlands" in this report), which requires three wetland "parameters" to be present rather than just one "attribute" for an area to be considered a wetland:

> *"....[E]vidence of a minimum of one positive wetland indicator from each parameter (hydrology, soil, and vegetation) must be found in order to make a positive wetland delineation."*
>
> (Environmental Laboratory 1987)

Areas that are inundated for sufficient duration and depth to exclude growth of hydrophytic vegetation, such as lakes and ponds, or convey water, such as streams, are also considered "jurisdictional waters" and may also include intermittent and ephemeral streams, as well as lakes and rivers. These areas are characterized by an ordinary high water mark (OHWM), defined as:

> *"...that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impresses on the bank, shelving, changes in the characteristics of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.*"
>
> (Federal Register Vol. 51, No. 219,
> Part 328.3 (d). November 13, 1986.)

CRAM methodology for "riverine wetlands" (Collins *et al*. 2008b) is intended for non-tidal, flow-through systems with channelized flow between a distinct inlet and outlet. However, in addition

to the area of "jurisdictional waters" determined using the OHWM, riverine wetlands, according to CRAM methodology, also include the adjacent riparian area:

> *"CRAM recognizes that all wetlands have some amount of adjacent riparian area, as defined by the National Research Council (NRC). However, for the purposes of wetland assessment, the riparian areas adjacent to lacustrine wetlands, depressional wetlands, vernal pools, playas, slope wetlands, and estuarine wetlands are considered part of the wetland buffers, and not part of the wetlands. In contrast, riverine wetlands include the portions of the adjacent riparian areas with which the riverine wetlands are inextricably and obviously connected through various ecological and hydrological processes."*
>
> (Collins *et al.* 2008a)

The definition of "riparian" used by CRAM is provided by the NRC:

> *"Riparian areas are transitional between terrestrial and aquatic ecosystems and are distinguished by gradients in biophysical conditions, ecological processes and biota. They are areas through which surface and subsurface hydrology connect water bodies with their adjacent uplands. They include those portions of terrestrial ecosystems that significantly influence exchanges of energy and matter with aquatic ecosystems. Riparian areas are adjacent to perennial, intermittent, and ephemeral streams, lakes and estuarine-marine shorelines."*
>
> (National Research Council 2001).

1.1.2 Wetland Classification

CRAM has been designed to assess six different classes of wetlands, and metric narratives differ depending on which type of wetland is being assessed. All impacts for the SRPL involved streams (including ephemeral, desert dry washes, intermittent, and perennial streams), classified as "riverine wetlands" according to CRAM, and all sites chosen for assessment were streams. These sites were assessed according to the procedure for riverine wetlands, using the CRAM User's Manual (Collins *et al.* 2008a) along with the Riverine Wetlands Field Book (Collins *et al.* 2008b). As described in Section 2.5 of the HMMP, Corps wetlands occurred at only two impact sites along the ROW, where the Coprs wetlands were within the bed and banks of intermittent streams. These two impact sites were therefore considered to represent both stream impacts and Corps wetland impacts, although according to CRAM, the streams and Corps wetlands collectively represent riverine wetland systems.

Seven CRAM assessments were also performed at four proposed mitigation properties, including both riverine and depressional wetlands. One of the mitigation assessments was at an AA also considered to be an impact site, as outlined in Section 3.3.4 of the HMMP. Depressional wetlands exist in topographic lows that do not usually have outgoing surface drainage except during extreme flood events or heavy rainfall. The CRAM methodology for Perennial Depressional Wetlands (Collins *et al.* 2008c) was applied to two sites where depressional wetlands occurred. Since both of the depressional wetlands assessed were determined to be seasonal wetlands, the resulting CRAM score may not reflect the full range of wetland function represented in CRAM scores from perennial depressional wetlands.

As described in the CRAM Technical Bulletin (CWMW 2009), seasonal wetlands and headwater streams often have naturally lower complexity. Consequently, the current version of CRAM may inherently produce lower scores for these wetland types. Future refinements of CRAM are planned to address this situation and more appropriately assess these wetland types.

Minor modifications of the CRAM procedures were used following recommendations from Southern California Coastal Water Research Project (SCCWRP) staff to apply the riverine methodology to desert dry washes. It was understood that many of the low-order ephemeral or intermittent streams within the SRPL ROW would receive somewhat lower CRAM scores due to the likelihood that they would have fewer of the field indicators of high-functioning riverine systems used in assigning CRAM scores.

1.1.3 Assessment Area Definition

An Assessment Area (AA) is the portion of a wetland or water that is assessed using CRAM. The guidelines and sizes for establishing the AA are different depending on site conditions and the type of wetland being assessed, but CRAM guidelines generally recommend using AAs between about 0.5 and 2.0 hectares (1.24 - 4.94 acres). For a smaller wetland, the boundary of the wetland and the boundary of the AA may be the same. For a larger wetland, the AA may be only a portion of the wetland. CRAM considers wetlands and the adjacent transitional zone to be part of the same system, thus CRAM AAs include a portion of the land surrounding the wetland that may technically be considered "upland" according to Section 404 of the Clean Water Act.

For riverine wetlands, the AA should begin at a hydrological or geomorphic break in form or structure of the channel that corresponds to a significant change in flow regime or sediment regime. If no such break exists, then the AA can begin at any point near the middle of the wetland. Riverine AAs should extend landward from the backshore of the floodplain to include the adjacent riparian area that probably accounts for bank stabilization and most of the direct allochthanous inputs of leaves, limbs, insects, etc. into the channel including its floodplain. Any trees or shrubs that directly contribute allochthanous material to the channel should be included in the AA in their entirety. If the lateral limits of allochthanous input are not discernable, then the AA should extend laterally from the backshore toward the uplands for a distance equal to twice the site potential vegetation height, i.e. twice as far as the height of the trees in the riparian zone.

1.1.4 Stressor Identification

An anthropogenic perturbation within a wetland or its environment setting is defined as a stressor in CRAM (Collins *et al*. 2008a). Identified stressors are likely to negatively impact the condition and function of the AA. Stressors that relate to the four CRAM attributes are identified in the field. Stressors do not necessarily affect the score of a CRAM AA, but they are noted as part of the assessment.

1.1.5 Precision of CRAM Scores

While CRAM provides a useful numeric score for the ecological condition of a wetland, site conditions and differences in practitioner opinion can result in some variation of scores. Analyses conducted by the CRAM developers suggest that overall CRAM scores can have up to 10% error due to differences in practitioners, while individual attribute scores may have up to 5% error (CWMW 2009). Therefore, differences in overall CRAM scores less than 10 percentage points or in attribute scores less than 5 percentage points may not represent significant differences in overall condition.

For the SRPL, it is likely that all CRAM scores have a high degree of precision. A small staff of only four biologists conducted all of these assessments after spending multiple days training and calibrating with SCCWRP to ensure agreement on treatment of common field scenarios.

2.0 SUNRISE POWERLINK CRAM ASSESSMENT METHODOLOGY

The central functional assessment methodology used to assess impact sites on the SRPL was CRAM. Southern California regulatory agencies involved in oversight of the Project widely supported the use of this standardized approach.

Special consideration was given to the implementation of CRAM on the SRPL. As mentioned above, seasonal wetlands and headwater streams may produce lower CRAM scores than similar wetlands with a larger duration and/or volume of hydrologic input. Therefore, staff members from SCCWRP, a group involved in the development of CRAM, were specifically involved in different aspects of the SRPL to ensure that these CRAM assessments produced valid scores for the waterways being assessed, particularly in desert ephemeral stream systems. Guidance incorporated findings from a focused study of CRAM techniques performed recently by SCCWRP in arid ephemeral streams (SCCWRP 2010). WRA field staff members were trained to apply CRAM in arid ephemeral systems in March 2010. SCCWRP staff also performed a CRAM "calibration" with WRA field biologists in June 2010 in the primary stages of data collection for the HMMP. This calibration was performed to ensure the precision of data collected by field biologists, i.e., that the scores the field biologists arrived at while independently assessing the same field conditions were within an acceptable range of SCCWRP scores and an acceptable range of one another. A range of up to ten percentage points for overall scores and 3-5 percentage points for attribute scores is considered to be within the normal error of the CRAM method due to differences in practitioner opinion (CWMW 2009).

In addition to the training and calibration, SCCWRP audited ten percent of all CRAM assessments for the SRPL to ensure that procedures were properly applied and that the scores obtained were within the acceptable error range of scores obtained by SCCWRP for the same sites. SCCWRP did not audit or otherwise provide guidance on assessments of mitigation sites, as these assessments were done after other CRAM work was completed in September 2010.

2.1 Sampling Method

Due to the large number of individual impact sites along the SRPL ROW, a subset of 30 impact sites was selected for assessment. This subset included 25 randomly selected desert dry washes and mountain ephemeral streams. All impacted intermittent and perennial streams within the SRPL ROW were also non-randomly selected for inclusion in the sample set (a total of four intermittent streams and one perennial stream). Since not all impacted desert dry wash and mountain ephemeral streams within the ROW were sampled, the 25 randomly sampled sites were taken to be representative of all combined desert dry wash and mountain ephemeral stream impact sites within the ROW. Cumulative frequency distributions based on these scores allow a reasonable degree of confidence in predicting the range and distribution of CRAM scores for all combined desert dry wash and mountain ephemeral stream impact sites (Sections 2.4.5.1 and 2.6.5.1 of the HMMP). CRAM scores based on conditions observed at desert dry wash and mountain ephemeral stream sites are also discussed separately in the HMMP.

Seven mitigation sites were also sampled using CRAM. These sites were chosen to provide insight on four separate properties where mitigation work is proposed (Section 3.2). Based on

guidance and review from staff at the Los Angeles District Corps, this was a sufficient sample set for the mitigation sites (Shanti Santulli, pers. com.).

2.2 *Field Protocols*

Standard CRAM methodology for riverine wetlands was applied to all impact sites selected for assessment, with minor adjustments necessary for application to the Project and its unique setting. These adjustments included modification of sample site or AA, and modification of the measurements used to assess entrenchment (explained in CRAM as the "hydrologic connectivity" metric). Modifications were developed by SCCWRP or established with input from SCCWRP in order to ensure that these modifications did not invalidate the results.

During fieldwork, the location of a proposed impact site along a particular stream required AAs to be established in a manner that deviates slightly from typical CRAM protocol. As explained above, a number of considerations are necessary to define the boundaries of an AA that adequately represents the stream being assessed and is not confounded by conditions that cannot be consistently found along the remainder of the stream. However, since the goal of the assessments was to obtain baseline information for the impact sites, it was necessary to position the AA to encompass the area of impacts even if it was a less ideal AA under the normal CRAM approach. Field teams were instructed to choose an AA that overlaps the impact area and also includes some distance downstream (ideally 100m). If this was not possible, the next drainage downstream or nearby was assessed instead. For example, on the waterways 16-DW-11 and 10-DW-1, the impact site was at the downstream end of the drainage, near its confluence with a larger drainage. In these areas the stream channels became more broad and divided into numerous smaller channels. Typical CRAM guidance would recommend that the AA for these streams be located further upstream, some distance away from the confluence in an area that adequately represents that majority of the channel. However, in these cases it was still possible to assess the impact area while avoiding the confluence. At stream 62-S-13, conversely, there was not a sufficient length of channel to establish an AA upstream from a confluence, and the next drainage downstream (62-S-12) was assessed instead.

A modified approach to the CRAM "hydrologic connectivity" metric was developed by SCCWRP for desert dry washes in Imperial County. This metric normally examines the entrenchment of a stream channel through measurements of width and depth, and a channel with the capacity for floodwater to spread over a wider area will receive a higher score. However, this system of measurements could not easily be applied to large desert washes that were often spread over a very broad area with multiple small channels passing between hummocks or islands that would only rarely be submerged by flooding. Therefore, a procedure was established to identify the floodplain of desert washes as a surrogate for the "flood prone area" that is normally established in CRAM through measurements of width and depth. The floodplain was seen as the area beyond all active stream channels that is only rarely submerged by floodwater, during floods that may only happen every 10-20 years. Signs of these rare flood flows are persistent in desert systems, allowing field technicians to identify the floodplain. Such signs included lack of "desert pavement" (a compacted soil condition common in upland areas of the Sonoran desert), secondary channels at higher elevation, scour on upper channel banks, or slight changes in vegetation. In addition to this surrogate for "flood prone area," it was established that only the single largest channel in the wash would be measured in order to obtain "bankfull width." This approach produced results that were seen to adequately reflect conditions within desert dry washes.

3.0 RESULTS

Complete CRAM scores for all impact sites assessed are presented in Table B-1. The type and location of all assessed sites along the ROW are presented in Figure 3 of the HMMP. An overview of these results at impact areas is presented in Sections 2.4-2.7 of the HMMP. While an overview of CRAM at mitigation sites is presented in Sections 3.2 and 4.1 of the HMMP.

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Appendix C. Data Summary for Hydrological Improvements

APPENDIX C - Data Summary for Hydrological Improvements

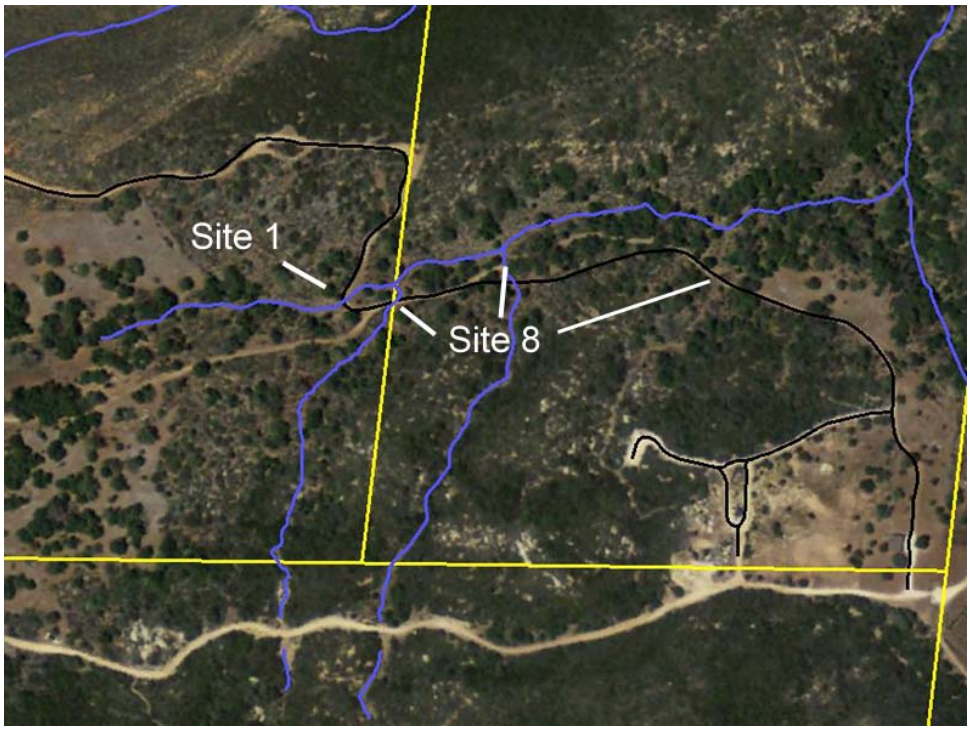


Figure C-1. View of existing road crossings at Sites 1 and 8 (aerial photograph taken 25 May 2009, source: Google Earth, accessed 2010). Present day road alignment shown in black and streams shown in blue.

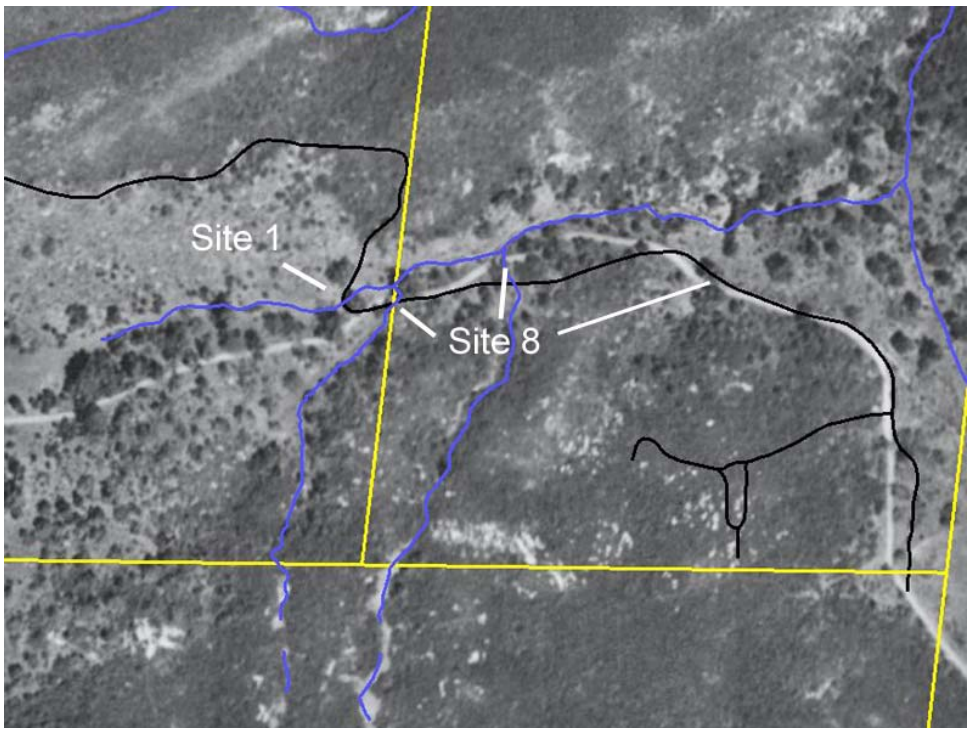


Figure C-2. View of historic road alignment at Sites 1 and 8 (aerial photograph taken 2 Apr 1953). Present day road alignment shown in black and streams shown in blue. Note that a road did not cross the stream at Site 1 (constructed 2002-2003) but did cross the two ephemeral tributary streams at Site 8.

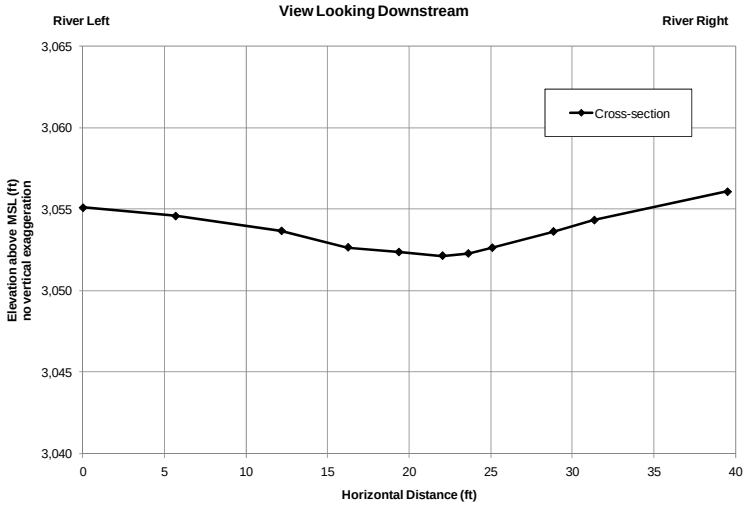


Figure C-3. At Site 1 looking upstream from the road crossing at a wetland impoundment.

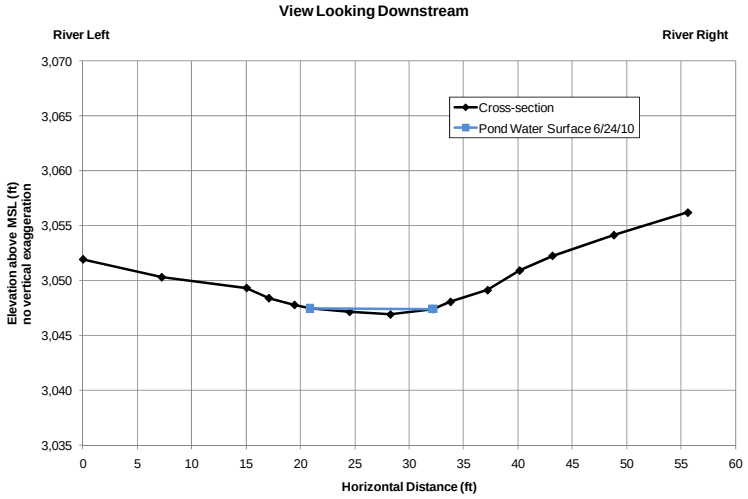


Figure C-4. At Site 1 looking downstream from the road crossing at the downstream reach of the intermittent stream channel.

a)



b)



c)

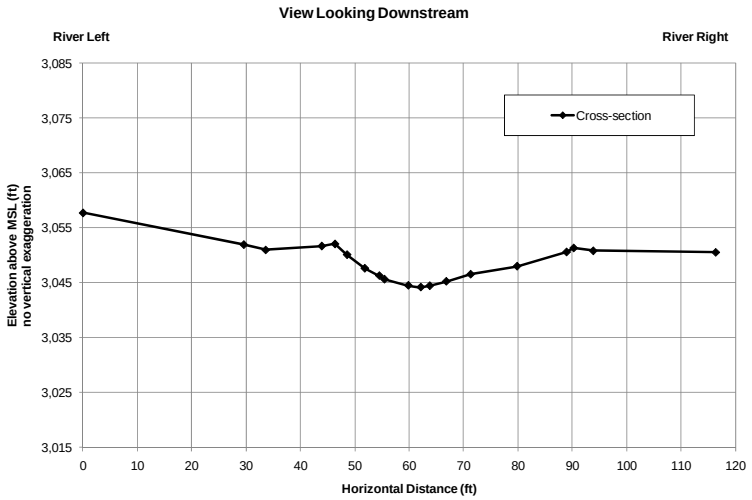


Figure C-5. Cross-sections upstream of the road crossing (a), across the pond upstream of the crossing (b), and downstream of the road crossing (c).

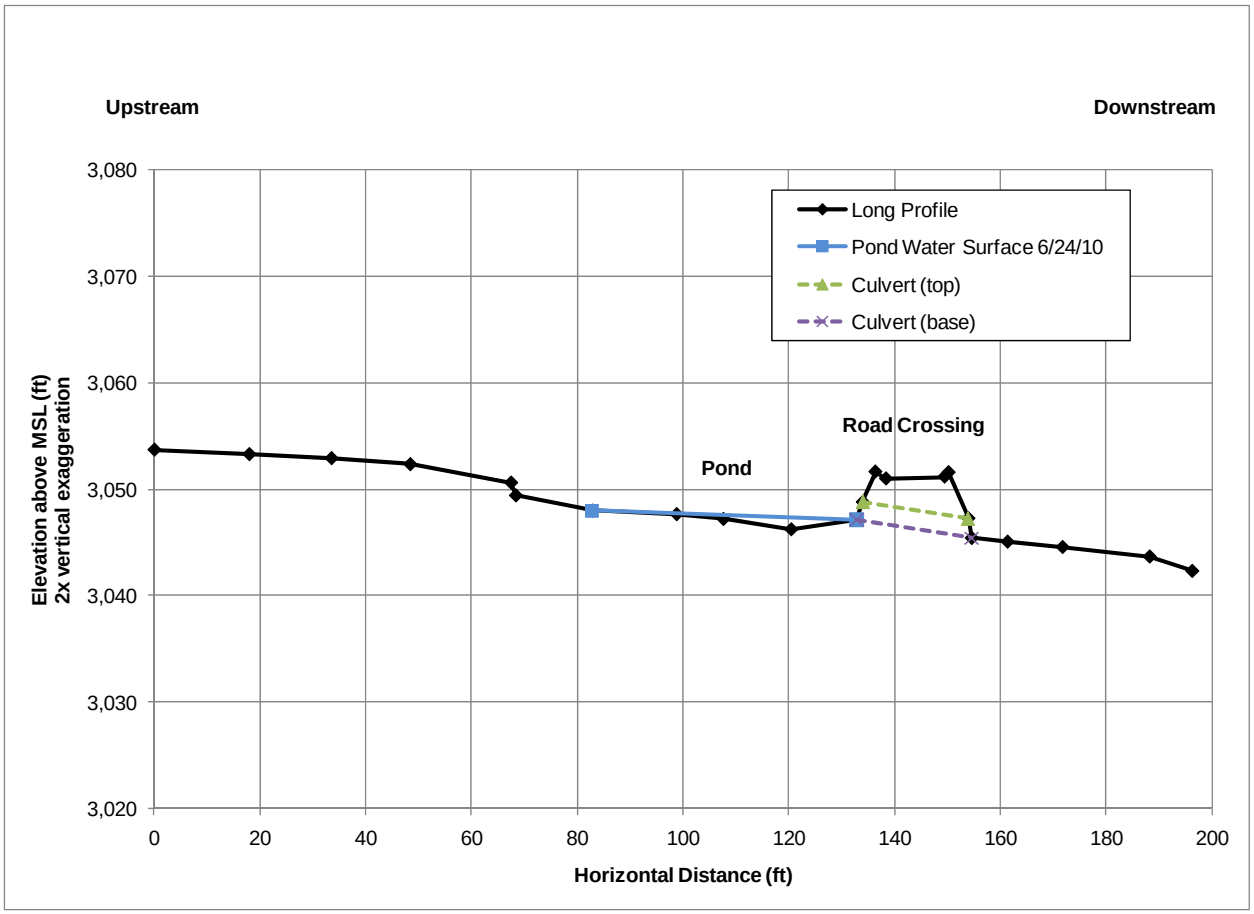


Figure C-6. Longitudinal profile along the intermittent stream channel at Site 1, with flow moving downstream from left to right. The road crossing presently impounds water on its upstream side forming a seasonal pond with wetland vegetation.



Figure C-7. At Site 8 looking east along existing road at the crossing of the western ephemeral stream (flow is right to left). Note that there is minimal impoundment on the upstream side of the crossing (right side of photo) and minimal channel drop on the downstream side (left side of image).



Figure C-8. At Site 8 looking east along existing road at the crossing of the eastern ephemeral stream (flow is right to left); similar morphology as the western ephemeral stream crossing (see Figure 9).

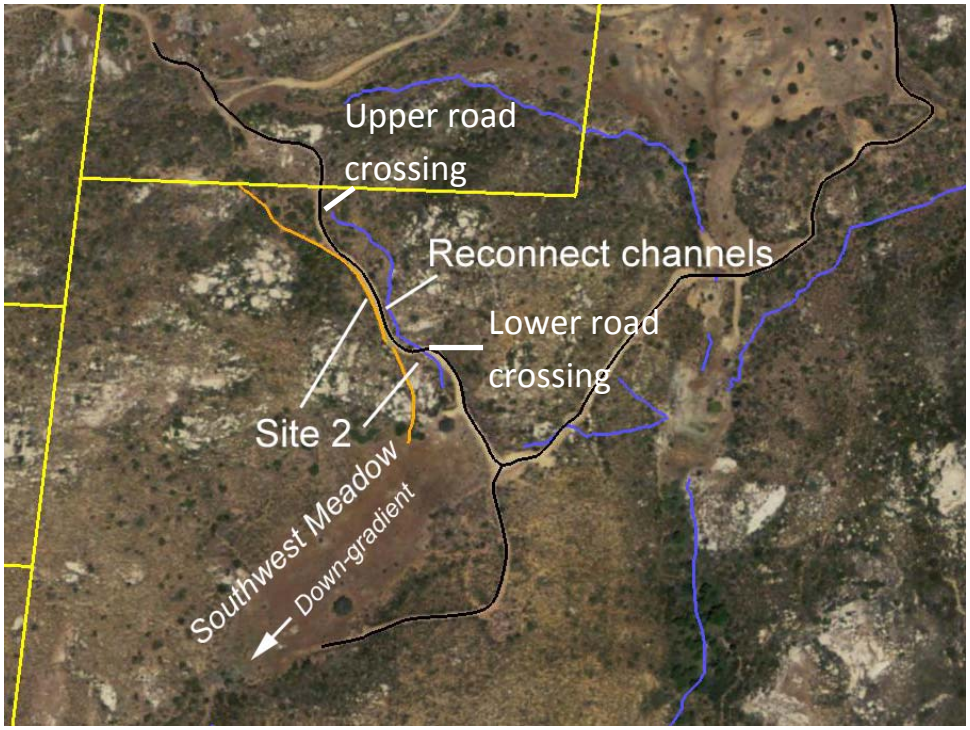


Figure C-9. View of existing road crossings at Site 2 along the stream channel that drains to the southwest grassland/meadow (aerial photograph taken 25 May 2009, source: Google Earth, accessed 2010). Present day road alignment shown in black, abandoned road and ditch shown in orange, and streams shown in blue.

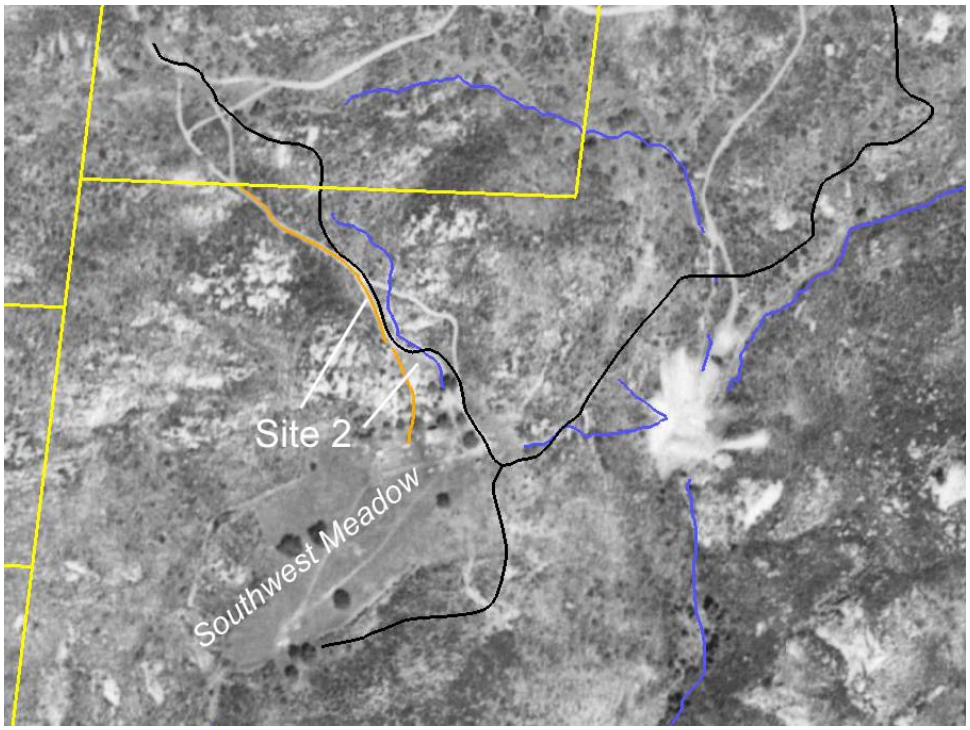


Figure C-10. View of historic road alignment at Site 2 (aerial photograph taken 2 Apr 1953). Present day road alignment shown in black, present day abandoned road and ditch shown in orange, and streams shown in blue. Note the abandoned road and ditch once served as the primary roadway.



Figure C-11. At Site 1 looking downstream along abandoned road/ditch channel towards its confluence with the existing roadway. At the road, this channel continues along an inboard ditch.

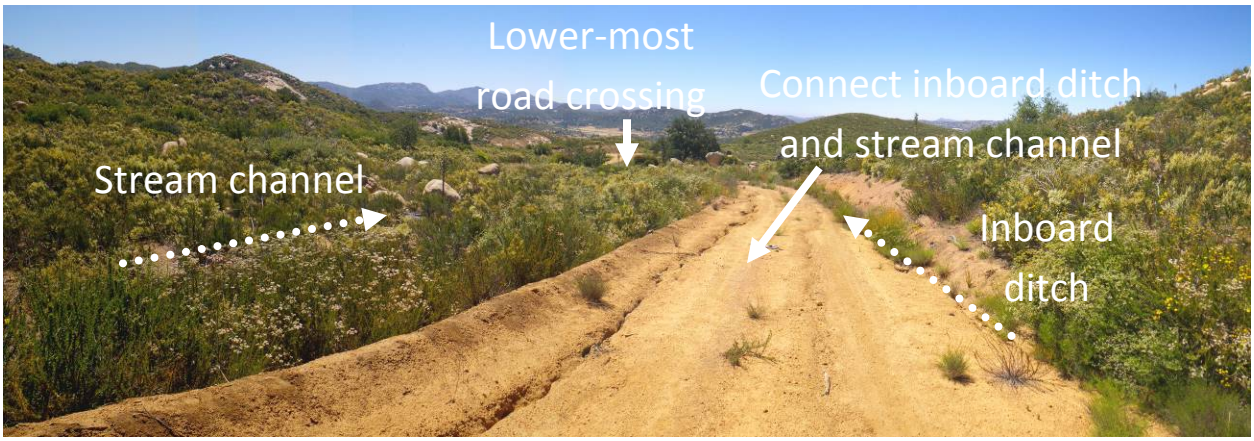


Figure C-12. At Site 1 looking down-gradient along the roadway with the stream channel running parallel to the left and an inboard ditch running on the right. The inboard ditch connects the abandoned road/ditch channel upstream to the ditch channel downstream.

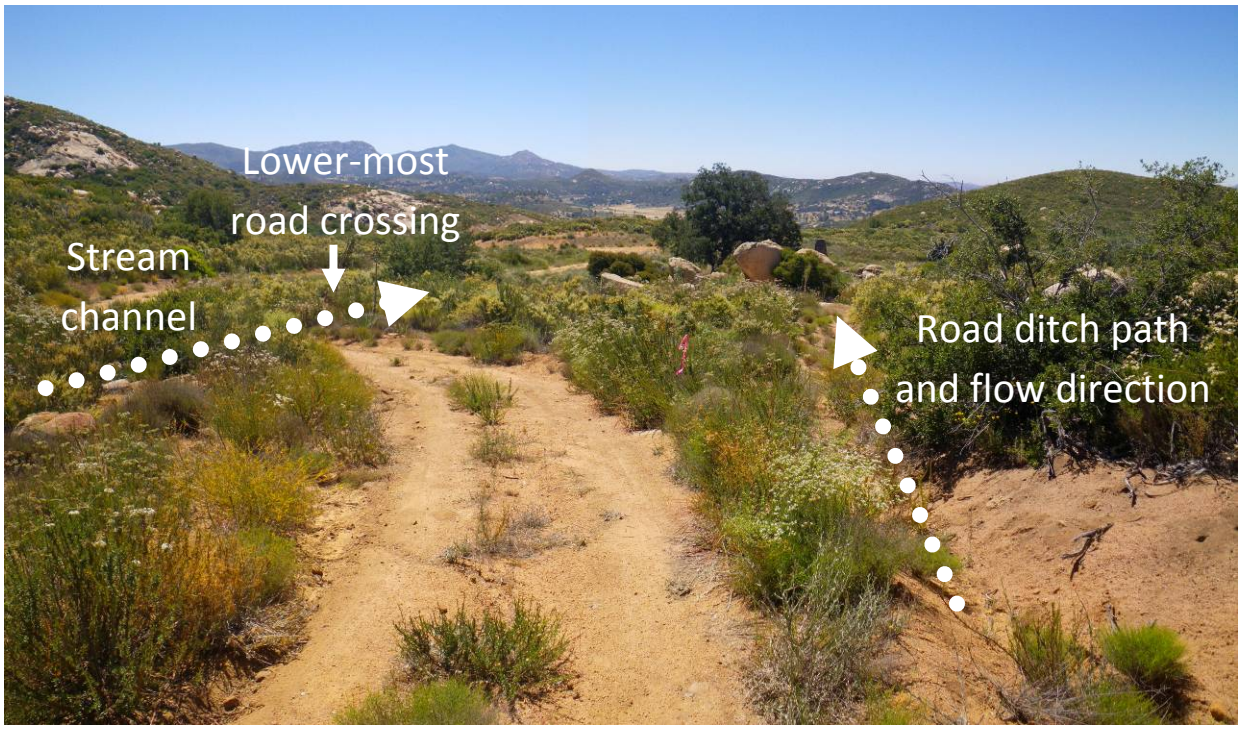


Figure C-13. At Site 1 looking down-gradient along the roadway with the inboard ditch diverting away to the right and the stream channel crossing on the left.

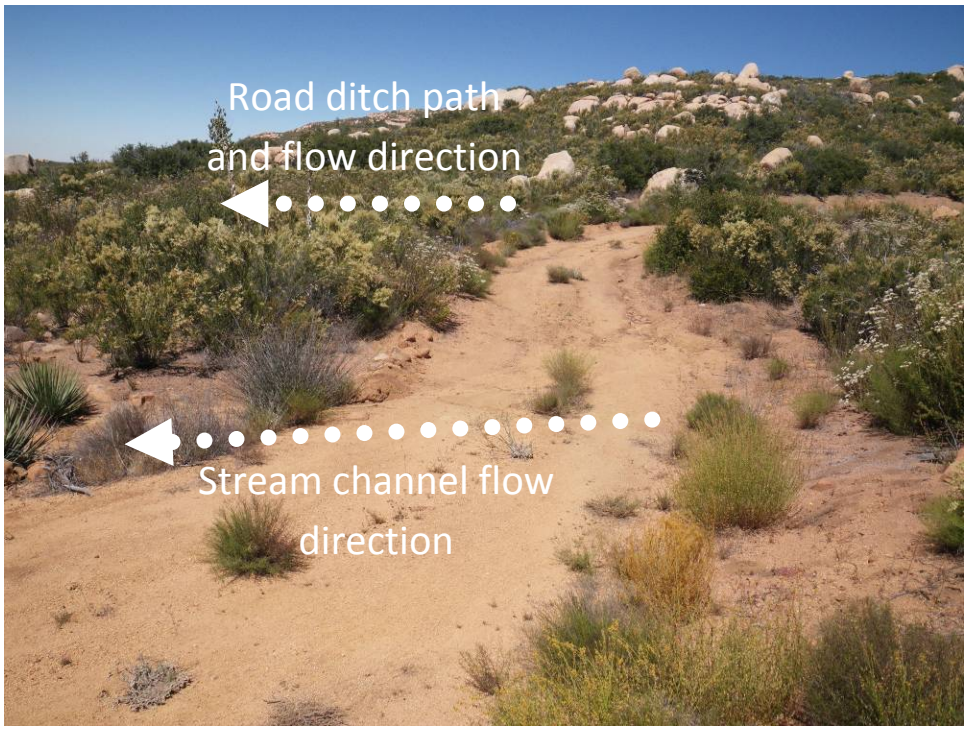


Figure C-14. At Site 2 looking at the lower-most road crossing of the stream channel that drains to the southwest grassland/meadow. The road ditch is also shown here.

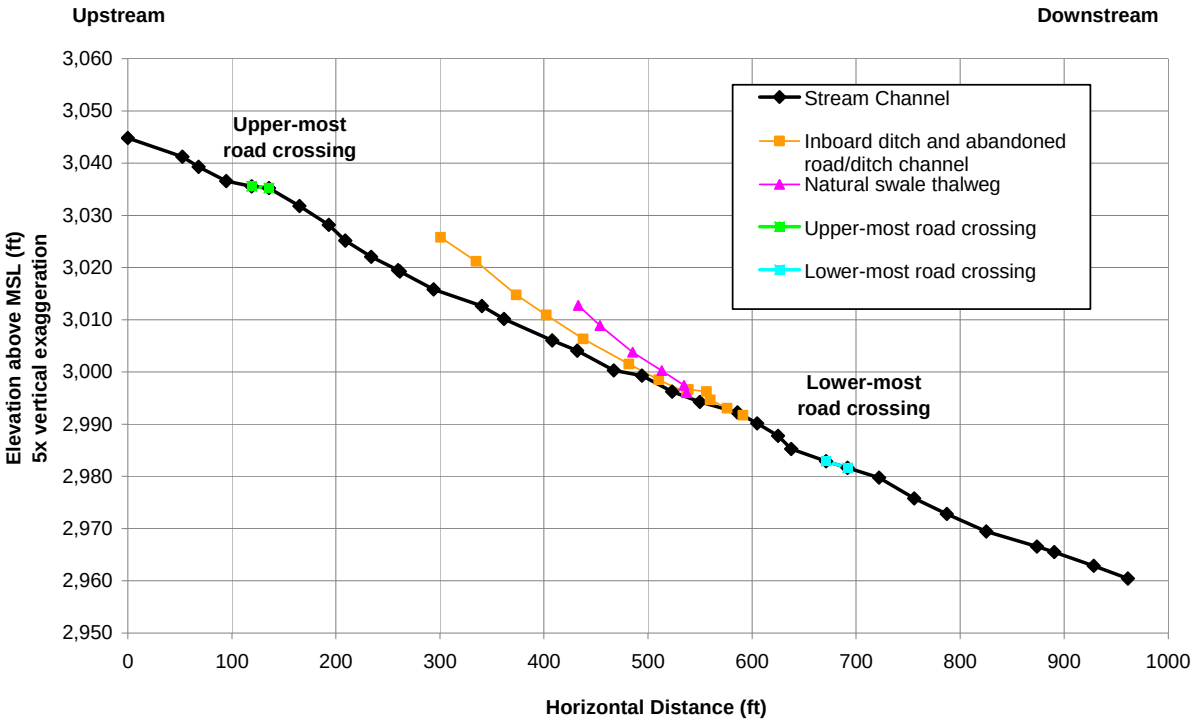
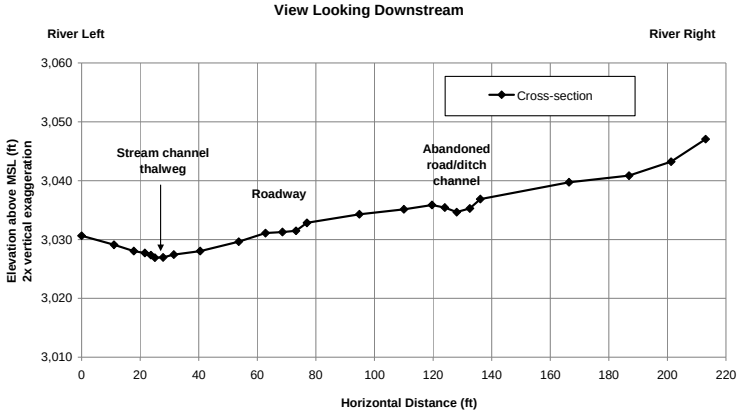
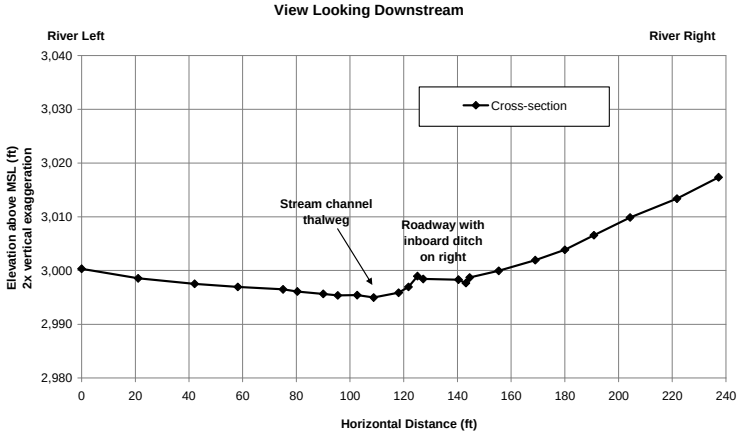


Figure C-15. Longitudinal profile along the intermittent stream channel at Site 1, with flow moving downstream from left to right. The road crossing presently impounds water on its upstream side forming a seasonal pond with wetland vegetation.

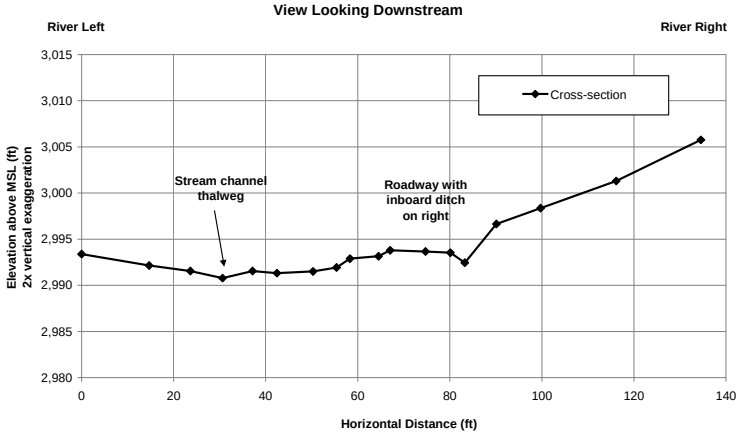
a)


View Looking Downstream
River Left
River Right
Cross-section
Stream channel thalweg
Roadway
Abandoned road/ditch channel
Elevation above MSL (ft) 2x vertical exaggeration
Horizontal Distance (ft)
3,060
3,050
3,040
3,030
3,020
3,010
0
20
40
60
80
100
120
140
160
180
200
220

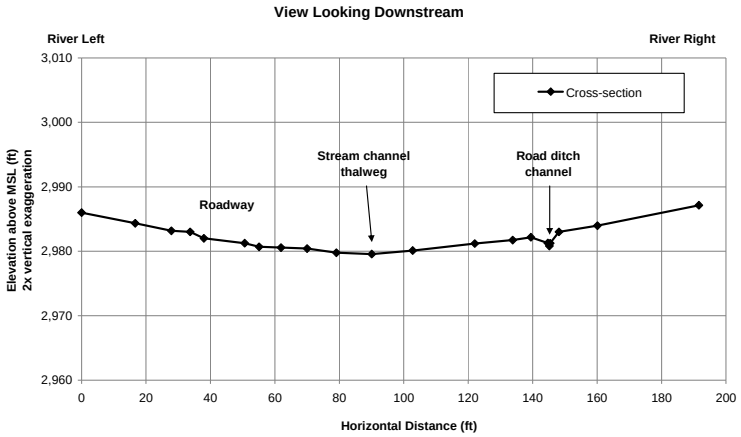
b)


View Looking Downstream
River Left
River Right
Cross-section
Stream channel thalweg
Roadway with inboard ditch on right
Elevation above MSL (ft) 2x vertical exaggeration
Horizontal Distance (ft)
3,040
3,030
3,020
3,010
3,000
2,990
2,980
0
20
40
60
80
100
120
140
160
180
200
220
240

c)


View Looking Downstream
River Left
River Right
Cross-section
Stream channel thalweg
Roadway with inboard ditch on right
Elevation above MSL (ft) 2x vertical exaggeration
Horizontal Distance (ft)
3,015
3,010
3,005
3,000
2,995
2,990
2,985
2,980
0
20
40
60
80
100
120
140

d)



e)

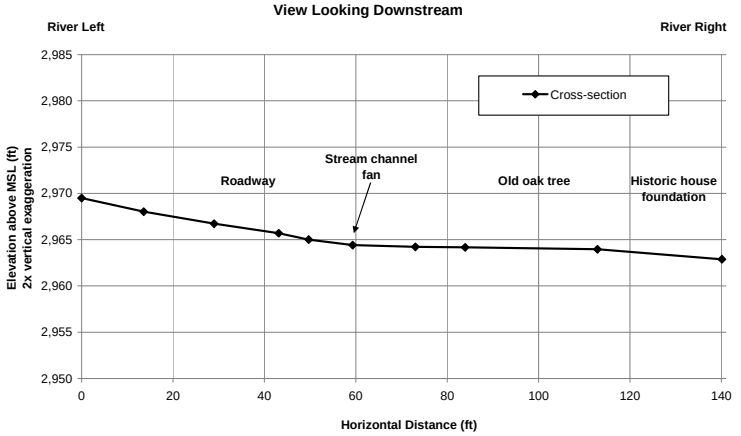


Figure C-16. Cross-sections upstream of the upper-most road crossing (a), upstream of the confluence with a natural ephemeral swale confluence and the proposed stream and ditch channel confluence (b), downstream of the proposed stream and ditch channel confluence (c), downstream of the lower-most road crossing (d), and across the fan of the stream channel at the upstream end of the southwestern grassland/meadow.

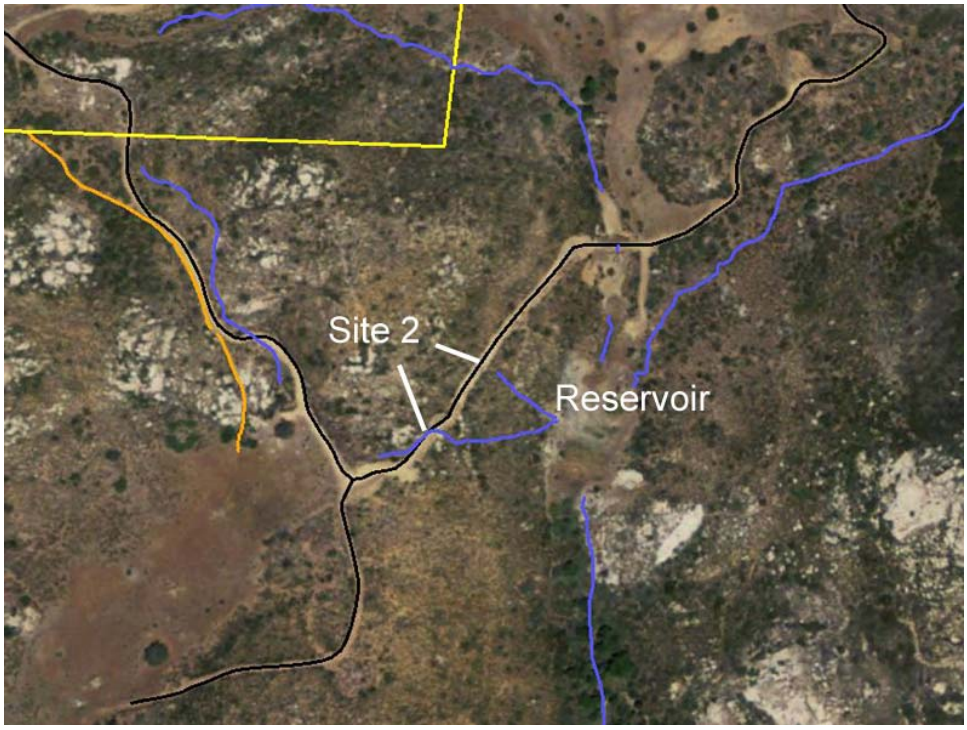


Figure C-17. View of existing road crossings at Site 2 along two ephemeral stream channels that drain eastward to the large stock pond (reservoir) (aerial photograph taken 25 May 2009, source: Google Earth, accessed 2010). Present day road alignment shown in black and streams shown in blue.



Figure C-18. View of existing road crossing (southwestern stream channel) at Site 2. Removal of road will re-connect the upstream and downstream reaches of this ephemeral stream channel.



Figure C-19. View of existing road crossing (northeastern stream channel) at Site 2. Removal of road will extend the ephemeral stream slightly farther up-gradient.

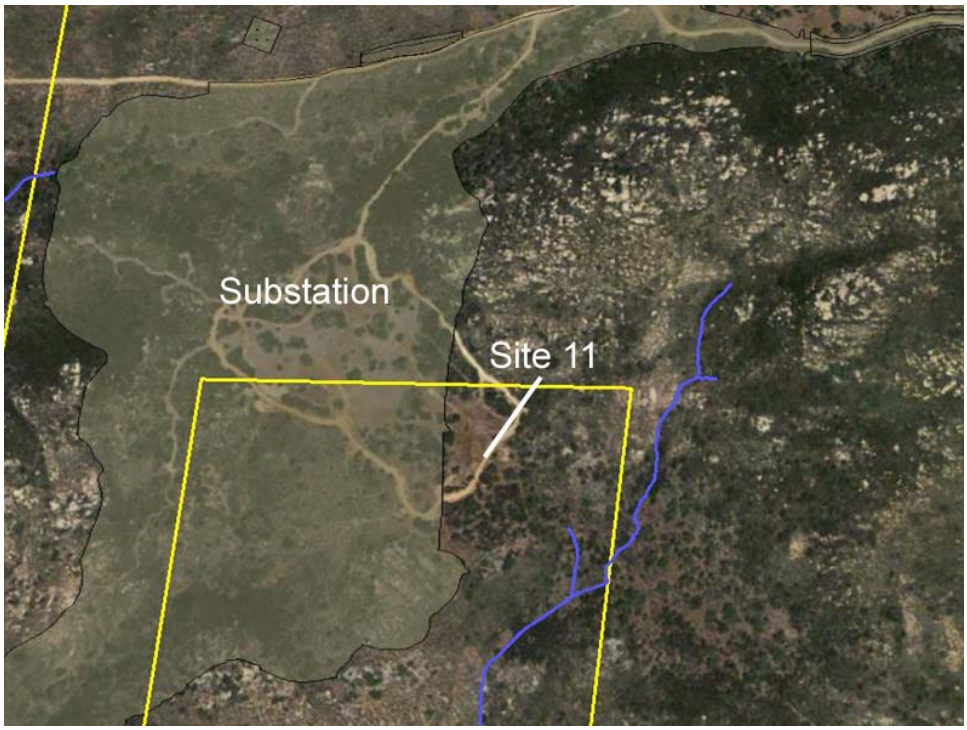


Figure C-20. View of existing road crossing at Site 11 above an ephemeral stream channel and situated on the east-side of the substation (aerial photograph taken 25 May 2009, source: Google Earth, accessed 2010). Present day road-loop alignment seen in the aerial photograph and streams shown in blue. Flow direction is to the southeast from the Site 11.

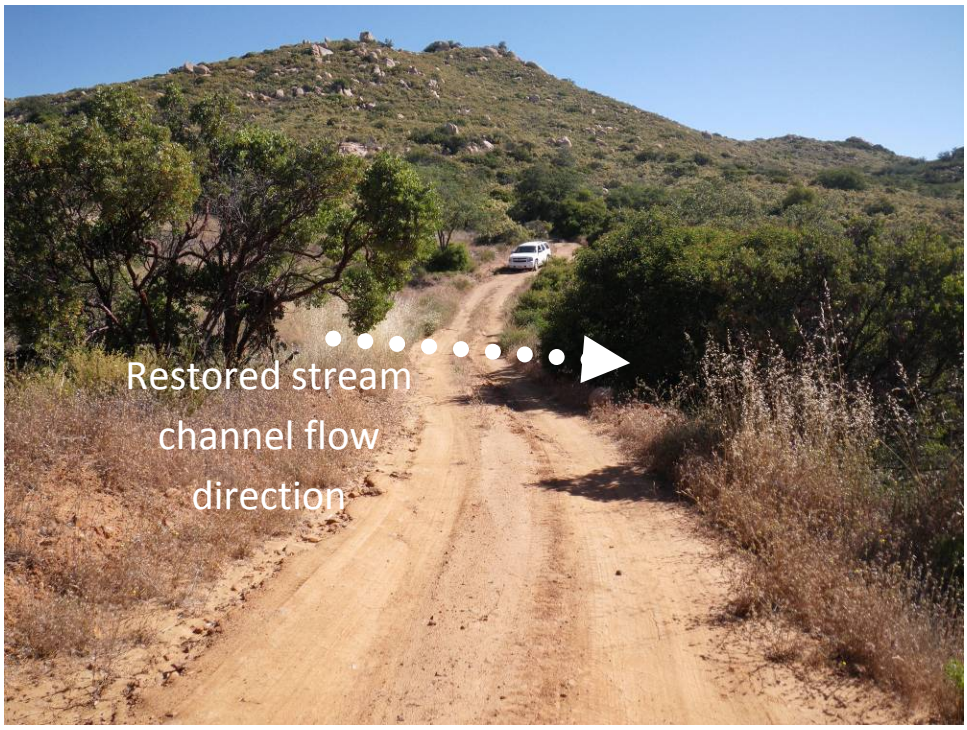


Figure C-21. View of existing road crossing at Site 11. Removal of road will re-connect the upstream and downstream reaches of this ephemeral stream channel, in addition to re-focusing the headwater drainage to the stream channel.

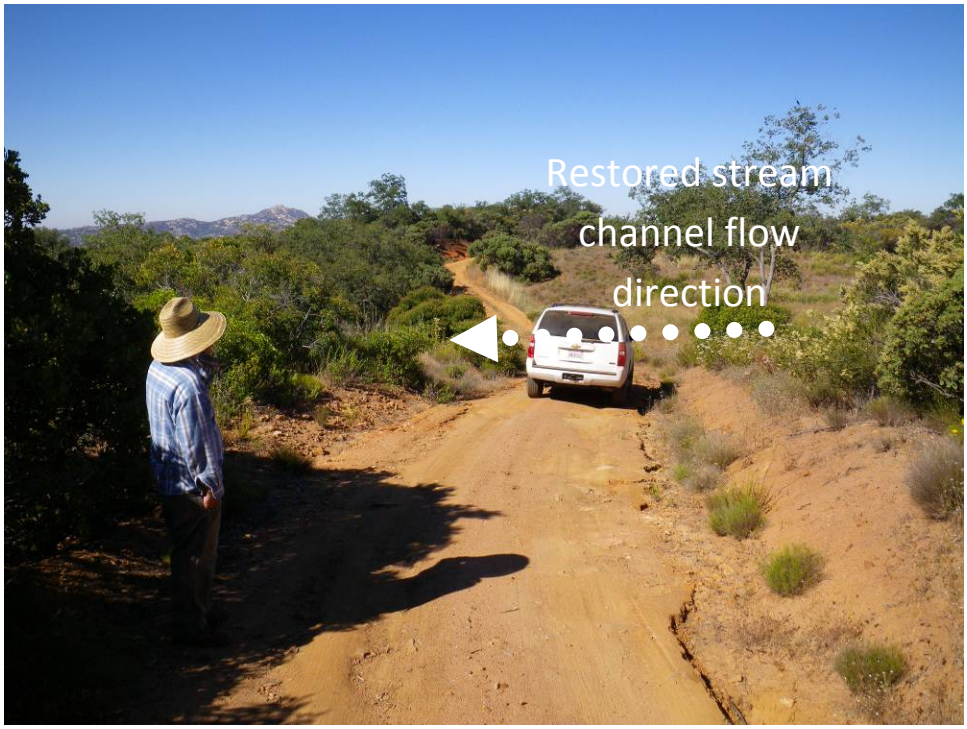


Figure C-22. View of same road crossing shown in Figure 23 at Site 11. Road cut areas will be filled to restore the natural topography surrounding the stream channel valley.

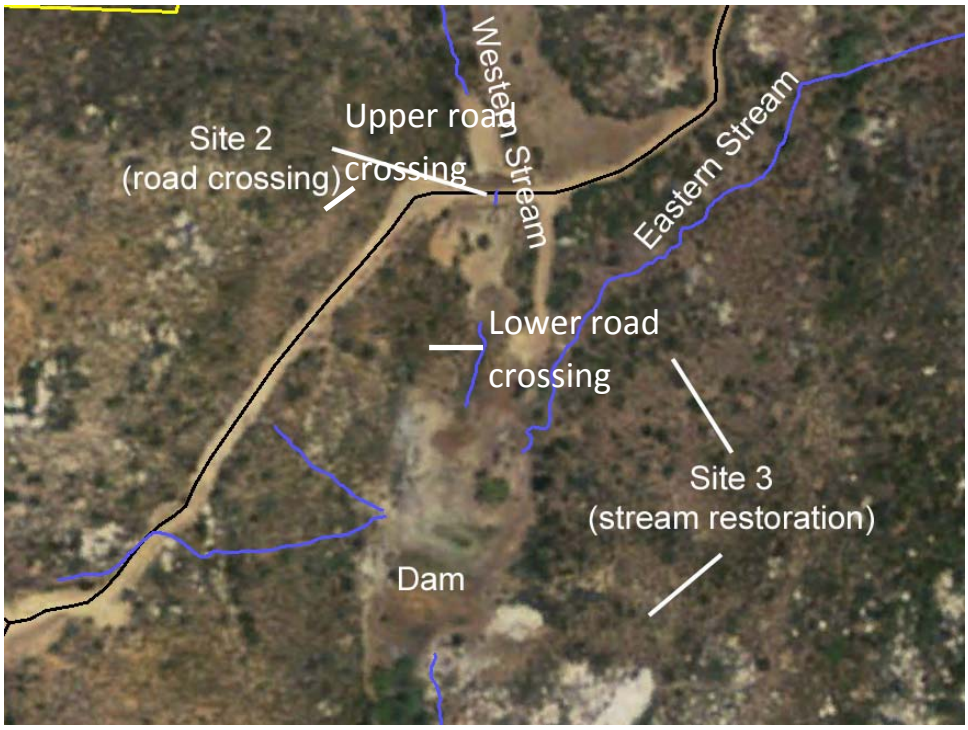


Figure C-23. View of the large stock pond (reservoir), dam, road crossing, and northwestern and northeastern stream channels at Sites 2 and 3 (aerial photograph taken 25 May 2009, source: Google Earth, accessed 2010). Present day road alignment shown in black and streams shown in blue.

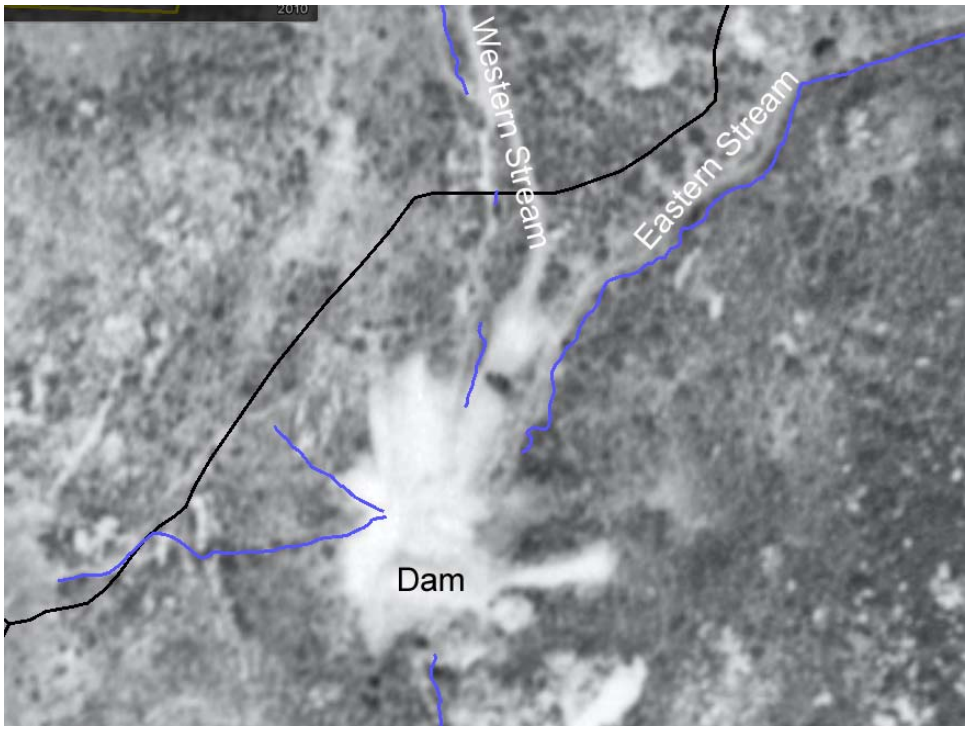


Figure C-24. View of historic road, stream, and dam alignment at Sites 2 and 3 (aerial photograph taken 2 Apr 1953). Present day road alignment shown in black and streams shown in blue. Note the roadway to the west and the road crossing were not present (constructed 2002-2003).

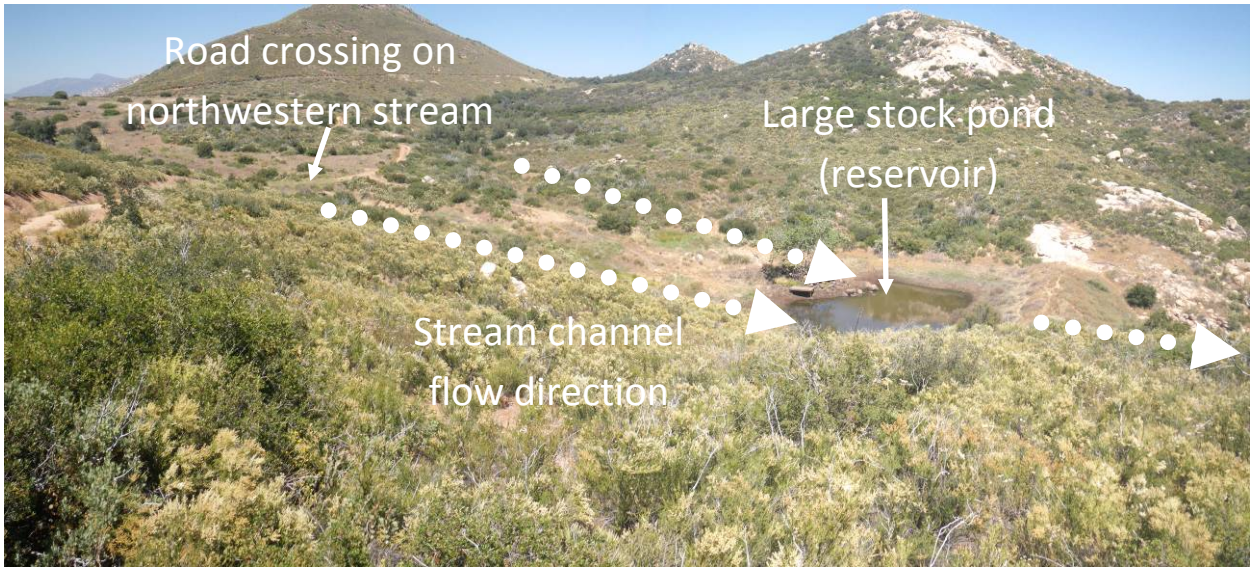


Figure C-25. Eastward view of the large stock pond (reservoir), dam, road crossing, and northwestern and northeastern stream channels at Sites 2 and 3. Removal of road crossing and pond storage berms and lowering of the large stock pond (reservoir) dam will enhance hydrologic connectivity from the headwaters to the downstream of the large stock pond (reservoir).



Figure C-26. View of road crossing over the northwestern stream channel with dry ponds (NW Ponds A and B) on the upstream and downstream sides at Site 2.

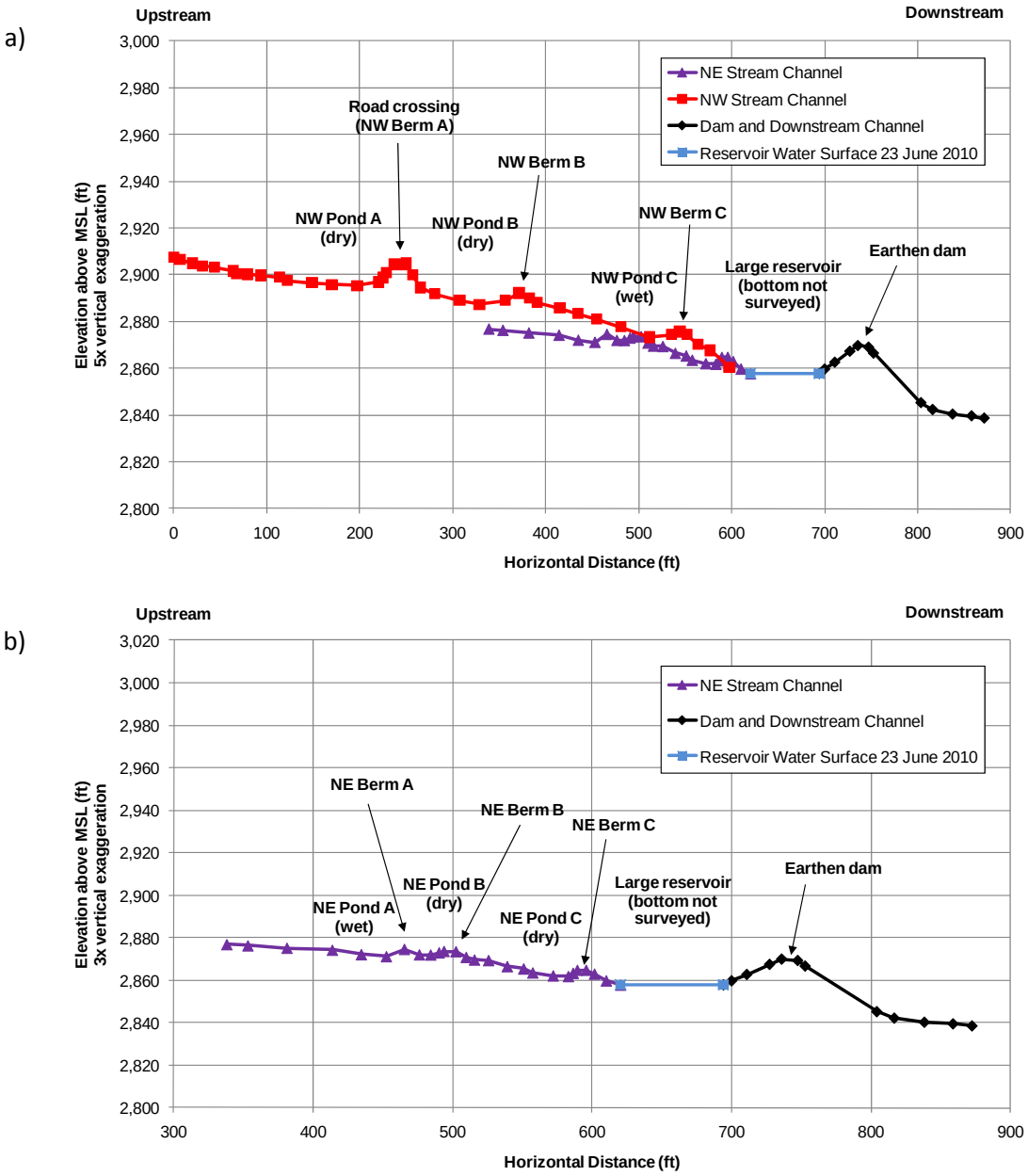
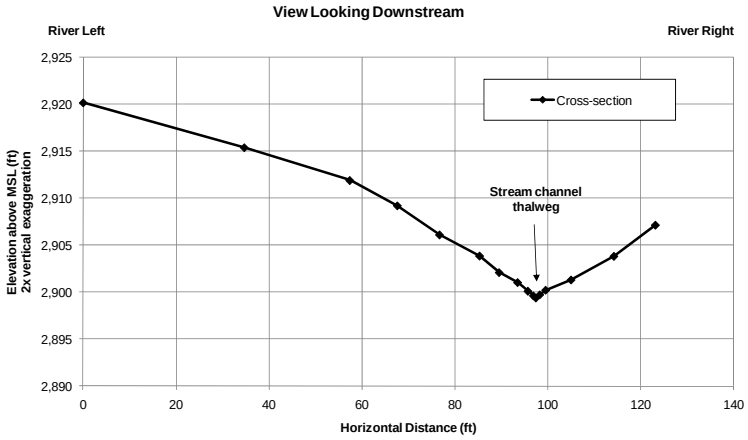
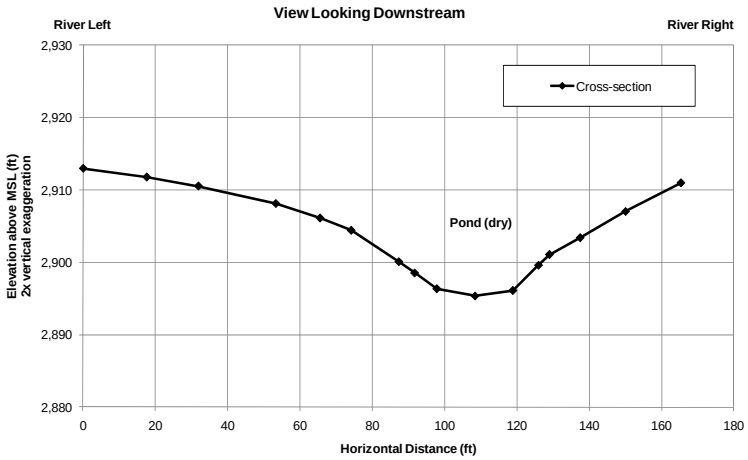


Figure C-27. Longitudinal profile along two intermittent stream channels that drain into the large stock pond (reservoir) at Site 3, with flow moving downstream from left to right (a). The longitudinal profile along the northeastern stream channel is shown as reference in (a) and alone in (b).

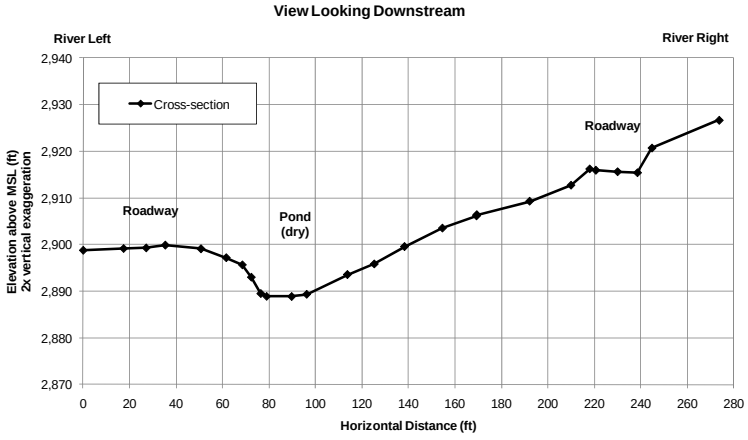
a)


View Looking Downstream
River Left
River Right
Cross-section
Stream channel thalweg
Elevation above MSL (ft) 2x vertical exaggeration
Horizontal Distance (ft)
2,925
2,920
2,915
2,910
2,905
2,900
2,895
2,890
0
20
40
60
80
100
120
140

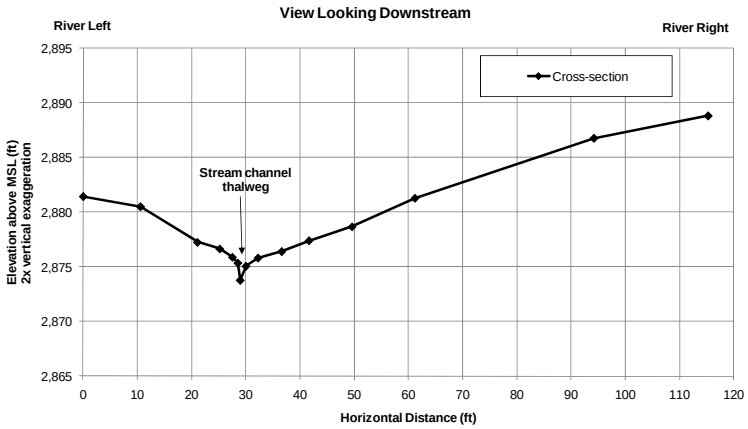
b)


View Looking Downstream
River Left
River Right
Cross-section
Pond (dry)
Elevation above MSL (ft) 2x vertical exaggeration
Horizontal Distance (ft)
2,930
2,920
2,910
2,900
2,890
2,880
0
20
40
60
80
100
120
140
160
180

c)


View Looking Downstream
River Left
River Right
Cross-section
Roadway
Roadway
Pond (dry)
Elevation above MSL (ft) 2x vertical exaggeration
Horizontal Distance (ft)
2,940
2,930
2,920
2,910
2,900
2,890
2,880
2,870
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280

d)



e)

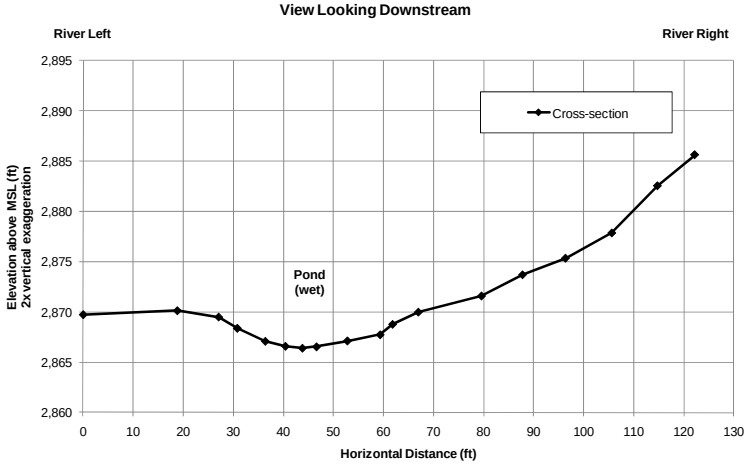
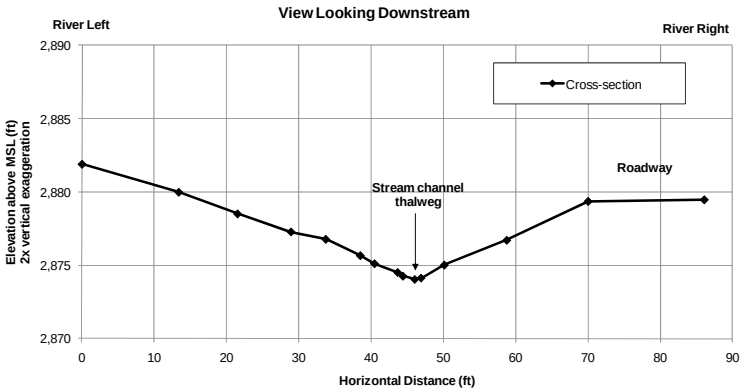
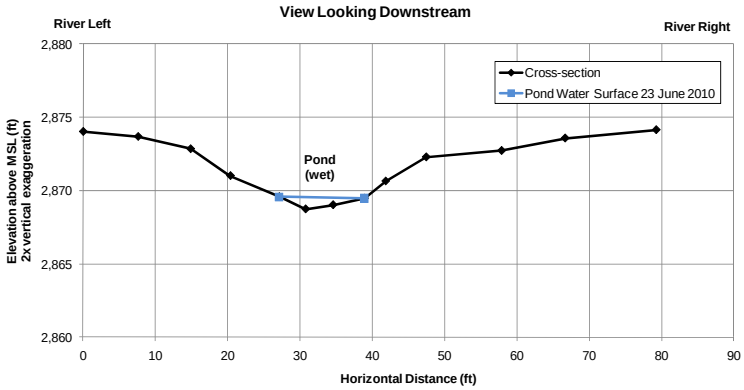


Figure C-28. Cross-sections along the northwestern stream channel above the large stock pond (reservoir). The cross-sections span the natural stream channel above NW Pond A (a), the NW Pond A above the road crossing (b), the NW Pond B below the road crossing (c), the stream channel between NW Pond B and NW Pond C (d), and the NW Pond C above the large stock pond (reservoir) (e).

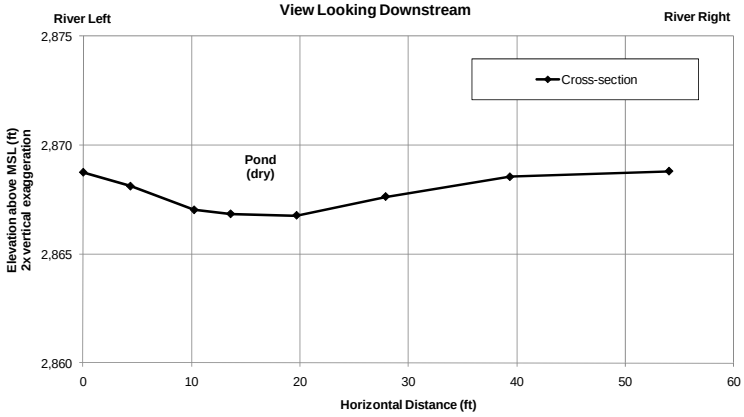
a)


View Looking Downstream
River Left
River Right
Cross-section
Roadway
Stream channel thalweg
Elevation above MSL (ft) 2x vertical exaggeration
Horizontal Distance (ft)
2,890
2,885
2,880
2,875
2,870
0
10
20
30
40
50
60
70
80
90

b)


View Looking Downstream
River Left
River Right
Cross-section
Pond Water Surface 23 June 2010
Pond (wet)
Elevation above MSL (ft) 2x vertical exaggeration
Horizontal Distance (ft)
2,880
2,875
2,870
2,865
2,860
0
10
20
30
40
50
60
70
80
90

c)


View Looking Downstream
River Left
River Right
Cross-section
Pond (dry)
Elevation above MSL (ft) 2x vertical exaggeration
Horizontal Distance (ft)
2,875
2,870
2,865
2,860
0
10
20
30
40
50
60

d)

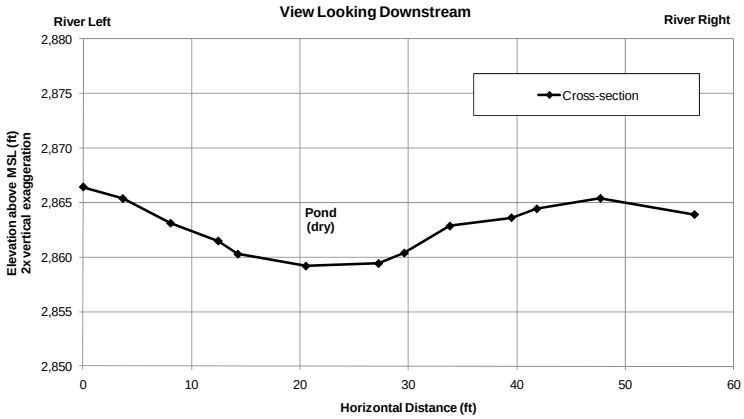

View Looking Downstream
River Left
River Right
Cross-section
Pond (dry)
Elevation above MSL (ft) 2x vertical exaggeration
Horizontal Distance (ft)
2,880
2,875
2,870
2,865
2,860
2,855
2,850
0
10
20
30
40
50
60

Figure C-29. Cross-sections along the northeastern stream channel above the large reservoir. The cross-sections span the natural stream channel above NE Pond A (a), the NE Pond A (b), the NE Pond B (c), and the NE Pond C above the large stock pond (reservoir) (d).

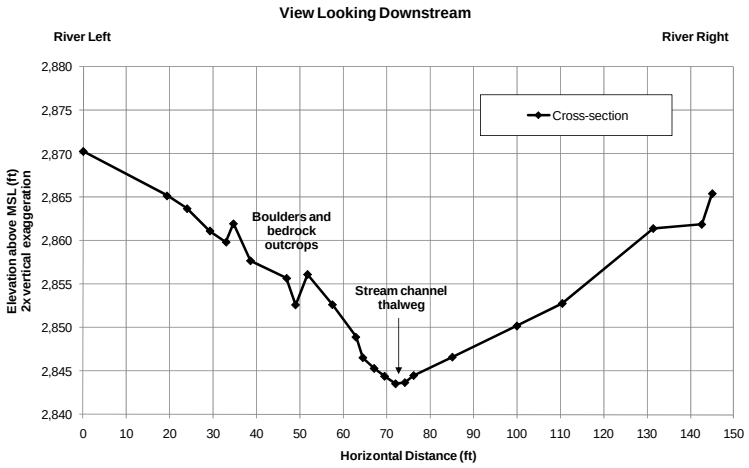


Figure C-30. Cross-section of the stream channel downstream of the large stock pond (reservoir) dam. Boulders and bedrock outcrops are present on the river-left upland slopes and the dam spillway is present in the notch near the top of the river-right upland slope.

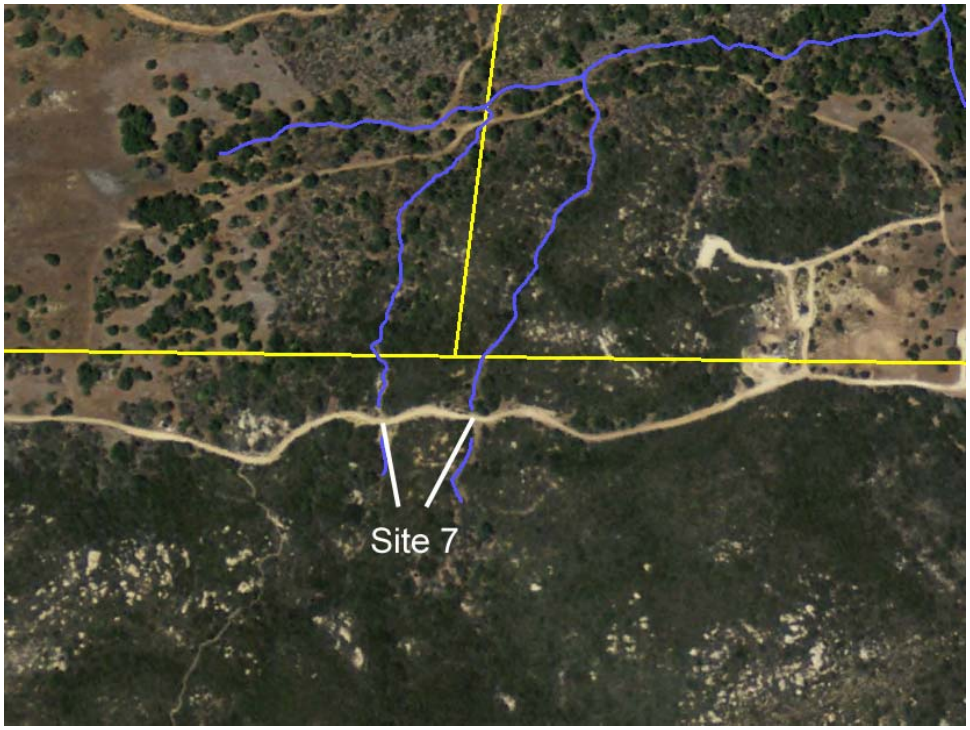


Figure C-31. View of existing road crossings at Site 7 along the Tower Access Road above ephemeral stream channels (aerial photograph taken 25 May 2009, source: Google Earth, accessed 2010).



Figure C-32. View of road crossing at the eastern ephemeral stream channel at Site 7. A small, dry pond area is present upstream of the crossing (left side of photo).



Figure C-33. View of road crossing at the western ephemeral stream channel at Site 7. A small, dry pond area is present upstream of the crossing (left side of photo) and a boulder-control drop is present on the downstream side.

Appendix D. Description of Stream Management in the Suncrest Substation Area

APPENDIX D - Assessment of Suncrest Substation and Integration with Downstream Mitigation by Stillwater Sciences

An important component in developing a comprehensive and sustainable restoration design for the project mitigation site is understanding the impact of the Suncrest Substation on run-off dynamics. As with all watershed development projects, the increased area of compacted soil or imperviousness associated with the substation has the potential to increase the magnitude of storm-induced peak flows in the channels downstream and increase the rate at which flows peak and subside, also called flow "flashiness". In addition to flow routing effects, site development may also disrupt coarse sediment (i.e., sand and larger) delivery dynamics by stabilizing or otherwise trapping sediment that would have been transported downstream. This impact can cause downstream channel instability and is particularly pronounced where the undisturbed channel is in balance with relatively high sediment delivery rates, such as in many southern California watersheds. As these site development impacts can limit downstream restoration options, we examined the plan to mitigate the hydrologic impacts of the Suncrest Substation with knowledge of site geologic and geomorphic conditions from the perspectives of both flow and sediment-delivery impacts.

The Suncrest Substation will have a footprint of approximately 100 acres and will be built on top of a headwater drainage network within the Sweetwater River watershed. To capture surface flow coming into and leaving the substation footprint, the Suncrest Substation Drainage Design Plan (SSDDP; SDG&E 2010) calls for the installation of three detention basins located around the perimeter of the site. The southwest and southeast detention basins (detention basins #2 and #3, respectively) are positioned to control runoff entering small headwater catchments downstream of the Substation. The northwest detention basin (detention basin #1) is at the downstream end of the footprint and will control runoff from the site before it enters the small 1st-order, intermittent stream channel that drains to the small stock pond (i.e., the northeast tributary). According to the SSDDP, the detention basins were designed under the following guidelines: (1) the 2005 County of San Diego Drainage Design Manual (SDDDM), (2) the 2009 Interim Hydromodification Management Criteria (IHMC; San Diego County 2009) specified by the San Diego Municipal Storm Water Permit (SDMSWP; RWQCB 2010) for developed areas greater than 50 acres, and (3) the 2010 County of San Diego Standard Urban Mitigation Plan Manual (SUMPM). Implementing these guidelines, detention basin design configurations, and drainage outlet sizes will result in the following:

- no increase in 100-year storm peak flow rate over pre-developed conditions;
- detention basins that drain within 72 hours following the 100-year storm peak flow;
- post-developed flow rates and durations that do not exceed 10% of pre-developed values for modest flows (i.e., flows between 20% of the pre-developed 5-year and 10-year storm events defined as "modest flows" or "frequently occurring large flow events); and
- the capture of sediment within storm water runoff from onsite and offsite tributary areas prior to entry into the detention basins.

However, we have not reviewed any of the hydrologic or engineering calculations for these ponds, so our review is restricted to an assessment of any potential downstream impacts under the assumption that these design standards are met.

Review of the detention basin design and desired function in the context of the watershed hydrologic and geomorphic processes indicates that the basins should not act to disrupt downstream channel stability (e.g., reach-average hydraulic geometry, gradient, and planform) and should not impede downstream stream restoration actions. Specifically, with respect to peak-flow effects, the combined requirements that the basins be able to handle flows that are within 10% of the pre-developed modest flows and durations (i.e., flows between 20% of the pre-developed 5-year and 10-year storm events) suggest a minimal likelihood of impacts. Depending on detention basin configuration, peak-flow increases in downstream channels are theoretically possible for storms between a 10-year and 100-year recurrence. However, the difference in rainfall between these two recurrence intervals is relatively small and so reasonable peak-flow control is anticipated for the 10- to 100-year interval as well.

Flow durations are much more important when considering potential impacts to channels. We have reviewed documentation associated with the IHMC, in which the County of San Diego has determined that flows generated by rainfall below the chosen threshold (20% of the 5-year storm event) are very unlikely to result in channel erosion or significant sediment transport. Flow durations may increase above the provided level of control (10-year storm event), but by definition such an event would have less than a 10% chance of occurring in any given year. Some degree of flow control is nonetheless likely to be provided by the control structures of the basins, even above this level.

Detention basins, by the nature of their basic design, have the potential to disrupt the delivery of sediment downstream, resulting in channel adjustments such as incision, as they trap virtually all coarse sediment generated upstream of and within their tributary area. However, field observations indicate that the coarse sediment production in the part of the watershed where the substation will be located is relatively low and the channels are already well-adjusted to a low coarse sediment yield. Therefore, potential sediment impacts from the substation on downstream channel conditions also appear to be minimal.

A final caveat to our assessment is the unknown impact of detention basin outlets on localized erosion. Detention basins discharge flow at a single point, which does not always correspond to a pre-existing channel. It appears that detention basins #1 and #2 will discharge into existing channels, which should not result in channel erosion. However, the flow from detention basin #3 appears that it will be released directly onto a hillside before reaching the nearest channel, which could potentially cause the creation and downward erosion of an unstable outlet channel. Therefore, detention basin #3 may require an outlet structure to bypass discharge past any remaining portion of the hillside that is not removed during site grading.

REFERENCES

Regional Water Quality Control Board (RWQCB). 2010. San Diego Municipal Storm Water Permit (SDMSWP). San Diego Region.

San Diego County. 2005. Drainage Design Manual (SDDDM). County of San Diego Department of Public Works Flood Control Section. July 2005.

San Diego County. 2009. Interim Hydromodification Management Criteria (IHMC). From the Hydromodification Management Plan. Prepared by Brown and Caldwell. May 1, 2009.

San Diego County. 2010. County of San Diego SUSMP: Standard Urban Stormwater Mitigation Plan Requirements for Development Applications. March 25, 2010.

San Diego Gas and Electric (SDG&E). 2010. Suncrest Substation Drainage Design Plan (SDDP)

Draft Disclosure

This document represents the current SWPPP for this project and will be revised prior to the start of construction.

Storm Water Pollution Prevention Plan (SWPPP)

Suncrest Substation
Unincorporated Community of Alpine
Alpine, CA 91901



May 19, 2010

Prepared for:
SDG&E
8315 Century Park Court
San Diego, CA 92123

Prepared by:
Bureau Veritas
11590 West Bernardo Court, Suite 100
San Diego, CA 92127
858.451.6100
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STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

FOR

SUNRISE POWERLINK
SUNCREST SUBSTATION
UNINCORPORATED COMMUNITY OF ALPINE,
ALPINE, CALIFORNIA 91901

San Diego Gas and Electric (SDG&E)
Contract Number: 5660016733

This SWPPP has been prepared for **Traditional Projects** in accordance/compliance with the **State Water Resources Control Board** (SWRCB) Order No. 2009-0009-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002 Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities.

WDID # 9 37C357500

SDGE

A Sempra Energy utility℠

Prepared for:
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Prepared by:
Bureau Veritas North America, Inc.
11590 W. Bernardo Court, Suite 100
San Diego, CA 92127

May 19, 2010

This Document Must Be Returned to
LINDA COLLINS (858) 650-4064 at Job Completion

EMERGENCY CONTACT INFORMATION

Use the following contact numbers if there is an injury or other non-storm water related emergency occurs during the course of the project:

SDG&E projects –

Life threatening:	911
Non-life threatening:	(619) 725-5100 (Trouble Dispatch)

See Appendix XIII for the contact information for the Legally Responsible Person (LRP), Qualified SWPPP Developer (QSD), Qualified SWPPP Practitioner (QSP) and other parties responsible for the SWPPP implementation.

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APPENDICES

APPENDIX I – BLANK FORMS

Notice of Intent
Permit Registration Documents (PRDs) Were Filed Record
Annual Reporting Form
Notice of Termination (NOT)
Post Construction Best Management Practice (BMP) Type, Description, Location, and Inspection & Maintenance Requirements (if required)
SWPPP Amendment Log
Certification Form
Notification of Anticipated Non-Compliance Form
SWPPP Training and Qualifications Forms
Visual Observation (Inspection) Form for Non-Storm Water Discharge
Visual Observation Form for Qualifying Rain Event
Inspection Form
Qualified SWPPP Practitioner (QSP) Implementation Checklist
Sampling Event Worksheet
Numeric Effluent Limitation (NEL) Violation Report
Numeric Action Level (NAL) Exceedance Report
Leaks and Spills Documentation
Secondary Containment and Spill Kit Inventory
Inventory of Potential Pollutant Sources Planned to be Used or Stored at the Project Site
List of Responsible Parties (Contact Information Form)
BMP Selection Worksheet

APPENDIX II – COPY OF CONSTRUCTION GENERAL PERMIT

Storm Water Regional Control Board (SWRCB) Order No. 2009 - 0009 – Division of Water Quality (DWQ), National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities

APPENDIX III – SITE MAP (Retain in this appendix the current and all historic Site Maps)

Site map includes the following information:

- Project's surrounding area (vicinity)
- Site layout
- Construction site boundaries
- Drainage areas
- Discharge locations
- Sampling locations
- Areas of soil disturbance (temporary or permanent)
- Active areas of soil disturbance (cut or fill)
- Locations of all BMPs (original & revised)
- Active Treatment System (ATS) location (if applicable)

- Locations of sensitive habitats, watercourses, or other features which are not to be disturbed
- Locations of all post-construction BMPs
- Locations of storage areas for waste, vehicles, service, loading/ unloading of materials, access (entrance/exits) points to construction site, fueling, and water storage, water transfer for dust control and compaction practices

APPENDIX IV – CALCULATIONS/ANALYSES

Risk Determination Analysis – N/A
Run-off Coefficient Calculations
Run-on Calculations
Particle Size Analysis Results – N/A
Alternative Risk Analysis – N/A
Receiving Water Information, Including Applicable Water Quality Standards
Sediment Basin Sizing
Post-Construction Water Balance Calculator – N/A

APPENDIX V – CONSTRUCTION MATERIALS

Inventory of Potential Pollutant Sources Planned to be Used or Stored at the Project Site
List of Potential Pollutant Sources

APPENDIX VI – CONSTRUCTION BMP MANUAL

SDG&E Water Quality Construction Best Management Practices Manual
Other BMPs Cited in the SWPPP

APPENDIX VII – BMP INFORMATION

QSP Implementation Checklist
BMP Selection Worksheet
Final Landscaping and Site Stabilization BMPs – N/A
Post-Construction Water Balance Calculator – N/A

APPENDIX VIII – REAPS

APPENDIX IX – SITE INSPECTION RECORDS

APPENDIX X – CONSTRUCTION SITE MONITORING PROGRAM (CSMP)

1. Overview
2. Visual Monitoring (Inspection) Requirements
   2.1 Exemptions for Visual Observation and Observation and Sample Collection
3. Water Quality Sampling and Analysis
4. Storm Water Discharge Water Quality Sampling Locations
5. Storm Water Sample Collection and Handling Instructions
6. Analytical and Monitoring Methods
7. NAL Exceedance Reports (Required for Risk Level 2 and 3 Projects) – N/A
8. NEL Violation Report (Required for Risk Level 3 Projects) – N/A

9. Compliance Storm Event Exemption
10. Watershed Monitoring Option
    (Required for Risk Level 2 and 3 Projects) – N/A
11. Particle Size Analysis for Project Risk Justification

APPENDIX XI – CSMP ATTACHMENTS

A. Blank Forms
   Visual Observation (Inspection) Form for Qualifying Rain Event *
   Visual Observation (Inspection) Form for Non-Storm Water Discharge *
   Sampling Event Worksheet *

B. Observation (Inspection) Forms
   Visual Observation (Inspection) Form for Qualifying Rain Event*
   Visual Observation (Inspection) Form for Non-Storm Water Discharge*

C. Reports
   Internal NAL Non-Compliance Documentation (Numeric Action Level Report located in Appendix XVII of the SWPPP)
   Internal NEL Non-Compliance Documentation (Numeric Effluent Limitation Report located in Appendix XVII of the SWPPP)

D. Sampling and Analysis Results
   Sampling Event Worksheet*
   Field Meter Information
   Calibration Records
   Contact Information for Analytical Laboratory
   Analytical Laboratory Results

E. RWQCB Correspondence: Additional Parameters for Storm Water Sampling

   a. Sample Forms

   b. Sample Chain of Custody Forms

F. Watershed Monitoring Option

APPENDIX XII –Permit Registration Documents (PRDS)

PRDs, including:

- PRDs Were Filed Record *
- Notice of Intent (NOI)
- Site Map (original)
- SWPPP (electronic version, as submitted)
- Risk Assessment - N/A
- Post-Construction Water Balance Calculation - N/A
- ATS Design Documentation & Certification - N/A
- Approved Signatory Delegation (original), if applicable
- Annual Fee (copy of check)
- Signed Certification Statement

NOT, including:

- Application
- Receipt of Approval
- Waste Discharge Identification Number Letter

APPENDIX XIII – RESPONSIBLE PARTIES

List of Responsible Parties (LRPs) (Contact Information Form) *, including

- LRP/Approved Signatory
- Qualified SWPPP Developer (QSD)
- QSP
- Sampling Personnel
- Inspection Personnel
- Other SWPPP Implementation Personnel
- Non-Storm Water Management
- Project Contractors & Sub-Contractors List

APPENDIX XIV – INSPECTION CHECKLISTS

Spill/ Leak History Record

APPENDIX XV – TRAINING DOCUMENTATION

SWPPP Training, including*:

- Spill Response
- QSD
- QSP
- Personnel directed by QSP

SWPPP Training and Qualifications Log

APPENDIX XVI – AMENDMENT LOG

Amendments Log*

APPENDIX XVII – REPORTS

Annual Report *
NEL Violation Report *
NAL Exceedance Report *
Anticipated Non-Compliance Reporting *
Storm Water Reports
Bioassessment Study Reports – N/A

APPENDIX XVIII – SECONDARY CONTAINMENT AND SPILL KIT INVENTORY

Secondary Containment and Spill Kit Inventory *

APPENDIX XIX – OTHER SWPPP EXHIBITS

APPENDIX XX – ACTIVE TREATMENT SYSTEM (ATS)

ATS Plan

APPENDIX XXI – BIOASSESSMENT – N/A

Study Plan
RWQCB approval for payment in lieu of field study
Other documentation

APPENDIX XXII – Glossary/Acronyms

* - Indicates that a blank form is available in Appendix I

1.0 SWPPP CERTIFICATION

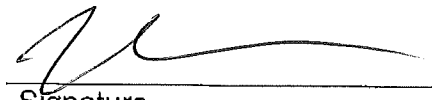
This SWPPP has been prepared for a Traditional Project in accordance/compliance with the State Water Resources Control Board (SWRCB) Order No. 2009-0009-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002 Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities.

Suncrest Substation
Unincorporated Community of Alpine
County of San Diego

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete.

I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signed:

ROBERT C. JACKSON Name of LRP *	*General Manager & Director-Construction & Engineering Sunrise* Title
San Diego Gas & Electric Company	(858) 654-6451 Telephone Number
 Signature	July 9, 2010 Date

*or approved signatory. The delegation of authority, for the Approved Signatory is included in Appendix XII.

I, Tracy Beach, am a Qualified Storm Water Pollution Prevention Plan (SWPPP) Developer and certify that I have completed this SWPPP for the **Suncrest Substation** project and/or the amendments contained herein, in compliance with the **State Water Resources Control Board** (SWRCB) Order No. 2009-0009-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002 Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities.

Signature: TBL

Print Name: Tracy Beach

Date: 8/4/10

Affix Certificate Number and/or Seal here:

Certificate Number C 73756

Seal:



2.0 GENERAL INFORMATION

2.1 Background

This SWPPP was prepared for the Suncrest Substation as a part of the overall Sunrise Powelink Project (SPL), a linear construction project

This Storm Water Pollution Prevention Plan (SWPPP) has been prepared in accordance with the State Water Resources Control Board (SWRCB) Order No. 2009-0009-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities (Construction General Permit) (herein after referred to as the CGP). The CGP will be effective on July 1, 2010.

This SWPPP has also been prepared to comply with the current permit, SWRCB Order No. 99-08-DWQ, which will be effective until July 1, 2010.

A copy of the CGP has been included in Appendix II of this SWPPP.

The goal of this SWPPP is to protect overall water quality during construction activities. Construction activities could potentially effect water quality by the storage and handling of various construction related materials as well as by causing soil erosion or the accumulation of sedimentation. With the implementation of the Best Management Practices (BMPs) and/or treatment outlined in this plan, the potential for the transport of contaminants or sediment to receiving waters will be minimized.

The SWPPP must be evaluated on an ongoing basis to document the changes and progression of construction activities throughout the life of the project.

2.2 Permit Registration Documents (PRDs)

The Project Registration Documents (PRDs) and the State Water Resources Control Board's (SWRCB) confirmation of permit coverage (and associated Waste Discharge Identification Number) are contained in Appendix XII. Copies of PRD updates and annual fee checks are also contained in Appendix XII.

2.3 SWPPP Amendments

The Qualified SWPPP Developer (QSD) must prepare and certify each SWPPP amendment.

Blank SWPPP Amendment forms and Certification log is located in Appendix I. These completed SWPPP Amendment forms are in Appendix XVI.

2.4 Availability of the SWPPP

The SWPPP shall be available at the construction site during working hours while construction is occurring and shall be made available upon request by State or Municipal inspectors. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and exhibits will be left with the field crew and the original SWPPP shall be made available via a request by radio or telephone. Once construction activities are complete, until stabilization is achieved, the SWPPP shall be made available by the LRP.

2.5 Anticipated Non-Compliance Reporting

If there are any anticipated non-compliance incidents for the Suncrest Substation project, a blank form (located in Appendix I) should be completed. Records of completed forms are retained in Appendix XVII.

A completed Notification of Anticipated Non-Compliance Form must be submitted in advance of a planned change in construction activity that may result in non-compliance with the CGP to the Regional Water Board and local storm water management agency (see contact information in Appendix XIII).

2.6 Certifications

Certification requirements are described in Attachment A, Section E.9 and E.10 of the CGP as provided in Appendix II of this SWPPP on pages 10 and 11 of Attachment A.

2.7 Soil Contamination

If soil contamination is found or suspected, and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action, the LRP shall have those soils sampled and tested to ensure proper handling and public safety measures are implemented. Sampling and testing records shall be retained in Appendix XI. Blank forms for sampling and testing records are provided at the front of Appendix XI. The LRP shall notify the appropriate local, state, and federal agency(ies) when contaminated soil is found at a construction site, and will notify the appropriate Regional Water Board.

LRP's shall ensure that trench spoils or any other soils disturbed during construction activities that are contaminated are not discharged with storm water or non-storm water discharges into any storm drain or water body except pursuant to a project specific NPDES permit.

.

2.8 Responsible Parties

Implementation of the SWPPP involves a number of responsible parties including, but not limited to, the Legally Responsible Party (LRP), Approved Signatory, Qualified SWPPP Developer (QSD) and Qualified SWPPP Practitioner (QSP). Additionally, other persons may be specifically responsible for conducting inspections, sampling, and BMP installation under the direction of the QSP. These responsible parties are identified in Appendix XIII.

3.0 PROJECT INFORMATION

3.1 OVERVIEW

San Diego Gas & Electric is dedicated to providing for the energy needs of its customers through the transmission and distribution of electric services. The need to upgrade existing facilities and to construct new facilities in support of new development is the primary impetus for SDG&E construction projects.

This Storm Water Pollution Prevention Plan (SWPPP) covers the Suncrest Substation, a traditional construction project ("Project").

The goal of this SWPPP is to protect overall water quality during construction activities. Construction activities could potentially affect water quality by the storage and handling of various construction-related materials as well as by causing soil erosion or the accumulation of sedimentation. With the implementation of the Best Management Practices (BMPs) outlined in this plan, the potential for the transport of contaminants or sediment to receiving waters will be minimized.

3.2 PROJECT CHARACTERISTICS

3.2.1 Project Location

The Suncrest Substation project is located at:	
ADDRESS	**Unincorporated Community of Alpine**
CITY, STATE, ZIP CODE	**Alpine, CA 91901**
THOMAS GUIDE LOCATION	**Thomas Brothers Guide pages 1235 & 1255**
LATITUDE / LONGITUDE	**32° 48' 31"N, 116° 40' 59"W**

The proposed Suncrest substation is located approximately six miles east of the unincorporated community of Alpine, approximately 3 miles west of Japatul Valley Road and immediately south of Bell Bluff Truck Trail. The project location is shown on the project Vicinity Map included in Appendix III.

3.2.2 Project Description

The proposed Suncrest Substation is a 500KV Substation with an adjoining access road.
This SWPPP has been prepared in accordance/compliance with the **State Water Resources Control Board** (SWRCB) Order No. 2009-0009-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002 Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities (CGP). The CGP identifies the following distinct phases of construction activities (listed below).

☒ Grading and Land Development Phase,

- ☒ Streets and Utilities Phase,
- ☒ Vertical Construction Phase,
- ☒ Final Landscaping and Site Stabilization and
- ☒ Inactive Construction Phase (i.e., 14 or more days of inactivity).

This Project is a part of a common plan of development or sale. This project is a part of the SPL. The SPL proposes to construct a new 120 mile electric transmission line between the existing Imperial Valley and Sycamore Canyon Substations.

3.2.3 Soil Disturbance and Total Area Estimate

The soil disturbance area for this project is approximately 78 acres. The soil disturbance descriptions and locations are:

- Access Road to Substation (along Bell Bluff Truck Trail)
- The substation pad, tower, slopes and detention basins (approximately 1325' x 2000')

Construction laydown/staging area, materials storage areas and employee and contractor parking areas will be located within the project area of the substation and are included in the disturbed acreage noted above.

Changes to the initial estimate will be documented in the copies of the revised Notice of Intent documents submitted to the SWRCB (see Appendix XII).

3.2.4 Site Imperviousness

Approximately 1.6% of the pre-project site is impervious. Approximately 32% of the post-project site is impervious. Runoff coefficient calculations and run-on flow calculations are found in Appendix IV.

3.3 RECEIVING WATERS

This section identifies the receiving waters into which the project discharges and the conditions and specific requirements for this project.

- **Receiving Water Name(s):** Peterson Creek

  Peterson Creek is located approximately 0.5 miles to the west of the Suncrest Substation. Storm water will not discharge directly into this receiving water body. Runoff from the substation will ultimately flow to Peterson Creek, but only after being treated, held in a sedimentation basin (detention area after construction), and then slowly released at reduced velocities and dispersed before it reaches the creek.

- **Hydrologic Number(s)/Name(s):** 909.31/Loveland Hydrologic Sub Area

- **Surface Water Quality Objectives** applicable to this project's receiving waters are contained in Appendix IV.

- **Specific information** for the **receiving waterbodies** as listed above (Check all that apply):

  ☐ Listed on SWRCB's 303(d) list for sedimentation, siltation or turbidity.

  ☐ A Total Maximum Daily Load (TMDL) has been adopted that addresses this impairment.

  Name of Waterbody / Impairment:

  _____

  _____

  _____

  _____

  ☐ A TMDL has not yet been adopted for this impairment.

  ☐ Listed on SWRCB's 303(d) list for pollutants other than sedimentation, siltation or turbidity.

  ☐ A TMDL has been adopted that addresses this impairment.

  Name of Waterbody / Impairment:

  _____

  _____

  _____

  _____

  ☐ A TMDL has not yet been adopted for this impairment.

  ☐ The 303(d) and/or TMDL requirements identified above are incorporated into the SWPPP site map/plans and other appropriate sections of the SWPPP.

- **Specific information** for the **watersheds** down-gradient from the receiving water body (Check all that apply):

  ☒ No surface waters are listed on the SWRCB's 303(d) list for sedimentation, siltation or turbidity.

  ☐ A surface water body is listed on SWRCB's 303(d) list for sedimentation, siltation or turbidity.

  Name of Waterbody / Impairment:

  _____

☐ A TMDL has been adopted that addresses this impairment. .

Name of Waterbody / Impairment:

☐ A TMDL has not yet been adopted for this impairment.

☐ No surface waters are listed on the SWRCB's 303(d) list for pollutants other than sedimentation, siltation or turbidity.

☒ A surface water body is listed on SWRCB's 303(d) list for pollutants other than sedimentation, siltation or turbidity.

☐ A TMDL has been adopted that addresses this impairment.

Name of Waterbody / Impairment:

☒ A TMDL has not yet been adopted for this impairment.

Name of Waterbody / Impairment:

Loveland Reservoir/Aluminum, Manganese, Dissolved Oxygen, pH

Sweetwater Reservoir/Dissolved Oxygen

San Diego Bay Shoreline, Chula Vista Marina/Copper

3.4 WETLANDS

Projects that will cross or will conduct work within or immediately adjacent to waters of the US or state–only waters may require additional permits for these activities. Check all the boxes below that apply:

☒ The project will cross or involve construction activities in a US Army Corps of Engineer's (ACOE) jurisdictional water body (e.g., wetland or waters of the United States).

☒ Applicable federal & state permits have or will be obtained. All construction activities will be covered under the ACOE Nationwide Permit.

☐ The project will cross or involve construction activities in a state-only jurisdictional water body (e.g., wetland or waters of the state, but not of the US).

☐ Applicable state permits have or will be obtained.

3.5 CONSTRUCTION, BMP IMPLEMENTATION AND MAINTENANCE SCHEDULES

Estimated Date Construction will begin:	*June 30, 2010*
Estimated Completion Date:	*June 1, 2013*
Actual Start Date	*TBD*

Applicable BMPs identified in this SWPPP are to be installed concurrently with the initiation of work and as work progresses at each location and will be routinely inspected and maintained.

3.6 SITE MAPS AND DIAGRAMS

The Site Map is included in Appendix III.

The Site Map is also included with the Permit Registration Documents (PRD's) in Appendix XII.
The Site Map shows:

- Project's surrounding area (vicinity);
- Site layout;
- Construction site boundaries;
- Locations of sensitive habitats, watercourses, or other features which are not to be disturbed;
- Areas of soil disturbance (temporary or permanent);
- Active areas of soil disturbance (cut or fill);
- Drainage areas;
- Discharge locations;
- Locations of all BMPs;
- ATS location (if applicable);
- Locations of storage areas for waste, vehicles, service, loading/unloading of materials, access (entrance/exits) points to construction site, fueling, and water storage, water transfer for dust control and compaction practices;
- Sampling location; and
- Locations of all post-construction BMPs

4.0 RISK LEVEL 1 REQUIREMENTS

4.1 RISK DETERMINATION

Construction for this project will begin under the existing permit 99-08DWQ. On July 1, 2010 the 99-08 DWQ permit expires and is replaced by the 2009-0009-DWQ Permit. This project will be grandfathered into the assignment of Risk Level 1. Therefore, this project is not subject to the risk assessment requirements. If this project is still active after September 2, 2011, risk assessment will be performed.

A. Effluent Standards

This project must meet narrative effluent standards.

This project is a Risk Level 1 project, therefore numeric effluent standards are not applicable.

4.2 GOOD SITE MANAGEMENT "HOUSEKEEPING"

The following sections describe specific measures to be implemented based on the risk level for this project. Tables have been provided for each measure described in the CGP Attachment C, D, or E that is applicable to the project's risk level. In this case, as the project is a Risk Level 1, Attachment C is applicable.

The first column of the table beginning on page 12 provides a measure identification number that corresponds to the applicable measure in the next column. The measures listed in the second column are required for Risk Level 1 projects.

The third column of the table describes whether this measure is applicable for the project.

The fourth column provides one or more BMP options that correspond to each required measure. These BMP Options(s) are references to the SDG&E Water Quality Construction Best Management Practices Manual (or "BMP Manual").

The fifth column of the table identifies the location within the SWPPP that contains the information applicable to the fourth column. The information in the fourth column is either a BMP Option or an inventory form.

Locations of the applicable measures and BMP Options are identified on the Site Map located in Appendix III. The initial layout of the BMPs has been identified by the QSD as part of the preparation of the SWPPP. As site conditions change, it will be the responsibility of the QSD to make all revisions necessary.

The QSD prepared the tables on the following pages as part this SWPPP. It is the responsibility of the QSP to review these tables during the course of the project and to update the SWPPP as applicable. In addition, a QSP Implementation Checklist has been provided in Appendix VII to document the updates as applicable.

This section addresses good site management (i.e., "housekeeping") practices, including practices for:

A. Construction Materials;
B. Waste Management;
C. Vehicle Storage and Maintenance;
D. Landscape Materials;
E. Assessment of Potential Pollutant Sources;
F. Air Deposition; and
G. Good Housekeeping Documentation

Tables have been provided for each good housekeeping measure described in the above sections, with the exception of Sections E and G. Sections E and G describe specific actions that must be taken to comply with the permit.

Each of the following measures is an element of Good Site Management “Housekeeping” as described in the CGP.

A. Good Site Management ("Housekeeping") Measures for **Construction Materials** at a minimum, shall consist of the following:

Construction Materials Measure ID No.	Construction Materials Measure	Applicable to Project?		BMP Option (check applicable option(s))	Location in SWPPP
		Yes	No		
CM-a	Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced.	X		QSP must conduct an inventory	Appendix V[1]
CM-b	Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).	X		☒ BMP 1-08	Appendix VI
CM-c	Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).	X		☒ BMP 2-01 ☐ BMP 2-02 ☒ BMP 2-03 ☒ BMP 2-04 ☐ BMP 2-05 ☐ BMP 2-06	Appendix VI
CM-d	Minimize exposure of construction materials with precipitation.	X		☒ BMP 2-01 ☐ BMP 2-02 ☒ BMP 2-03 ☒ BMP 2-04 ☐ BMP 2-05 ☐ BMP 2-06 ☒ BMP 2-07 ☐ BMP 2-08	Appendix VI
CM-e	Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.	X		☒ BMP 1-07	Appendix VI

[1]QSP to review List of Potential Pollutant Sources in Appendix V and complete an Inventory of Potential Pollutant Sources planned to be used or stored at the project site in Appendix V as well.

at a minimum, shall consist of the following:

B. Good Site Management ("Housekeeping") Measures for **Waste Management**

Waste Management Measure ID No.	Waste Management Measure	Applicable to Project?		BMP Option (check applicable option(s))	Location in SWPPP
		Yes	No		
WM-a	Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.	X		☒ BMP 3-02 ☐ BMP 3-03 ☐ BMP 3-04 ☒ BMP 3-05 ☐ BMP 3-06 ☒ BMP 3-07 ☐ BMP 3-08 ☐ BMP 3-09	Appendix VI
WM-b	Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.	X		☒ BMP 2-07	
WM-c	Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.	X		☒ BMP 2-07	Appendix VI
WM-d	Cover waste disposal containers at the end of every business day and during a rain event.	X		☒ BMP 2-01 ☐ BMP 2-02 ☒ BMP 2-03 ☒ BMP 2-04 ☐ BMP 2-05 ☐ BMP 2-06 ☒ BMP 2-07 ☐ BMP 2-08	Appendix VI
WM-e	Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.	X		☒ BMP 2-01 ☐ BMP 2-02 ☒ BMP 2-03 ☒ BMP 2-04 ☐ BMP 2-05 ☐ BMP 2-06 ☒ BMP 2-07 ☐ BMP 2-08	Appendix VI

B. Good Site Management ("Housekeeping") Measures for **Waste Management** at a minimum, shall consist of the following:

Waste Management Measure ID No.	Waste Management Measure	Applicable to Project?		BMP Option (check applicable option(s))	Location in SWPPP
		Yes	No		
WM-f	Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.	X		☒ BMP 1-08	Appendix VI
WM-g	Implement procedures that effectively address hazardous and non-hazardous spills.	X		☒ BMP 2-03	Appendix VI
WM-h	Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that: • Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and • Appropriate spill response personnel are assigned and trained.	X		☒ BMP 2-03	-Appendix VI. -For spill response personnel, see Appendix XIII. -For relevant training see Appendix XV.
WM-i	Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.	X		☒ BMP 2-04	Appendix VI

B. Good Site Management ("Housekeeping") Measures for Waste Management at a minimum, shall consist of the following:

C. Good Site Management ("Housekeeping") Measures for **Vehicle Storage and Maintenance** at a minimum, shall consist of the following:

Vehicle Storage and Maintenance Measure ID No.	**Vehicle Storage and Maintenance Measure**	Applicable to Project?		BMP Option (check applicable option(s))	Location in SWPPP
		Yes	No		
VSM-a	Prevent oil, grease, or fuel from leaking in to the ground, storm drains or surface waters.	**X**		☒ BMP 3-03 ☒ BMP 3-04 ☒ BMP 3-05	Appendix VI
VSM-b	Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.	**X**		☒ BMP 2-03 ☒ BMP 2-02 ☐ BMP 3-03 ☐ BMP 3-04	Appendix VI
VSM-c	Clean leaks immediately and disposing of leaked materials properly.	**X**		☒ BMP 2-03	Appendix VI

at a minimum, shall consist of the following:

D. Good Site Management ("Housekeeping") Measures for **Landscape Materials**

Landscape Materials Measure ID No.	Landscape Materials Measure	Applicable to Project?		BMP Option (check applicable option(s))	Location in SWPPP
		Yes	No		
LM-a	Contain stockpiled materials such as mulches and topsoil when they are not actively being used.	X		☒ BMP 1-08 ☒ BMP 4-07 ☐ BMP 4-02	Appendix VI
LM-b	Contain fertilizers and other landscape materials when they are not actively being used.	X		☒ BMP 1-08 ☒ BMP 2-01 ☒ BMP 2-02	Appendix VI
LM-c	Discontinuing the application of any erodible landscape material within 2 days before a forecasted rain event[2] or during periods of precipitation.	X		☒ BMP 3-07 ☒ BMP 2-02	Appendix VI
LM-d	Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.	X		☒ BMP 3-07 ☒ BMP 2-02	Appendix VI
LM-e	Stacking erodible landscape material on pallets and covering or storing such materials when not being used or applied.	X		☒ BMP 3-07 ☒ BMP 2-01 ☒ BMP 2-02	Appendix VI

[2] Excerpt from CGP – 50% or greater chance of producing precipitation.

E. Good Housekeeping for Assessment of Potential Pollutant Sources

Pollutant sources will be dynamic over the life of the construction project due to the various phases of construction.

An assessment of construction materials that may be used and activities that will be performed during this project that may have the potential to contribute pollutants, other than sediment, to storm water runoff for the project is located in Appendix V. The QSP must review the list throughout the life of the project and update it accordingly. Appropriate revisions to the SWPPP based on any changes to the list shall be made by the QSD.

In addition, a history of leaks or spills is maintained in Appendix XIV.

F. Good Housekeeping for Control of Air Deposition
This project shall implement good housekeeping measures on the construction site related to Air Deposition:

Air Deposition Measure ID No.	Air Deposition Measures	Applicable to Project?		BMP Option (check applicable option(s))	Location in SWPPP
		Yes	No		
AD-a	Control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.	X		☒ BMP 4-08	Appendix VI

G. “Good Housekeeping” Documentation

The project is a Risk Level 1 project; therefore, specific Good Housekeeping Documentation is not applicable for this project.

The QSP is responsible, however, for documenting good housekeeping BMPs in the SWPPP. During the development of this SWPPP, good housekeeping BMPs applicable to the project were determined. However, these BMPs may vary over the course of the project due to the nature and phase of the construction project.

For ease of the QSP, a checklist form has been provided in Appendix VII that identifies good housekeeping measures. The QSP must complete the form prior to the beginning of each phase of construction.

The QSP must document the status of these BMPs on the Site Inspection form (blank forms located in Appendix I and completed forms to be located in Appendix IX).

4.3 NON-STORM WATER MANAGEMENT

All non-storm water discharges are required to be controlled. BMPs must be implemented for construction related activities that are potential sources of discharges other than storm water.

Implement the following measures to control all Non-Storm Water Discharges during construction:

Non-Storm Water Management Measure ID No.	Measure	Applicable to Project?		BMP Option (check applicable option(s))	Location in SWPPP
		Yes	No		
NSWM-a	Implement measures to control all non-storm water discharges during construction.	X		☐ BMP 3-03 ☒ BMP 3-02 ☒ BMP 1-07	Appendix VI
NSWM-b	Wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.	X		☒ BMP 3-03	Appendix VI
NSWM-c	Clean streets in such a manner as to prevent non-storm water discharges from reaching surface water or MS4 drainage systems.	X		☒ BMP 3-02 ☒ BMP 1-07	Appendix VI

Vehicles will not be washed onsite, however, wash stations will be on site for weed control to wash tires, undercarriages and tools.

4.4 EROSION CONTROL MEASURES

Erosion is the detachment of soil from existing landscapes by water or wind. Erosion is a natural process that can be accelerated by construction activities such as grading or trenching. For example, when a site is cleared or grubbed, protective vegetation is removed and the disturbed soil is directly exposed to wind and water. Erosion controls protect the surface and prevent the soil particles from being detached by rainfall or wind. BMPs for erosion control include soil stabilization.

Erosion Control measures, at a minimum, shall consist of the following:

Erosion Control Measure ID No.	Measures	Applicable to Project?		BMP Option (check applicable option(s))	Location in SWPPP
		Yes	No		
ECM-a	Implement effective wind erosion control.	X		☒ BMP 4-08	Appendix VI
ECM-b	Provide effective soil cover for inactive[3] areas and all finished slopes, open space, utility backfill, and completed lots.	X		☒ BMP 4-02 ☐ BMP 4-03 ☒ BMP 4-04 ☐ BMP 4-05 ☒ BMP 4-06 ☐ BMP 4-07	Appendix VI
ECM-c	Limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the LRP shall consider the use of plastic materials resistant to solar degradation.		X	☐ BMP 4-07	Appendix VI

[3] Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.

The project will not use plastic materials in erosion control measures.

4.5 SEDIMENT CONTROL MEASURES

Sediment Control measures, at a minimum, shall consist of the following:

Sediment Measure ID No.	Measure	Applicable to Project?		BMP Option (check applicable option(s))	Location in SWPPP
		Yes	No		
SC-a	Establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.	X		☒ BMP 1-01 ☒ BMP 1-02 ☒ BMP 1-03 ☒ BMP 1-04 ☐ BMP 1-05 ☒ BMP 1-06 ☒ BMP 1-07 ☒ BMP 1-08	Appendix VI
SC-b	On sites where sediment basins are to be used, at a minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook	X		N/A	Appendix VI
SC-c	Implement appropriate erosion control BMPs (runoff control and soil stabilization) in conjunction with sediment control BMPs for areas under active[4] construction.	X		☒ BMP 4-02 ☐ BMP 4-03 ☒ BMP 4-04 ☐ BMP 4-05 ☒ BMP 4-06 ☐ BMP 4-07	Appendix VI
SC-d	Apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths[5] in accordance with Table 1 (See Table 1 on the following page).	X		☒ BMP 1-02 ☒ BMP 1-03	Appendix VI
SC-e	Ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment.	X		☒ BMP 1-07	Appendix VI
SC-f	Ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire washoff locations) are maintained and protected from activities that reduce their effectiveness.	X		☒ BMP 1-06	Appendix VI

[4] Active areas of construction are areas undergoing land surface disturbance. This includes construction activity during the preliminary stage, mass grading stage, streets and utilities stage, and the vertical construction stage.

[5] Sheet flow length is the length that shallow, low velocity flow travels across a site.

Sediment Measure ID No.	Measure	Applicable to Project?		BMP Option (check applicable option(s))	Location in SWPPP
		Yes	No		
SC-g	Inspect on a daily basis all immediate access roads daily. At a minimum daily (when necessary) and prior to any rain event, the LRP shall remove any sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).	X		☒ BMP 1-07	Appendix VI
SC-h	The Regional Water Quality Control Board (RWQCB) may require LRP's to implement additional site-specific sediment control requirements if the implementation of the other requirements in this section is not adequately protecting the receiving waters.	X		N/A	Appendix VI

Table 1 - Critical Slope/Sheet Flow Length Combinations (refer to ID No. SC-d)

Slope Percentage	Sheet flow length not to exceed
0-25%	20 feet
25-50%	15 feet
Over 50%	10 feet

4.6 RUN-ON AND RUN-OFF CONTROLS

Run-on and Run-off Controls shall be effectively managed for all run-on/run-off associated with the site and all runoff that discharges off the site, through the following measures:

Run-on and Run-off Control Measure ID No.	Measure	Applicable to Project?		Location in SWPPP
		Yes	No	
RRC-a	Effectively manage all run-on, all runoff within the site and all runoff that discharges off the site.	X		Appendix VI
RRC-b	Run-on from off-site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitation in the CGP.	X		Appendix VI

BMPs include graded swales, silt fence and fiber rolls to direct run-on away from the project site, fiber rolls and/or silt fence along the perimeter of the site, storm drain inlet protection with gravel bags and energy dissipaters at outflow points.

4.7 INSPECTION, MAINTENANCE AND REPAIR

Inspections shall be conducted by the QSP or a trained individual directed by a QSP.

For each inspection required, Risk Level 1 projects shall complete a Site Inspection Form, located in Appendix IX. Prior to conducting a site inspection, obtain weather information at the following website: http://www.srh.noaa.gov/forecast and attach the information to the Inspection Form.

Risk Level 1 projects shall perform weekly inspections and observations and at least once

each 24-hour period during extended storm events, to identify and record BMPs that have failed, or that could fail to operate as intended.

Upon identifying failures or other shortcomings, as directed by the QSP, the project shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

Project Specific Inspection Requirements:

The inspection forms shall remain onsite with the SWPPP and at a minimum shall include:

a. Inspection date and date the inspection report was written.
b. Weather information (rain gauge), including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.
c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.
d. A description of any BMPs evaluated and any deficiencies noted.
e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.
f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.
g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.
h. Photographs taken during the inspection, if any. These photos should be representative of actual site conditions, and be time stamped (dated).
i. Inspector's name, title, and signature.

Blank Inspection Forms are located in Appendix I. Completed Site Inspection Forms are retained in Appendix IX.

4.8 RAIN EVENT ACTION PLAN (REAP)

The Suncrest Substation project is a Risk Level 1, therefore a REAP is not required.

5.0 CONSTRUCTION SITE MONITORING PROGRAM (CSMP)

The Construction Site Monitoring Program (CSMP) for this project is located in Appendix X of this SWPPP.

6.0 RECORDKEEPING

The LRP shall electronically submit all storm event sampling results to the State Water Board no later than 5 days (for field samples only) after the conclusion of the storm event. For electronic submittal instructions, refer to Section IV, page 24 of the CGP.

Records of all storm water monitoring information and copies of all reports (including Annual Reports) shall be retained for a period of at least three years. If, after three years the RWQCB has not required the records to be retained for a longer period, these records shall be managed in accordance with the company's record retention policy. All records shall be retained on-site while construction is ongoing. These records include:

- The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation;
- The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements; for laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed;
- The date and approximate time of analyses;
- The individual(s) who performed the analyses;
- A summary of all analytical results from the last three years, the method detection limits and reporting units, and the analytical techniques or methods used, and the chain of custody forms;
- Rain gauge readings from visual observations (inspections);
- Quality assurance/quality control records and results;
- Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Section I, page 4 of the CGP);
- Visual observation and sample collection exception records (see Section I, page 4 of the CGP), including the corrective actions taken in response to the observations;
- The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections; and
- All field and/or analytical data.

All of these records can be found in Appendix XI in this SWPPP.

6.1 ANNUAL REPORTS

The Annual Report must be certified by the LRP. A blank certification form is located in Appendix I. Include the signed certification form with the Annual Report submittal. Records of Annual Reports are maintained in Appendix XVII of this SWPPP.

The LRP shall prepare and electronically submit an Annual Report no later than September 1 of each year.

Refer to the CGP Section XVI, page number 40, for all pertinent submittal requirements.

7.0 TRAINING

The QSP shall ensure that all persons responsible for implementing requirements of the CGP are appropriately trained in accordance with the requirements described in Section VII of the CGP, page 33.

The QSP shall provide documentation of all training for persons responsible for implementing the requirements of the CGP in the Annual Reports.

Storm water pollution prevention training should be provided regularly by the QSP. Topics can include, but are not limited to:

- spill prevention and response;
- inspections;
- annual reporting;
- locations and functions of sediment/erosion control devices;
- good housekeeping;
- sampling;
- fines and penalties; and
- material management practices.

Blank Training Logs can be found in Appendix I. Attendance records should be kept for each training session in Appendix XV. Training relevant for the QSD, QSP and individuals directed by the QSP are also located in Appendix XV.

8.0 EMERGENCY RESPONSE PLAN

EMERGENCY RESPONSE PLAN

1. BUSINESS NAME: San Diego Gas & Electric – Suncrest Substation

2. BUSINESS SITE ADDRESS: Unincorporated Community of Alpine, CA 91901

3. BUSINESS TELEPHONE: (858) 603-6241 24-Hour: (619) 725-5100

4. BRIEF DESCRIPTION OF PRODUCT MANUFACTURED AND/OR SERVICE PROVIDED:

The 500kV substation site includes: a substation pad, graded slopes, 3 detention basins and an access road. During construction there will be a laydown/staging area, materials storage areas and employee and contractor parking.

5. EVACUATION PROCEDURES: Notify employees to evacuate by shouting.

Employees will meet at the substation entrance located at the northeast corner of the substation pad.

Emergency Coordinators will be available at the substation entrance to assist Emergency Responders.

6. NOTIFICATION PROCEDURES:
In the event of a release or threatened release of a hazardous material the following agencies are to be notified:

PHONE NUMBERS:

A. Local Emergency Response Agencies 911
Hazardous Materials Management Division (619) 338-2222 (911 after working hours)

B. State Office of Emergency Services (800) 852-7550 or (916)427-4341

NAME OF PERSON(S) RESPONSIBLE FOR COMPLETING NOTIFICATIONS:

DESCRIBE NOTIFICATION PROCEDURES: Notify agencies and call SDG&E Trouble Department as needed.

7. EMERGENCY PROCEDURES: Main Concerns: Fire or Chemical Spill.

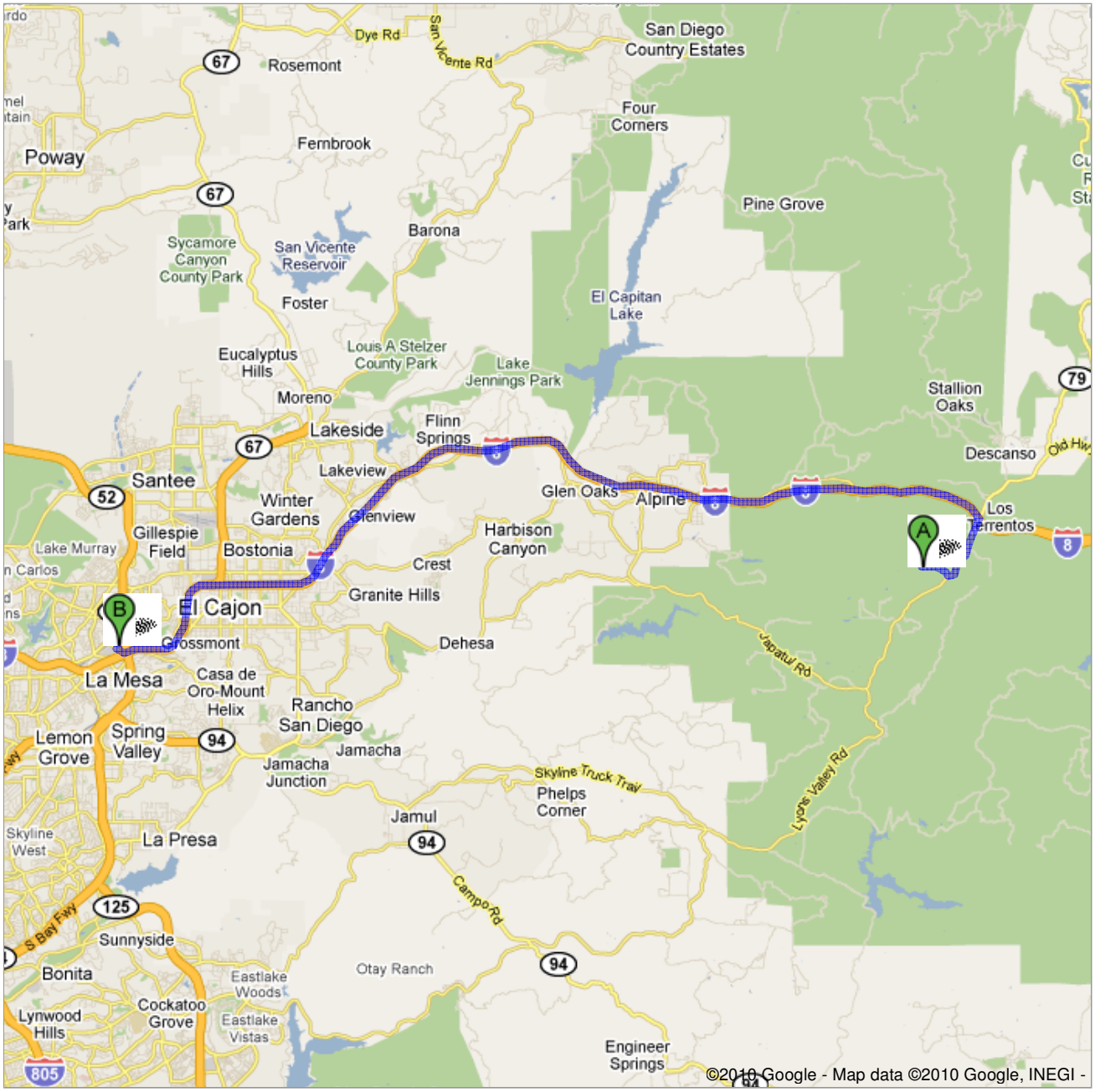
FIRE - Evacuate if Necessary. Employees will notify local fire department. If safe, employees will shut off power and attempt to control fire using fire extinguisher.
SMALL CHEMICAL SPILL - Spilled material will be identified, contained and cleaned up with appropriate materials by trained personnel.
LARGE CHEMICAL SPILLS - Employee will notify Emergency Coordinator. If safe, spill will be identified, contained and prevented from entering storm drains and sewer. Spilled material will be cleaned up by trained personnel such as SDG&E's Hazmat Team or appropriate clean up contractors.

NOTE: Disposal of hazardous waste generated from spill cleanup will be managed in compliance with Local, State and Federal regulations.

Google maps

Directions to Sharp Grossmont Hospital
5555 Grossmont Center Drive, La Mesa, CA 91942
- (619) 740-4000
28.6 mi – about **35 mins**

Save trees. Go green!
Download Google Maps on your phone at **google.com/gmm**



Bell Bluff Truck Trail, Alpine, CA 91901

	1. Head **east** on **Bell Bluff Truck Trail** toward **Bell Bluff Tr Trail** About 2 mins	go 0.8 mi total 0.8 mi
	2. Turn **left** at **Japatul Valley Rd** About 4 mins	go 1.8 mi total 2.6 mi
	3. Turn **left** to merge onto **I-8 W** toward **San Diego** About 26 mins	go 25.4 mi total 28.0 mi
	4. Take the **La Mesa Blvd** exit toward **Grossmont Center Dr**	go 0.2 mi total 28.2 mi
	5. Turn **right** at **La Mesa Blvd**	go 0.1 mi total 28.3 mi
	6. Continue onto **Grossmont Center Dr**	go 0.1 mi total 28.4 mi
	7. Turn **right** at **Healthcare Dr**	go 361 ft total 28.5 mi
	8. Turn **left** to stay on **Healthcare Dr**	go 138 ft total 28.5 mi
	9. Turn **right**	go 115 ft total 28.6 mi
	10. Turn **right** Destination will be on the right	go 43 ft total 28.6 mi

Sharp Grossmont Hospital
5555 Grossmont Center Drive, La Mesa, CA 91942 - (619) 740-4000

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2010 Google, INEGI

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

Appendix I
Blank Forms

State Water Resources Control Board

NOTICE OF INTENT

TO COMPLY WITH THE TERMS OF THE
GENERAL PERMIT TO DISCHARGE STORM WATER
ASSOCIATED WITH CONSTRUCTION ACTIVITY (WQ ORDER No. 99-08-DWQ)

I. NOI STATUS (SEE INSTRUCTIONS)

MARK ONLY ONE ITEM 1. ☐ New Construction 2. ☐ Change of Information for WDID#

II. PROPERTY OWNER

Name	Contact Person		
Mailing Address	Title		
City	State	Zip	Phone

Owner Type (*check one*) 1.[ ] Private Individual 2.[ ]Business 3.[ ]Municipal 4.[ ]State 5.[ ]Federal 6.[ ]Other

III. DEVELOPER/CONTRACTOR INFORMATION

Developer/Contractor	Contact Person		
Mailing Address	Title		
City	State	Zip	Phone

IV. CONSTRUCTION PROJECT INFORMATION

Site/Project Name	Site Contact Person		
Physical Address/Location	Latitude _____°	Longitude _____°	County
City (or nearest City)	Zip	Site Phone Number	Emergency Phone Number

A. Total size of construction site area: _____ Acres

B. Total area to be disturbed: _____ Acres (% of total _____)

C. Percent of site imperviousness (including rooftops):
Before Construction: _____%
After Construction: _____%

D. Tract Number(s): _____, _____

E. Mile Post Marker: _____

F. Is the construction site part of a larger common plan of development or sale? ☐ YES ☐ NO

G. Name of plan or development:

H. Construction commencement date: _____/_____/_____

I. % of site to be mass graded: _____

J. Projected construction dates:
Complete grading: _____/_____/_____ Complete project: _____/_____/_____

K. Type of Construction (Check all that apply):

1. ☐ Residential 2. ☐ Commercial 3. ☐ Industrial 4. ☐ Reconstruction 5. ☐ Transportation
6. ☐ Utility Description: _____ 7. ☐ Other (Please List): _____

V. BILLING INFORMATION

SEND BILL TO:	Name	Contact Person	
☐ OWNER (as in II. above)			
☐ DEVELOPER (as in III. above)	Mailing Address	Phone/Fax	
☐ OTHER (enter information at right)	City	State	Zip

VI. REGULATORY STATUS

A. Has a local agency approved a required erosion/sediment control plan?..... ☐ YES ☐ NO

Does the erosion/sediment control plan address construction activities such as infrastructure and structures?..... ☐ YES ☐ NO

Name of local agency: _____ Phone: _____

B. Is this project or any part thereof, subject to conditions imposed under a CWA Section 404 permit of 401 Water Quality Certification?..... ☐ YES ☐ No

If yes, provide details: _____

VII. RECEIVING WATER INFORMATION

A. Does the storm water runoff from the construction site discharge to (Check all that apply):

1. ☐ **Indirectly to waters of the U.S.**
2. ☐ **Storm drain system - Enter owner's name:** _____
3. ☐ **Directly to waters of U.S. (e.g. , river, lake, creek, stream, bay, ocean, etc.)**

B. Name of receiving water: (river, lake, creek, stream, bay, ocean): _____

VIII. IMPLEMENTATION OF NPDES PERMIT REQUIREMENTS

A. STORM WATER POLLUTION PREVENTION PLAN (SWPPP) (check one)

☐ A SWPPP has been prepared for this facility and is available for review: Date Prepared: ____/____/____ Date Amended: ____/____/____

☐ A SWPPP will be prepared and ready for review by (enter date): ____/____/____

☐ A tentative schedule has been included in the SWPPP for activities such as grading, street construction, home construction, etc.

B. MONITORING PROGRAM

☐ A monitoring and maintenance schedule has been developed that includes inspection of the construction BMPs before anticipated storm events and after actual storm events and is available for review.

If checked above: A qualified person has been assigned responsibility for pre-storm and post-storm BMP inspections to identify effectiveness and necessary repairs or design changes..... ☐ YES ☐ NO

Name: _____ Phone: _____

C. PERMIT COMPLIANCE RESPONSIBILITY

A qualified person has been assigned responsibility to ensure full compliance with the Permit, and to implement all elements of the Storm Water Pollution Prevention Plan including:

1. Preparing an annual compliance evaluation..... ☐ YES ☐ NO

Name: _____ Phone: _____

2. Eliminating all unauthorized discharges..... ☐ YES ☐ NO

IX. VICINITY MAP AND FEE (must show site location in relation to nearest named streets, intersections, etc.)

Have you included a vicinity map with this submittal? ..... ☐ YES ☐ NO

Have you included payment of the annual fee with this submittal?..... ☐ YES ☐ NO

X. CERTIFICATIONS

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment. In addition, I certify that I have read the entire General Permit, including all attachments, and agree to comply with and be bound by all of the provisions, requirements, and prohibitions of the permit, including the development and implementation of a Storm Water Pollution Prevention Plan and a Monitoring Program Plan will be complied with."

Printed Name: _____

Signature: _____ **Date:** _____

Title: _____

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PRDs Filed
(Store Completed Forms in Appendix XII)

PRDs were filed:

Copy of Submittal:

The following documents, except the Annual Fee which was mailed, were submitted electronically to the SWRCB:

- Notice of Intent (NOI) – Enclosed
- Risk Assessment – Enclosed
- Site Map – Enclosed
- Storm Water Pollution Prevention Plan – Enclosed
- Annual Fee – Enclosed
- Signed Certification Statement – Enclosed

ORIGINAL - MAKE COPIES

ANNUAL REPORTING FORM
(Store Completed Forms in Appendix XVII)

Project Name _____

WDID Number _____

- Electronically submit no later than September 1 of each year
- Keep a copy in Appendix XVII of the SWPPP. Retain an electronic or paper copy for a minimum of three years after the date that the Annual Report is filed; after three years, retain in accordance with the company's record retention policy.

This Annual Reporting Form is for the period of _____ to _____ and includes the following documents:

Training Information:
(See Appendix XV)

1. Documentation of all training for individuals responsible for all activities associated with compliance with this Construction General Permit (CGP);
2. Documentation of all training for individuals responsible for BMP installation, inspection, maintenance, and repair; and
3. Documentation of all training for individuals responsible for overseeing, revising, and amending the SWPPP.

Storm Water Monitoring Information:
(See Appendix XI)

1. A summary and evaluation of all sampling and analysis results, including original laboratory reports;
2. The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit");
3. A summary of all corrective actions taken during the compliance year;
4. Identification of any compliance activities or corrective actions that were not implemented;
5. A summary of all violations of the Construction General Permit (CGP);
6. The names of individual(s) who performed the facility inspections, sampling, visual observation (inspections), and/or measurements;
7. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge); and
8. The visual observation and sample collection exception records and reports specified in Attachments C, D, and E of the CGP.

Refer to Section XVI of the CGP for additional information specific to the Annual Reporting Requirements.

State Water Resources Control Board

Division of Water Quality

1001 I Street • Sacramento, California 95814 • (916) 341-5537
Mailing Address: P.O. Box 1977 • Sacramento, California • 95812-1977
FAX (916) 341-5543 • Internet Address: http://www.waterboards.ca.gov/stormwtr/index.html

Linda S. Adams
Secretary for
Environmental Protection

Arnold Schwarzenegger
Governor

To: Storm Water Permit Holder

RE: NOTICE OF TERMINATION OF COVERAGE UNDER THE GENERAL **CONSTRUCTION** STORM WATER PERMIT (GENERAL PERMIT)

In order for us to terminate your coverage under the General Permit, please complete and submit the enclosed Notice of Termination (NOT) your local Regional Water Quality Control Board (RWQCB). Refer to the last page of the NOT packet for RWQCB locations.

Submittal of a NOT does not guarantee termination and outstanding invoices are still valid. If your NOT is denied, you will be required to continue complying with the requirements of the General Permit and all outstanding invoice(s) are due. You will be notified of your NOT status by the RWQCB or State Water Resources Control Board. Approval of your Notice of Termination does not relieve you from paying any applicable outstanding invoices.

Should you have any questions regarding this matter, please contact your local RWQCB at the number listed on the back page of the NOT package, or the Storm Water Unit at (916) 341-5537.

Sincerely,

Storm Water Unit
Division of Water Quality

Enclosure

SEND TO YOUR LOCAL RWQCB FOR APPROVAL

State of California
State Water Resources Control Board

NOTICE OF TERMINATION

OF COVERAGE UNDER THE NPDES GENERAL PERMIT NO. CAS000002
FOR DISCHARGES OF STORM WATER
ASSOCIATED WITH CONSTRUCTION ACTIVITY

Submission of this Notice of Termination constitutes notice that the owner (and his/her agent) of the site identified on this form is no longer authorized to discharge storm water associated with construction activity by NPDES General Permit No. CAS000002.

I. WDID NO.

II. OWNER

COMPANY NAME CONTACT PERSON

STREET ADDRESS TITLE

CITY STATE ZIP PHONE

III. CONSTRUCTION SITE INFORMATION

A. DEVELOPER NAME CONTACT PERSON

STREET ADDRESS TITLE

CITY CA ZIP PHONE

B. SITE ADDRESS COUNTY

CITY CA ZIP PHONE

IV. BASIS OF TERMINATION

_____ 1. The construction project is complete and the following conditions have been met.

- All elements of the Storm Water Pollution Prevention Plan have been completed.
- Construction materials and waste have been disposed of properly.
- The site is in compliance with all local storm water management requirements.
- A post-construction storm water operation and management plan is in place.

Date of project completion _____/_____/_____

_____ 2. Construction activities have been suspended, either temporarily _____ or indefinitely _____ and the following conditions have been met.

- All elements of the Storm Water Pollution Prevention Plan have been completed.
- Construction materials and waste have been disposed of properly.
- All denuded areas and other areas of potential erosion are stabilized.
- An operation and maintenance plan for erosion and sediment control is in place.
- The site is in compliance with all local storm water management requirements.

SEND TO YOUR LOCAL RWQCB FOR APPROVAL

Date of suspension _____/_____/_____ Expected start up date _____/_____/_____

_____ 3. Site can not discharge storm water to waters of the United States (check one).

_____ All storm water is retained on site.

_____ All storm water is discharged to evaporation or percolation ponds offsite.

_____ 4. Discharge of storm water from the site is now subject to another NPDES general permit or an individual NPDES permit.

NPDES Permit No._____ Date coverage began _____/_____/_____

_____ 5. There is a new owner of the identified site. Date of owner transfer _____/_____/_____

Was the new owner notified of the General Permit requirements? YES ____ NO ____

NEW OWNER INFORMATION

COMPANY NAME CONTACT PERSON

STREET ADDRESS TITLE

CITY STATE ZIP PHONE

V. EXPLANATION OF BASIS OF TERMINATION (Attach site photographs - see instructions).

VI. CERTIFICATION:

I certify under penalty of law that all storm water discharges associated with construction activity from the identified site that are authorized by NPDES General Permit No. CAS000002 have been eliminated or that I am no longer the owner of the site. I understand that by submitting this Notice of Termination, I am no longer authorized to discharge storm water associated with construction activity under the general permit, and that discharging pollutants in storm water associated with construction activity to waters of the United States is unlawful under the Clean Water Act where the discharge is not authorized by a NPDES permit. I also understand that the submittal of this Notice of Termination does not release an owner from liability for any violations of the general permit or the Clean Water Act.

PRINTED NAME TITLE

SIGNATURE: DATE _____/_____/_____

REGIONAL WATER BOARD USE ONLY

This Notice of Termination has been reviewed, and I recommend termination of coverage under the subject NPDES general permit.

Printed Name _____ Region No. _____

Signature _____ Date _____/_____/_____

NOT effective date:

Date: ____/____/____

State of California
State Water Resources Control Board

INSTRUCTIONS FOR COMPLETING NOTICE OF TERMINATION FOR CONSTRUCTION ACTIVITY

Who May File

Dischargers who are presently covered under NPDES General Permit No. CAS000002 for discharge of storm water associated with construction activity may submit a Notice of Termination when they meet one of the following criteria.

1. The construction project has been completed and the following conditions have been met: all elements of the Stormwater Pollution Prevention Plan have been completed; construction materials and equipment maintenance waste have been disposed of properly; the site is in compliance with all local storm water management requirements including erosion/sediment control requirements and the appropriate use permits have been obtained; and a post-construction storm water operation and management plan is in place.

2. Construction activities have been suspended, either temporarily or indefinitely and the following conditions have been: all elements of the Stormwater Pollution Prevention Plan have been completed; construction materials and equipment maintenance waste have been disposed of properly; all denuded areas and other areas of potential erosion are stabilized; an operation and maintenance plan for erosion and sediment control is in place; and the site is in compliance with all local storm water management requirements including erosion/sediment control requirements.
   The date construction activities were suspended, and the expected date construction activities will start up again should be provided.

3. Construction site can not discharge storm water to waters of the United States. Please indicate if all storm water is retained on site or if storm water is collected offsite.

4. Discharge of construction storm water from the site is now subject to another NPDES general permit or an individual NPDES permit. The general permit or individual permit NPDES number and date coverage began should be provided.

5. There is a new owner of the identified site. If ownership or operation of the facility has been transferred then the previous owner must submit a Notice of Termination and the new owner must submit a Notice of Intent for coverage under the general permit. The date of transfer and information on the new owner should be provided. Note that the previous owner may be liable for discharge from the site until the new owner files a Notice of Intent for coverage under the general permit.

Where to File

Submit the Notice of Termination to the Executive Officer of the Regional Water Quality Control Board responsible for the area in which the facility is located. See attached. Submittal of a NOT does not guarantee termination and outstanding invoices are still valid. If the Executive Officer, or his designated staff, agrees with the basis of termination, the Notice of Termination will be transmitted to the State Water Board for processing at which time it will be determined if any outstanding invoices are still valid. Approval of your Notice of Termination does not relieve you from paying any applicable outstanding invoices. If the Executive Officer, or his designated staff, does not agree with the basis of termination, the Notice of Termination will be returned. The Regional Water Board may also inspect your site prior to accepting the basis of termination.

LINE-BY-LINE INSTRUCTIONS

All necessary information must be provided on the form. Type or print in the appropriate areas only. Submit additional information, if necessary, on a separate sheet of paper.

SECTION I--WDID NO.

The WDID No. is a number assigned to each discharger covered under the General Permit. If you do not know your WDID No., please call the State Water Board or Regional Water Board and request it prior to submittal of the Notice of Termination.

SECTION II--OWNER

Enter the owner of the construction site's official or legal name (This should correspond with the name on the Notice of Intent submitted for the site), address of the owner, contact person, and contact person's title and telephone number.

SECTION III--CONSTRUCTION SITE INFORMATION

In Part A, enter the name of the developer (or general contractor), address, contact person, and contact person's title and telephone number. The contact person should be the construction site manager completely familiar with the construction site and charged with compliance and oversight of the general permit. This information should correspond with information on the Notice of Intent submitted for the site.

In Part B, enter the address, county, and telephone number (if any) of the construction site. Construction sites that do not have a street address must attach a legal description of the site.

SECTION IV--BASIS OF TERMINATION

Check the category which best defines the basis of your termination request. See the discussion of the criteria in the Who May File section of these instructions. Provide dates and other information requested. Use the space under Explanation of Basis of Termination heading.

SECTION V--EXPLANATION OF BASIS OF TERMINATION

Please explain the basis or reasons why you believe your construction site is not required to comply with the General Permit. To support your explanation, provide a site map and photograph of your site.

SECTION VI--CERTIFICATION

This section must be completed by the owner of the site.

The Notice of Termination must be signed by:

For a Corporation: a responsible corporate officer

For a Partnership or Sole Proprietorship: a general partner or the proprietor, respectively.

For a Municipality, State, or other Non-Federal Public Agency: either a principal executive officer or ranking elected official.

For a Federal Agency: either the chief or senior executive officer of the agency.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARDS

NORTH COAST REGION (1)
5550 Skylane Blvd, Ste. A
Santa Rose, CA 95403
(707) 576-2220 FAX: (707)523-0135
http://www.waterboards.ca.gov/northcoast/

SAN FRANCISCO BAY REGION (2)
1515 Clay Street, Ste. 1400
Oakland, CA 94612
(510) 622-2300 FAX: (510) 622-2640
http://www.waterboards.ca.gov/sanfranciscobay/

CENTRAL COAST REGION (3)
895 Aerovista Place, Ste 101
San Luis Obispo, CA 93401
(805) 549-3147 FAX: (805) 543-0397
http://www.waterboards.ca.gov/centralcoast/

LOS ANGELES REGION (4)
320 W. 4th Street, Ste. 200
Los Angeles, CA 90013
(213) 576-6600 FAX: (213) 576-6640
http://www.waterboards.ca.gov/losangeles/

CENTRAL VALLEY REGION (5S)
11020 Sun Center Dr., #200
Rancho Cordova, CA 95670-6114
(916) 464-3291 FAX: (916) 464-4645
http://www.waterboards.ca.gov/centralvalley/

FRESNO BRANCH OFFICE (5F)
1685 E St.
Fresno, CA 93706
(559) 445-5116 FAX: (559) 445-5910
http://www.waterboards.ca.gov/centralvalley/

REDDING BRANCH OFFICE (5R)
415 Knollcrest Drive, Ste. 100
Redding, CA 96002
(530) 224-4845 FAX: (530) 224-4857
http://www.waterboards.ca.gov/centralvalley/

LAHONTAN REGION (6 SLT)
2501 Lake Tahoe Blvd.
South Lake Tahoe, CA 96150
(530) 542-5400 FAX: (530) 544-2271
http://www.waterboards.ca.gov/lahontan/

VICTORVILLE OFFICE (6V)
14440 Civic Drive, Ste. 200
Victorville, CA 92392-2383
(760) 241-6583 FAX: (760) 241-7308
http://www.waterboards.ca.gov/lahontan/

COLORADO RIVER BASIN REGION (7)
73-720 Fred Waring Dr., Ste. 100
Palm Desert, CA 92260
(760) 346-7491 FAX: (760) 341-6820
http://www.waterboards.ca.gov/coloradoriver/

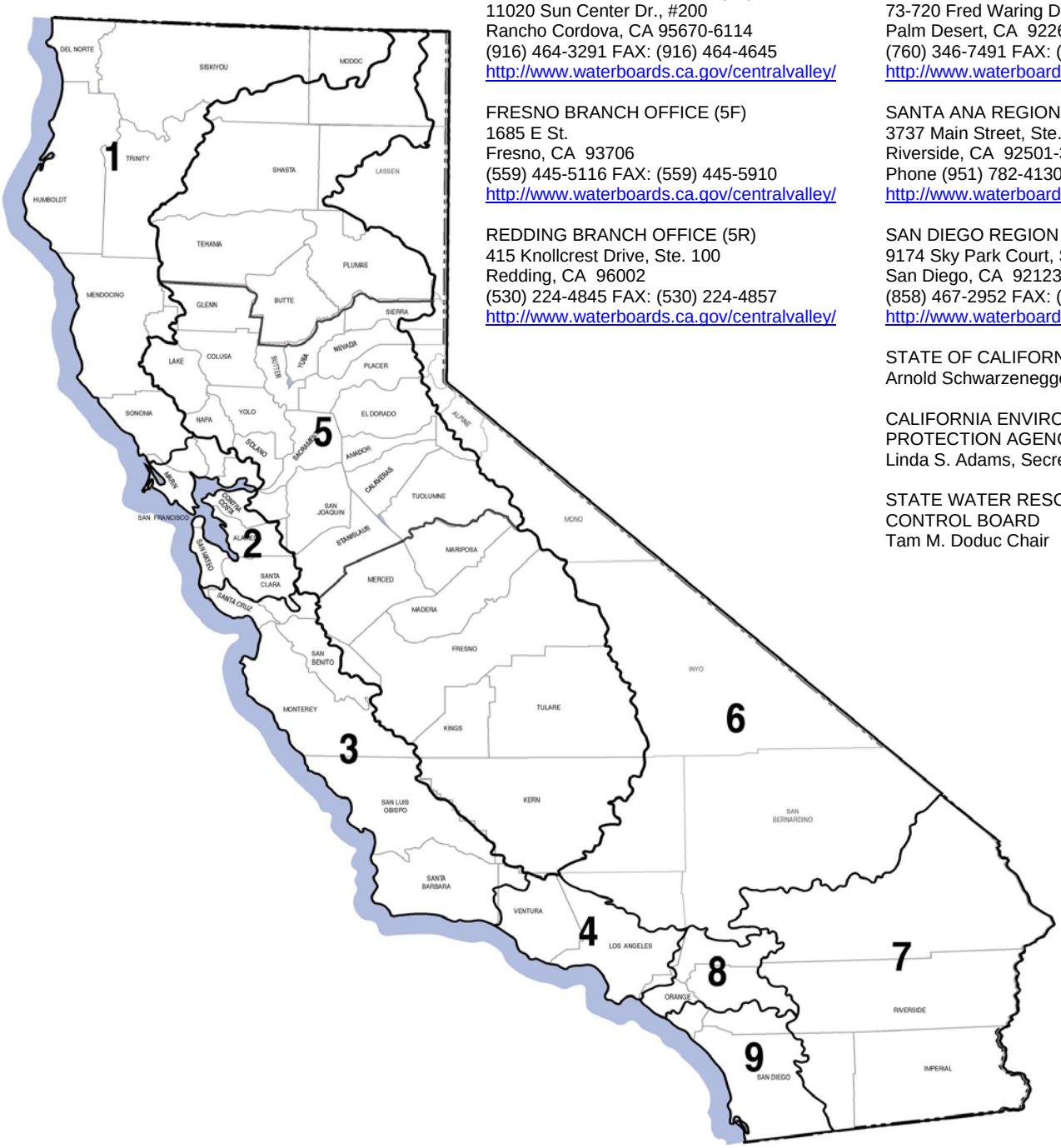
SANTA ANA REGION (8)
3737 Main Street, Ste. 500
Riverside, CA 92501-3339
Phone (951) 782-4130 FAX: (951) 781-6288
http://www.waterboards.ca.gov/santaana/

SAN DIEGO REGION (9)
9174 Sky Park Court, Ste. 100
San Diego, CA 92123-4340
(858) 467-2952 FAX: (858) 571-6972
http://www.waterboards.ca.gov/sandiego/

STATE OF CALIFORNIA
Arnold Schwarzenegger, Governor

CALIFORNIA ENVIRONMENTAL
PROTECTION AGENCY
Linda S. Adams, Secretary

STATE WATER RESOURCES
CONTROL BOARD
Tam M. Doduc Chair



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SWPPP Amendment Log
(Store Completed Forms in Appendix XVI)

DATE:	BY:	DESCRIPTION:

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CERTIFICATION FORM
(Store Completed Forms in Appendix XII)

Project Name _____

WDID Number _____

This certification is for (check appropriate box):

The QSD will complete this box and, once signed by the approved signatory, insert the signed certification form in the appropriate Appendix.

- ☐ Amendment to SWPPP (Appendix XVI)
- ☐ PRDs (Appendix XII)
- ☐ NOT (Appendix XII)
- ☐ Annual Report (Appendix XVII)
- ☐ Other _____

Any person signing documents under Section IV.I of the CGP shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Name of LRP *	Title
Company	Telephone Number
Signature	Date

*or approved signatory.

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NOTIFICATION OF ANTICIPATED NON-COMPLIANCE (Store Completed Forms in Appendix XVII)

This form will be used to report instances of anticipated non-compliance. The LRP must provide advanced notice to the local Regional Water Quality Control Board and local Storm Water Management Agency (see Appendix XIII for the relevant contact information).

Project Name _____

WDID Number _____

in accordance/compliance with the **State Water Resources Control Board** (SWRCB) Order No. 2009-0009-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002 Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities, the following discharge is anticipated:

Nature of planned change in construction activity that may result in non-compliance with CGP requirements:

Date, time, and location of anticipated discharge:

Name of LRP *	Title
Company	Telephone Number
Signature	Date

**or approved signatory.*

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SWPPP Training and Qualifications Log
(Store Completed Form in Appendix XV)

Project Name _____

WDID Number _____

Training Location: _____

Trainer(s): _____ **Date:** _____

TRAINING TOPICS COVERED

- ☐ Review and Discussion of SWPPP
- ☐ General BMPs for Site and Materials Management
- ☐ BMPs for Erosion and Sediment Control
- ☐ Spill or Release Response
- ☐ Proper Selection of BMPs
- ☐ Proper BMP Implementation/Maintenance Techniques
- ☐ Review and Discussion of SWPPP Inspection Requirements
- ☐ Review and Discussion of Sampling Requirements
- ☐ Sampling and Monitoring
- ☐ Record Keeping
- ☐ Other: _____

NAME	AREA OF RESPONSIBILITY	COMPANY NAME	PHONE NUMBER

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NAME	AREA OF RESPONSIBILITY	COMPANY NAME	PHONE NUMBER

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Qualified SWPPP Developer (QSD) Qualifications

The Qualified SWPPP Developer (QSD) holds the following registration(s) and/or certification(s):
(Check all that apply and include a copy of the registration(s) and/or certification(s)):

- ☐ A California registered professional civil engineer;
- ☐ A California registered professional geologist or engineering geologist;
- ☐ A California registered landscape architect;
- ☐ A professional hydrologist registered through the American Institute of Hydrology;
- ☐ A Certified Professional in Erosion and Sediment Control (SPESC)™ registered through Enviro Cert, International, Inc.;
- ☐ A Certified Professional in Storm Water Quality (CPSWQ) ™ registered through Enviro Cert, International, Inc.; or
- ☐ A professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies (NICET).

-- AND --

The QSD attended formal State Water Board sponsored or approved QSD training course on the following date *:

Date: _____

Name of Course: _____

Presented by: _____

A copy of the certification of attendance is attached.

* A requirement as of September 2, 2011

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Qualified SWPPP Practitioner (QSP) Qualifications

The Qualified SWPPP Practitioner (QSP)* holds the following registration(s) and/or certification(s):
Check all that apply and include a copy of the registration(s) and/or certification(s):

- ☐ Qualified SWPPP Developer (QSD)
- ☐ A certified erosion, sediment and storm water inspector registered through Enviro Cert, International, Inc.; or
- ☐ A certified inspector of sediment and erosion control registered through Certified Inspector of Sediment and Erosion Control, Inc.

* A requirement as of September 2, 2011, the QSP shall be either a QSD or have one of the above certifications:

-- AND --

The QSP attended formal State Water Board sponsored or approved QSP training course on the following date **:

Date: _____

Name of Course: _____

Presented by: _____

A copy of the certification of attendance is attached.

** A requirement as of September 2, 2011

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Visual Observation (Inspection) Form for Non-Storm Water Discharges
(Store the Completed Form in Appendix XI)

Inspect each drainage area for the presence of (or indications of prior) unauthorized and authorize non-storm water discharges and their sources

Project Name _____

WDID Number: _____

Date and Time of Inspection _____

Current Weather Conditions _____

Name of Inspector _____

Inspector's Company/Title _____

QSP's Signature _____

Visual observation serves as the quarterly inspection for the following quarter (check which is applicable):

☐ January – March ☐ April - June ☐ July – September ☐ October – December

A visual observation (inspection) must document the presence or evidence of any non-storm water discharge (authorized or unauthorized).

Were any of these discharges observed at the time of the inspection

☐YES ☐ NO

If yes, describe the discharge, their source and response taken to eliminate unauthorized non-sw discharges and to reduce or prevent pollutants from contacting non-sw discharges

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Non-Storm Pollutant Water Characteristics	
Characteristic	**Observation (Circle one)**
Discolorations	Clear Brown Gray Yellow Red Other_____
Turbidity	Clear Cloudy Opaque
Floating or Suspended Materials?	None Vegetation Mulch Trash Foam Other_____
Sheen	None Slight Heavy
Any observed pollutants?	None Sewage Other_____
Possible sources?	

Were samples collected?

☐ YES* ☐ NO Reason: _____

If yes, refer to Appendix X for sampling information.

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Visual Observation (Inspection) Form for a Qualifying Rain Event (Store Complete Forms in Appendix XI)

Project Name

WDID Number:

Date and Time of Inspection

Current Weather Conditions

Name of Inspector

Inspector's Company/Title

QSP's Signature

Inspection Type ☐ 48 hours prior to qualifying rain event ☐ Post-Rain (within 48 hours after a qualifying rain event)

☐ Stored or contained storm water being discharged that is derived from and discharged subsequent to a qualifying rain event producing ½ inch or more at the time of discharge ☐ Other:

Storm Event Date:

Site Rain Gauge Reading at Time of Inspection:

NOAA Rain Gauge Reading at Time of Inspection:

NOAA Rain Gauge ID:

Inspection Observations

Are there any spills, leaks, or uncontrolled pollutant sources?
* If yes, describe below

☐ Yes* ☐ No

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Are BMPs properly implemented in accordance with the SWPPP/REAP? ☐Yes* ☐No If yes, describe implemented corrective actions below
[ ]
[ ]
[ ]
[ ]

Do any storm water storage and containment areas have leaks? ☐Yes* ☐No If yes, describe below

Are BMPs were adequately designed, implemented, and effective? ☐Yes* ☐No
[ ]
[ ]
[ ]
[ ]

Inspect all discharge locations. If any of the characteristics are observed, describe the conditions and discharge location(s) below.

Storm Water Characteristics	
Characteristic	Observation (Circle applicable response)
Discolorations	None Brown Gray Yellow Red Other_____
Turbidity	Cloudy Opaque
Floating or Suspended Materials?	None Vegetation Mulch Trash Foam Other_____
Sheen	None Slight Heavy
Any observed pollutants? Possible sources?	None Sewage Other_____

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Description of observations and location:

Is there a need for any additional BMPs? If so, describe below and inform the QSD that the SWPPP needs to be revised.

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Inspection Form (Store Completed Form in Appendix IX)

Project Name	
WDID Number	
Date of Inspection	
Date Inspection Report was Written	
Name of QSP*	
Inspector's Company/Title	
Inspector's Signature	
Inspection Type	☐ Weekly ☐ 24 Hour Interval During Extended Storm Events Date storm began: Duration of Storm : Rainfall Amount (inches): Precipitation: ☐ Present ☐ Absent Time elapsed since last storm (hours or days) _____

*Or individual conducting the inspection that has been trained by the QSP (herein referred to as Inspector).

Is the site safely accessible during inclement weather?

☐ YES ☐ NO

If yes, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls.

If no, list why not safely accessible.

List the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

A site map is attached that supplements this inspection form

☐ YES ☐ NO

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BMP No.	BMP Options (Additional BMPs shall be implemented as necessary to protect water quality as determined by field conditions)	Selected BMPs
BMP-1-02	Silt Fence	☐
BMP-1-03	Fiber Rolls	☐
BMP-1-04	Gravel Bag Berm	☐
BMP-1-05	Sand Bag Barrier	☐
BMP-1-06	Storm Drain Inlet Protection	☐
BMP-1-07	Tracking Controls	☐
BMP-1-08	Stockpile Management	☐
BMP-2-01	Material Delivery and Storage	☐
BMP-2-02	Material Use	☐
BMP-2-03	Spill Control	☐
BMP-2-04	Solid Waste Management	☐
BMP-2-05	Hazardous Materials/Waste Management	☐
BMP-2-06	Contaminated Soil Management	☐
BMP-2-07	Sanitary/Septic Waste Management	☐
BMP-2-08	Liquid Waste Management	☐
BMP-3-01	Dewatering Operations	☐
BMP-3-02	Paving Operations	☐
BMP-3-03	Vehicle and Equipment Washing	☐
BMP-3-04	Vehicle and Equipment Fueling	☐
BMP-3-05	Concrete/Coring/Saw Cutting and Drilling Waste Management	☐
BMP-3-06	Dewatering Utility Substructures and Vaults	☐
BMP-3-07	Vegetation Management including Mechanical and Chemical Weed Control	☐
BMP-3-08	Over-Water Protection	☐
BMP-3-09	Removal of Utility Location/Mark-Out Paint	☐
BMP-4-01	Preservation of Existing Vegetation	☐
BMP-4-02	Temporary Soil Stabilization	☐
BMP-4-03	Hydraulic Mulch	☐
BMP-4-04	Hydroseeding	☐
BMP-4-05	Soil Binders	☐
BMP-4-06	Straw Mulch	☐
BMP-4-07	Geotextiles, Plastic Covers and Erosion Control Blankets/Mats	☐
BMP-4-08	Dust (Wind Erosion) Control	☐
CASQA EC-10	Velocity Dissipation Devices	☐
CASQA EC-12	Streambank Stabilization	☐
CASQA NS-4	Temporary Stream Crossing	☐
CASQA NS-5	Clear Water Diversion	☐

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Site Information		
Current stage of construction (check which applies)	☐ Grading and Land Development Phase ☐ Streets and Utilities Phase ☐ Inactive Construction	☐ Final Landscaping and Site Stabilization ☐ Vertical Construction Phase
Activities completed:		
Approximate area of the site exposed (in acres):		

Review and update (as applicable) the QSP Implementation Checklist in Appendix VIII. Based on a review of this checklist and an evaluation of BMPs on-site complete the following:

Inspected the site for good site management (i.e., "housekeeping") measures implemented for Construction Materials		
Were any BMP deficiencies observed (i.e., BMPs requiring maintenance and repair)?	☐ Yes*	☐ No
*If yes, describe the deficiency:		

Describe any BMP Corrective Actions..	
Date	BMP Corrective Action Taken
Date	
Date	
Date	

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Inspected the site for good site management (i.e., "housekeeping") measures implemented for Waste Management:		
Were any BMP deficiencies observed (i.e., BMPs requiring maintenance and repair)?	☐Yes*	☐No
`*If yes, describe below:		
Describe any BMP Corrective Actions.		
Date	BMP Corrective Action Taken	
Date		
Date		
Date		

Inspected the site for good site management (i.e., "housekeeping") measures implemented for Vehicle Storage and Maintenance:		
Were any BMP deficiencies observed (i.e., BMPs requiring maintenance and repair)?	☐Yes*	☐No
*If yes, describe below:		
Date	BMP Corrective Action Taken	
Date		
Date		
Date		

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Inspected the site for good site management (i.e., "housekeeping") measures implemented for Landscape Materials:		
Were any BMP deficiencies observed (i.e., BMPs requiring maintenance and repair)? *If yes, describe below:	☐ Yes*	☐ No

Date	BMP Corrective Action Taken
Date	
Date	
Date	

Inspected the site for good site management (i.e., "housekeeping") measures implemented for Air Deposition:		
Were any BMP deficiencies observed (i.e., BMPs requiring maintenance and repair)? *If yes, describe below:	☐ Yes*	☐ No

Date	BMP Corrective Action Taken
Date	
Date	
Date	

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Inspected the site for good site management (i.e., "housekeeping") measures implemented for Non-Storm Water Discharges:		
Were any BMP deficiencies observed (i.e., BMPs requiring maintenance and repair)? *If yes, describe below:	☐Yes*	☐No

Date	BMP Corrective Action Taken
Date	
Date	
Date	

Inspected the site for good site management (i.e., "housekeeping") measures implemented for Erosion Control:	☐Yes	☐No
Were any BMP deficiencies observed (i.e., BMPs requiring maintenance and repair)? *If yes, describe below:	☐Yes*	☐No

Date	BMP Corrective Action Taken
Date	
Date	
Date	

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Inspected the site for good site management (i.e., "housekeeping") measures implemented for Sediment Control:	☐Yes	☐No
Were any BMP deficiencies observed (i.e., BMPs requiring maintenance and repair)? *If yes, describe below:	☐Yes*	☐No
Describe any BMP Corrective Actions.. ☐ ☐ ☐ ☐		

Inspected the site for good site management (i.e., "housekeeping") measures implemented for Run-on and Runoff Controls:	☐Yes	☐No
Were any BMP deficiencies observed (i.e., BMPs requiring maintenance and repair)? *If yes, describe below:	☐Yes*	☐No
Describe any BMP Corrective Actions. ☐ ☐ ☐ ☐		

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List any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates:

Report the presence of noticeable odors/visible sheen on the surface of any discharges immediately to _____ at _____ and document observations below:

Were photographs taken during the inspection? ☐ Yes ☐ No
If yes, attach to this site inspection.

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QSP IMPLEMENTATION CHECKLIST
(Store Completed Forms in Appendix VII)

The QSP completes this checklist prior to each phase of construction.

Phase of construction: _____

A. Good Site Management ("Housekeeping") Measures for Construction Materials:

Construction Materials Measures ID No.	Construction Materials Measures	BMP Option	Implemented?		Alternative BMP Option
			Y	N*	*Describe why BMP was not implemented
CM-b	Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).	BMP-2-01 BMP-2-02 BMP-2-03 BMP-2-04 BMP-2-05 BMP-2-06			
CM-c	Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).	BMP-2-01 BMP-2-02 BMP-2-03 BMP-2-04 BMP-2-05 BMP-2-06 BMP-2-07 BMP-2-08			
CM-d	Minimize exposure of construction materials with precipitation.	BMP 1-07			

[1] QSP to review List of Potential Pollutant Sources in Appendix V and complete an Inventory of Potential Pollutant Sources planned to be used or stored at the project site in Appendix V as well.

B. Good Site Management ("Housekeeping") Measures for Waste Management:

Construction Materials Measures ID No.	Construction Materials Measures	BMP Option	Implemented?		Alternative BMP Option
			Y	N*	*Describe why BMP was not implemented
WM-a	Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.	BMP 3-02 BMP 3-03 BMP 3-04 BMP 3-05 BMP 3-06 BMP 3-07 BMP 3-08 BMP 3-09			
WM-b	Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.	BMP 2-07			
WM-c	Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.	BMP 2-07			

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QSP IMPLEMENTATION CHECKLIST

B. Good Site Management ("Housekeeping") Measures for Waste Management:

		BMP Option			Alternative BMP Option
WM-d	Cover waste disposal containers at the end of every business day and during a rain event.	BMP 2-01 BMP 2-02 BMP 2-03 BMP 2-04 BMP 2-05 BMP 2-06 BMP 2-07 BMP 2-08			
WM-e	Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.	BMP 2-01 BMP 2-02 BMP 2-03 BMP 2-04 BMP 2-05 BMP 2-06 BMP 2-07 BMP 2-08			
WM-f	Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.	BMP 1-08			
WM-g	Implement procedures that effectively address hazardous and non-hazardous spills.	BMP 2-03			
WM-h	Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that: • Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and • Appropriate spill response personnel are assigned and trained.	BMP 2-03			
WM-i	Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.	BMP 2-04			

C. Good Site Management ("Housekeeping") Measures for Vehicle Storage and Maintenance:

Construction Materials Measures		BMP Option	Implemented?		Alternative BMP Option
			Y	N*	*Describe why BMP was not implemented
VSM-a	Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.	BMP 3-03 BMP 3-04 BMP 3-05			
VSM-b	Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.	BMP 2-03 BMP 2-02 BMP 3-03 BMP 3-04			

QSP IMPLEMENTATION CHECKLIST

C. Good Site Management ("Housekeeping") Measures for Vehicle Storage and Maintenance:

		BMP Option			Alternative BMP Option
VSM-c	Clean leaks immediately and disposing of leaked materials properly.	BMP 2-03			

D. Good Site Management ("Housekeeping") Measures for Landscape Materials:

Landscape Materials Measures		BMP Option			Alternative BMP Option
			Implemented?		*Describe why BMP was not implemented
			Y	N*	
LM-a	Contain stockpiled materials such as mulches and topsoil when they are not actively being used.	BMP 1-08 BMP 4-07 BMP 4-02			
LM-b	Contain fertilizers and other landscape materials when they are not actively being used.	BMP 1-08 BMP 2-01 BMP 2-02			
LM-c	Discontinuing the application of any erodible landscape material within 2 days before a forecasted rain event[2] or during periods of precipitation.	BMP 3-07 BMP 2-02			
LM-d	Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.	BMP 3-07 BMP 2-02			
LM-e	Stacking erodible landscape material on pallets and covering or storing such materials when not being used or applied.	BMP 3-07 BMP 2-01 BMP 2-02			

[2] Excerpt from CGP – 50% or greater chance of producing precipitation.

F. Good Site Management ("Housekeeping") Measures for Air Deposition:

Air Deposition		BMP Option			Alternative BMP Option
			Implemented?		*Describe why BMP was not implemented
			Y	N*	
AD-a	Control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.	BMP 4-08			

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QSP IMPLEMENTATION CHECKLIST

Non-Storm Water Management:		BMP Option	Implemented?		Alternative BMP Option
			Y	N*	*Describe why BMP was not implemented
NSWM-a	Implement measures to control all non-storm water discharges during construction.	BMP 3-03 BMP 3-02 BMP 1-07			
NSWM-b	Wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.	BMP 3-03			
NSWM-c	Clean streets in such a manner as to prevent non-storm water discharges from reaching surface water or MS4 drainage systems.	BMP 3-02 BMP 1-07			

[2] Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.

Erosion Control		BMP Option	Implemented?		Alternative BMP Option
			Y	N*	*Describe why BMP was not implemented
ECM-a	Effective wind erosion control	BMP 4-08			
ECM-b	Provide effective soil cover for inactive[3] areas and all finished slopes, open space, utility backfill, and completed lots.	BMP 4-02 BMP 4-03 BMP 4-04 BMP 4-05 BMP 4-06 BMP 4-07			
ECM-c	Limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.	BMP 4-07			

[3] Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.

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QSP IMPLEMENTATION CHECKLIST

Sediment Control: SC-c, SC-d, SC-e, SC-f, SC-g, SC-h are not applicable to Risk Level 1 projects. If the project is a Risk Level 1, delete SC-c, SC-d, SC-e, SC-f, SC-g, SC-h in the table below. SC-h also does not apply to Risk Level 2 projects; delete this BMP if the project is Risk Level 2.

Sediment Control		BMP Option			Alternative BMP Option
			Implemented?		
			Y	N*	*Describe why BMP was not implemented
SC-a	Establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.	BMP 1-01 BMP 1-02 BMP 1-03 BMP 1-04 BMP 1-05 BMP 1-06 BMP 1-07 BMP 1-08			
SC-b	On sites where sediment basins are to be used, at a minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook	N/A			
SC-c	Implement appropriate erosion control BMPs (runoff control and soil stabilization) in conjunction with sediment control BMPs for areas under active[4] construction.	BMP 4-02 BMP 4-03 BMP 4-04 BMP 4-05 BMP 4-06 BMP 4-07			
SC-d	Apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths[5] in accordance with Table 1.	BMP 1-02 BMP 1-03			

[4] Active areas of construction are areas undergoing land surface disturbance. This includes construction activity during the preliminary stage, mass grading stage, streets and utilities stage, and the vertical construction stage.

[5] Sheet flow length is the length that shallow, low velocity flow travels across a site.

SC-e	Ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment.	BMP 1-07			
SC-f	Ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire washoff locations) are maintained and protected from activities that reduce their effectiveness.	BMP 1-06			

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QSP IMPLEMENTATION CHECKLIST

		BMP Option			Alternative BMP Option
SC-g	Inspect on a daily basis all immediate access roads daily. At a minimum daily (when necessary) and prior to any rain event, the discharger shall remove any sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).	BMP 1-07			
SC-h	The Regional Water Board may require Risk Level 3 dischargers to implement additional site-specific sediment control requirements if the implementation of the other requirements in this section are not adequately protecting the receiving waters.	N/A			

Excerpt from the CGP Attachment D:
Excerpt from the CGP Attachment E:

Table 1 - Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Sheet flow length not to exceed
0-25%	20 feet
25-50%	15 feet
Over 50%	10 feet

Run-on and Run-off Controls		Applicable to Project?		Alternative BMP Option
		Y	N*	*Describe why BMP was not implemented
RRC-a	Effectively manage all run-on, all runoff within the site and all runoff that discharges off the site.			
RRC-b	Run-on from off-site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitation in the CGP.			

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SAMPLING EVENT WORKSHEET
(Store Completed Forms in Appendix XI.D)

Name of Inspector: _____

Storm Event Date(s): _____

Rain Gauge Readings: _____ Risk Level: _____

Samples collected:

☐ Qualifying Rain Event

Samples not collected:

☐ Non-Target Storm Event – Event was not preceded by 72 hours of dry weather

☐ Non-Target Storm Event – Event occurred outside of daylight hours

☐ False Alert – Predicted storm event never started or did not produce runoff

☐ Compliance Storm Event Exception

☐ Dangerous Conditions

☐ Outside Business Hours

Storm Start Time:		Storm End Time:	

Runoff Start Time:		Total Precipitation:	

Check All That Apply (complete form for each sampling location per day):

☐ Dischargers shall ensure that the grab samples collected of stored or contained storm water are from discharges subsequent to a qualifying rain event (producing precipitation of ½ inch or more with a 48 hour or greater period between rain events)

☐ Discharge run-off location

☐ Run-on location

☐ ATS discharge location

☐ Non-visible pollutant location

☐ 3 samples per day:

☐ Sample 1 ☐ Sample 2 ☐ Sample 3

Effluent Sampled for:

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- ☐ pH
- ☐ Turbidity
- ☐ Any additional parameters for which monitoring is required by the Regional Water Board:

_____

_____

_____

_____

Who collected the sample? Name, company, phone number? Rain gauge readings?

Name: _____

Company: _____

Phone Number _____

Who collected the sample? Name, company, phone number? Rain gauge readings?

Name: _____

Company: _____

Phone Number _____

Who collected the sample? Name, company, phone number? Rain gauge readings?

Name: _____

Company: _____

Phone Number _____

Who collected the sample? Name, company, phone number? Rain gauge readings?

Name: _____

Company: _____

Phone Number _____

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For Monitoring Location:

		Sampler Name	Time Sample Taken	Results	Daily Average	Was there an NAL Exceedance (Y[1] / N[2])	Was there an NEL Violation (Y/N)[3]
pH	1st Sample						
	2nd Sample						
	3rd Sample						
Turbidity	1st Sample						
	2nd Sample						
	3rd Sample						
SSC							

[1] Refer to Appendix X.7 for required action.
[2] No further action required.
[3] Refer to Appendix X.8 for required action.

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Numeric Effluent Limitation (NEL) Violation Report (Store Completed Form in Appendix XVII)

Project Name _____

WDID Number _____

Risk Level _____

Attach the following documents to this NEL Violation Report:

- Description of the current onsite BMPs and the proposed corrective actions taken to manage the NEL exceedance.
- A copy of the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (from Appendix X)
- A copy of the completed Visual Observation (Inspection) form for the sampling event (from Appendix X.B)

Date and Time of Sampling Event _____

Weather Conditions _____

Name of NEL Preparer _____

NEL Preparer's Company/Title _____

Sample Identification Number	Location	Parameter pH/Turbidity	Reporting Units	Result

Daily Average Value: _____ NEL Limitation: _____

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Describe the current BMPs associated with the effluent sample that exceeded the NEL:

Describe the proposed corrective actions taken to manage the effluent associated with the NEL exceedance:

Any person signing documents under Section IV.I of the CGP shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Name of LRP *	Title
Company	Telephone Number
Signature	Date

*or approved signatory.

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Numeric Action Level (NAL) Exceedance Report (Store Completed Forms in Appendix XVII)

Project Name _____

WDID Number _____

Risk Level _____

Attach the following documents to this NAL Exceedance Report:

- The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (Appendix X)
- The completed Visual Observation (Inspection) form and the sampling event worksheet (Appendix XI)

Date and Time of Sampling Event _____

Weather Conditions _____

Name of NAL Preparer _____

NAL Preparer's Company/Title _____

Sample Identification Number	Location	Parameter pH/Turbidity	Reporting Units	Result

Daily Average Value: _____ NAL Limitation: _____

Describe the current BMPs associated with the effluent sample that exceeded the NAL

Were any corrective actions taken? If yes, describe below:

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LEAKS AND SPILLS DOCUMENTATION
(Completed Form Stored in Appendix XIV)

Immediately report any leaks or spills to the LRP

Name _____

Phone Number _____

Date & Time of incident or
time of discovery of spill: _____

Material Spilled: ☐ Liquid ☐ Solid ☐ Gas

What is it used for? _____

Known dangerous quantities? _____

MDSD available ☐ YES * ☐ NO
If yes, consult the MSDS sheet for appropriate handling, storage and disposal practices

Chemical or Trade Name _____

Estimate Amount
☐ _____ *Gallons if liquid*
☐ _____ *Pounds if solid or gas*
☐ _____ *Leaked or Spilled*

Potential dangers (as appropriate) ☐ Fire ☐ Explosion ☐ Toxic Fumes & Fluids ☐ Threat to life or property

☐ Other (describe): _____

Cause and source of incident (e.g., human error, corrosion):

_____

_____

_____

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Secondary Containment and Spill Kit Inventory (Store Completed Form in Appendix XVIII)

To be completed by the QSP

- Equipment and materials for cleanup of spills shall be available on site and spills and leaks shall be cleaned up ***immediately*** and the materials used to clean up the spills shall be disposed of properly; and
- Ensure appropriate spill response personnel are assigned and trained.
- Ensure the containment of washout areas that may contain additional pollutants so that there is no discharge into the underlying soil and/or surrounding areas.

The following spill control equipment can be found on-site:

Quantity[1]	Description[2]	Location[3]	Absorbent Capacity (Gallons)[4]

1 – Number of spill kits or product
2 - Contents of spill kit or product
3 – Storage location of spill kit or product
4 – Absorbent capacity of the spill kit or product

Note: Spill response kits come from a variety of suppliers. Kit contents and absorbent capacity may vary from supplier's description.

The following secondary containment equipment can be found on-site:

Description of Material Stored in Secondary Containment[5]	Location[6]	Type of Containment/Enclosure[7]	Volume	
			Maximum Storage/ Containment[8]	Spill Potential[9]

5- For example, paint, oil, lubricant, solvent, etc.
6- Location of secondary containment
7- Description of the secondary containment enclosure. For example, poly-pack, poly-pallet, cabinet, visqueen-lined sump.
8- Capacity of the secondary device (usually identified on the device or can be obtained from the manufacturer)
9- Quantity of material (in gallons) stored in the secondary containment

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Inventory of Potential Pollutant Sources Planned to be Used or Stored at the Project Site (Store Completed Forms in Appendix V)

The QSP shall conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced at the site.

A list of possible products that are typically found at construction sites are listed in Appendix V.

Typical Materials Handled, Produced, Stored, Recycled, or Disposed of at the Site	Quantity (e.g., gal, lbs, oz)	Physical Characteristics (e.g., liquid, powder, solid)	Location of Each Material	Proximity to Storm Drain Inlet/Receiving Waters

Based on the table above, describe the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water (i.e., proximity to storm drain inlets or receiving waters).

Describe BMPs implemented to address these pollutant sources:

Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas

Based on the inventory and evaluation above, describe the anticipated pollutants for the project below and include these analytes in the CSMP in Appendix X of the SWPPP.

Appendix XIII
List of Responsible Parties

PROJECT: _____ **WDID NUMBER:** _____

☐ *LEGALLY RESPONSIBLE PARTIES (LRP)* ☐ *THE LRP's APPROVED SIGNATORY*			
AREA OF RESPONSIBILITY:	**Construction and Engineering Sunrise Powerlink Project**		
NAME		**TITLE:**	
COMPANY NAME:			
ADDRESS			
CITY		**STATE**	**ZIP**
TELEPHONE			
EMERGENCY TELEPHONE			
FAX			
E-MAIL			

QUALIFIED SWPPP DEVELOPER (QSD):RESPONSIBLE FOR PREPARING THE SWPPP:			
NAME		**TITLE:**	
COMPANY NAME:			
ADDRESS			
CITY		**STATE**	**ZIP**
TELEPHONE			
EMERGENCY TELEPHONE			
FAX			
E-MAIL			

ADDITIONAL QSD:			
AREA OF RESPONSIBILITY:			
NAME		**TITLE:**	
COMPANY NAME:			
ADDRESS			
CITY		**STATE**	**ZIP**
TELEPHONE			
EMERGENCY TELEPHONE			
FAX			
E-MAIL			
START DATE		**END DATE**	

QUALIFIED SWPPP PRACTITIONER (QSP):					
AREA OF RESPONSIBILITY:					
NAME		**TITLE:**			
COMPANY NAME:					
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

ADDITIONAL QSP:					
AREA OF RESPONSIBILITY:					
NAME		**TITLE:**			
COMPANY NAME:					
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

SPILL RESPONSE PERSONNEL					
NAME		**TITLE:**			
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

SPILL RESPONSE PERSONNEL					
NAME		**TITLE:**			
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

SPILL RESPONSE PERSONNEL					
NAME		**TITLE:**			
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

SPILL RESPONSE PERSONNEL					
NAME		**TITLE:**			
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

STORM WATER SAMPLING AGENT:					
CONTACT PERSON		**TITLE:**			
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

STORM WATER SAMPLING AGENT:					
CONTACT PERSON		**TITLE:**			
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

STORM WATER SAMPLING AGENT:					
CONTACT PERSON		**TITLE:**			
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

STORM WATER SAMPLING AGENT:					
CONTACT PERSON		**TITLE:**			
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

REGIONAL BOARD CONTACT INFORMATION		*RQWQB NAME:*	
CONTACT PERSON		**TITLE:**	
ADDRESS			
CITY		**STATE**	**ZIP**
TELEPHONE			
EMERGENCY TELEPHONE			
FAX			
E-MAIL			

LOCAL STORM WATER MANAGEMENT AGENCY		*AGENCY NAME:*	
CONTACT PERSON		**TITLE:**	
ADDRESS			
CITY		**STATE**	**ZIP**
TELEPHONE			
EMERGENCY TELEPHONE			
FAX			
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PLEASE CHECK APPROPRIATE BOX ABOVE. IF "OTHER", PLEASE INDICATE:

COMPANY NAME _____

CONTACT PERSON _____ **TITLE:** _____

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BMP SELECTION WORKSHEET
(Store Completed Forms in Appendix VII)

BMP No.	BMP Options (Additional BMPs shall be implemented as necessary to protect water quality as determined by field conditions)	Selected BMPs	Option 1	Option 2
Section 1 Sediment Controls				
BMP-1-02	Silt Fence	☐	*-*-*	-SF-
BMP-1-03	Fiber Rolls	☐	- - -	-FR-
BMP-1-04	Gravel Bag Berm	☐	○○○	~GBB~
BMP-1-05	Sand Bag Barrier	☐	●●●	-SBB-
BMP-1-06	Storm Drain Inlet Protection	☐	□	-SDIP-
BMP-1-07	Tracking Controls	☐	■	-TC-
BMP-1-08	Stockpile Management	☐	◊	-SM-
Other – User Defined	BMP Description	☐		
The following rows have been provided to add additional BMPs that may be required during the course of the project. QSD to provide this information as applicable.				
Other – User Defined	BMP Description:	☐		
Section 2 Waste Management and Material Controls				
BMP-2-01	Material Delivery and Storage	☐	»»»»	-MDS-
BMP-2-02	Material Use	☐	☼	-MV-
BMP-2-03	Spill Control	☐	⯃	-SC-
BMP-2-04	Solid Waste Management	☐	○-○-○	-SWM-
BMP-2-05	Hazardous Materials/Waste Management	☐	◺	-HM/WM-
BMP-2-06	Contaminated Soil Management	☐	◎	-CSM-

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BMP SELECTION WORKSHEET
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BMP No.	BMP Options (Additional BMPs shall be implemented as necessary to protect water quality as determined by field conditions)	Selected BMPs	Option 1	Option 2
BMP-2-07	Sanitary/Septic Waste Management	☐	▲	-S/SWM-
BMP-2-08	Liquid Waste Management	☐	△	-LWM-
The following rows have been provided to add additional BMPs that may be required during the course of the project. QSD to provide this information as applicable.				
Other – User Defined	BMP Description:	☐		
Section 3 Non-Storm Water Discharge Controls				
BMP-3-01	Dewatering Operations	☐	☆	-DW-
BMP-3-02	Paving Operations	☐	●-●-●	-PO-
BMP-3-03	Vehicle and Equipment Washing	☐	⬠	-VEW-
BMP-3-04	Vehicle and Equipment Fueling	☐	⏢	-VEF-
BMP-3-05	Concrete/Coring/Saw Cutting and Drilling Waste Management	☐	⊗	-CWM-
BMP-3-06	Dewatering Utility Substructures and Vaults	☐	▶	-DUS&V-
BMP-3-07	Vegetation Management including Mechanical and Chemical Weed Control	☐	⟺	-VM-
BMP-3-08	Over-Water Protection	☐	▭	-OWP-
BMP-3-09	Removal of Utility Location/Mark-Out Paint	☐	⊜	-UL-
The following rows have been provided to add additional BMPs that may be required during the course of the project. QSD to provide this information as applicable.				
Other – User Defined	BMP Description:	☐		

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BMP SELECTION WORKSHEET
(Store Completed Forms in Appendix VII)

BMP No.	BMP Options (Additional BMPs shall be implemented as necessary to protect water quality as determined by field conditions)	Selected BMPs	Option 1	Option 2
Section 4 Erosion Control and Soil Stabilization				
BMP-4-01	Preservation of Existing Vegetation	☐	▼	-PEV-
BMP-4-02	Temporary Soil Stabilization	☐	■-■-■	-TSS-
BMP-4-03	Hydraulic Mulch	☐	≈≈≈≈	-M-
BMP-4-04	Hydroseeding	☐	>>>>	-BP-
BMP-4-05	Soil Binders	☐	¬¬¬¬	-SOS-
BMP-4-06	Straw Mulch	☐	««««	-S-
BMP-4-07	Geotextiles, Plastic Covers and Erosion Control Blankets/Mats	☐	¤¤¤¤	-ECB-
BMP-4-08	Dust (Wind Erosion) Control	☐	....	-WE-
The following rows have been provided to add additional BMPs that may be required during the course of the project. QSD to provide this information as applicable.				
Other – User Defined	BMP Description:	☐		

ORIGINAL - MAKE COPIES

BMP SELECTION WORKSHEET
(Store Completed Forms in Appendix VII)

BMP No.	BMP Options (Additional BMPs shall be implemented as necessary to protect water quality as determined by field conditions)	Selected BMPs	Option 1	Option 2
Section 5 Streambed Discharges and Crossings				
CASQA EC-10	Velocity Dissipation Devices	☐	≡≡≡≡	-VDD-
CASQA EC-12	Streambank Stabilization	☐	~~~~	-SBS-
CASQA NS-4	Temporary Stream Crossing	☐	<<<<	-TSC-
CASQA NS-5	Clear Water Diversion	☐	+++++	-CWD-
The following rows have been provided to add additional BMPs that may be required during the course of the project. QSD to provide this information as applicable.				
Other – User Defined	BMP Description:	☐		

Appendix II
Construction General Permit

Linda S. Adams
Secretary for
Environmental Protection

State Water Resources Control Board

Arnold Schwarzenegger
Governor

Division of Water Quality
1001 I Street • Sacramento, California 95814 • (916) 341-5455
Mailing Address: P.O. Box 100 • Sacramento, California • 95812-0100
Fax (916) 341-5463 • http://www.waterboards.ca.gov

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR
STORM WATER DISCHARGES
ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE
ACTIVITIES

ORDER NO. 2009-0009-DWQ
NPDES NO**. CAS000002**

This Order was adopted by the State Water Resources Control Board on:	**September 2, 2009**
This Order shall become effective on:	**July 1, 2010**
This Order shall expire on:	**September 2, 2014**

IT IS HEREBY ORDERED, that this Order supersedes Order No. 99-08-DWQ except for enforcement purposes. The Discharger shall comply with the requirements in this Order to meet the provisions contained in Division 7 of the California Water Code (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on September 2, 2009.

AYE: Vice Chair Frances Spivy-Weber
Board Member Arthur G. Baggett, Jr.
Board Member Tam M. Doduc

NAY: Chairman Charles R. Hoppin

ABSENT: None

ABSTAIN: None

Jeanine Townsend
Clerk to the Board

List of Documents included in this single file saved in pdf format on September 22, 2009:

- Fact Sheet
- Order
- Attachment A – Linear Underground/Overhead Requirements
- Attachment A.1 – LUP Project Type Determination
- Attachment A.2 – LUP Permit Registration Documents
- Attachment B – Permit Registration Documents
- Attachment C – Risk Level 1 Requirements
- Attachment D – Risk Level 2 Requirements
- Attachment E – Risk Level 3 Requirements
- Attachment F – Active Treatment System Requirements
- Appendix 1 – Risk Determination Worksheet and Sediment-related 303d List
- Appendix 2 – Post-Construction Water Balance
- Appendix 2.1 – Post-Construction Water Balance Calculator
- Appendix 3 - Bioassessment Monitoring Guidelines
- Appendix 4 – Adopted/Implemented Sediment and Non-sediment TMDLs
- Appendix 5 – Glossary
- Appendix 6 - Acronym List
- Appendix 7 – State and Regional Water Board Contacts

Linda S. Adams
Secretary for
Environmental Protection

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Arnold Schwarzenegger
Governor

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I. BACKGROUND

A. History

In 1972, the Federal Water Pollution Control Act (also referred to as the Clean Water Act [CWA]) was amended to provide that the discharge of pollutants to waters of the United States from any point source is unlawful unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. The 1987 amendments to the CWA added Section 402(p), which establishes a framework for regulating municipal and industrial storm water discharges under the NPDES Program. On November 16, 1990, the U.S. Environmental Protection Agency (USEPA) published final regulations that established storm water permit application requirements for specified categories of industries. The regulations provide that discharges of storm water to waters of the United States from construction projects that encompass five or more acres of soil disturbance are effectively prohibited unless the discharge is in compliance with an NPDES Permit. Regulations (Phase II Rule) that became final on December 8, 1999 lowered the permitting threshold from five acres to one acre.

While federal regulations allow two permitting options for storm water discharges (Individual Permits and General Permits), the State Water Board has elected to adopt only one statewide General Permit at this time that will apply to most storm water discharges associated with construction activity.

On August 19, 1999, the State Water Board reissued the General Construction Storm Water Permit (Water Quality Order 99-08-DWQ). On December 8, 1999 the State Water Board amended Order 99-08-DWQ to apply to sites as small as one acre.

The General Permit accompanying this fact sheet regulates storm water runoff from construction sites. Regulating many storm water discharges under one permit will greatly reduce the administrative burden associated with permitting individual storm water discharges. To obtain coverage under this General Permit, dischargers shall electronically file the Permit Registration Documents (PRDs), which includes a Notice of Intent (NOI), Storm Water Pollution Prevention Plan (SWPPP), and other compliance related documents required by this General Permit and mail the appropriate permit fee to the State Water Board. It is expected that as the storm water program develops, the Regional Water Quality Control Boards (Regional Water Boards) may issue General Permits or Individual Permits containing more specific permit provisions. When this occurs, this General Permit will no longer regulate those dischargers.

B. Legal Challenges and Court Decisions

1. Early Court Decisions

Shortly after the passage of the CWA, the USEPA promulgated regulations exempting most storm water discharges from the NPDES permit requirements. (See 40 C.F.R. § 125.4 (1975); see also *Natural Resources Defense Council v. Costle* (D.C. Cir. 1977) 568 F.2d 1369, 1372 (*Costle*); *Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159, 1163 (*Defenders of Wildlife*).) When environmental groups challenged this exemption in federal court, the District of Columbia Court of Appeals invalidated the regulation, holding that the USEPA "does not have authority to exempt categories of point sources from the permit requirements of [CWA] § 402." (*Costle*, 568 F.2d at 1377.) The *Costle* court rejected the USEPA's argument that effluent-based storm sewer regulation was administratively infeasible because of the variable nature of storm water pollution and the number of affected storm sewers throughout the country. (*Id.* at 1377-82.) Although the court acknowledged the practical problems relating to storm sewer regulation, the court found the USEPA had the flexibility under the CWA to design regulations that would overcome these problems. (*Id.* at 1379-83.) In particular, the court pointed to general permits and permits based on requiring best management practices (BMPs).

During the next 15 years, the USEPA made numerous attempts to reconcile the statutory requirement of point source regulation with the practical problem of regulating possibly millions of diverse point source discharges of storm water. (See *Defenders of Wildlife*, 191 F.3d at 1163; see also Gallagher, Clean Water Act in Environmental Law Handbook (Sullivan, edit., 2003) p. 300 (Environmental Law Handbook); Eisen, *Toward a Sustainable Urbanism: Lessons from Federal Regulation of Urban Storm Water Runoff* (1995) 48 Wash. U.J. Urb. & Contemp. L.1, 40-41 [Regulation of Urban Storm Water Runoff].)

In 1987, Congress amended the CWA to require NPDES permits for storm water discharges. (See CWA § 402(p), 33 U.S.C. § 1342(p); *Defenders of Wildlife,* 191 F.3d at 1163; *Natural Resources Defense Council v. USEPA* (9th Cir. 1992) 966 F.2d 1292, 1296.) In these amendments, enacted as part of the Water Quality Act of 1987, Congress distinguished between industrial and municipal storm water discharges. With respect to industrial storm water discharges, Congress provided that NPDES permits "shall meet all applicable provisions of this section and section 1311 [requiring the USEPA to establish effluent limitations under specific timetables]." (CWA § 402(p)(3)(A), 33 U.S.C. § 1342(p)(3)(A); see also *Defenders of Wildlife,* 191 F.3d at 1163-64.)

In 1990, USEPA adopted regulations specifying what activities were considered “industrial” and thus required discharges of storm water associated with those activities to obtain coverage under NPDES permits. (55 Fed. Reg. 47,990 (1990); 40 C.F.R. § 122.26(b)(14).) Construction activities, deemed a subset of the industrial activities category, must also be regulated by an NPDES permit. (40 C.F.R. § 122.26(b)(14)(x)). In 1999, USEPA issued regulations for “Phase II” of storm water regulation, which required most small construction sites (1-5 acres) to be regulated under the NPDES program. (64 Fed. Reg. 68,722; 40 C.F.R. § 122.26(b)(15)(i).)

2. Court Decisions on Public Participation

Two recent federal court opinions have vacated USEPA rules that denied meaningful public review of NPDES permit conditions. On January 14, 2003, the Ninth Circuit Court of Appeals held that certain aspects of USEPA’s Phase II regulations governing MS4s were invalid primarily because the general permit did not contain express requirements for public participation. (*Environmental Defense Center v. USEPA* (9th Cir. 2003) 344 F.3d 832.) Specifically, the court determined that applications for general permit coverage (including the Notice of Intent (NOI) and Storm Water Management Program (SWMP)) must be made available to the public, the applications must be reviewed and determined to meet the applicable standard by the permitting authority before coverage commences, and there must be a process to accommodate public hearings. (*Id.* at 852-54.) Similarly, on February 28, 2005, the Second Circuit Court of Appeals held that the USEPA's confined animal feeding operation (CAFO) rule violated the CWA because it allowed dischargers to write their own nutrient management plans without public review. (*Waterkeeper Alliance v. USEPA* (2d Cir. 2005) 399 F.3d 486.) Although neither decision involved the issuance of construction storm water permits, the State Water Board’s Office of Chief Counsel has recommended that the new General Permit address the courts’ rulings where feasible[1].

[1] In *Texas Independent Producers and Royalty Owners Assn. v. USEPA* (7th Cir. 2005) 410 F.3d 964, the Seventh Circuit Court of Appeals held that the USEPA’s construction general permit was not required to provide the public with the opportunity for a public hearing on the Notice of Intent or Storm Water Pollution Prevention Plan. The Seventh Circuit briefly discussed why it agreed with the Ninth Circuit’s dissent in *Environmental Defense Center*, but generally did not discuss the substantive holdings in *Environmental Defense Center* and *Waterkeeper Alliance*, because neither court addressed the initial question of whether the plaintiffs had standing to challenge the permits at issue. However, notwithstanding the Seventh Circuit’s decision, it is not binding or controlling on the State Water Board because California is located within the Ninth Circuit.

The CWA and the USEPA's regulations provide states with the discretion to formulate permit terms, including specifying best management practices (BMPs), to achieve strict compliance with federal technology-based and water quality-based standards. (*Natural Resources Defense Council v. USEPA* (9th Cir. 1992) 966 F.2d 1292, 1308.) Accordingly, this General Permit has developed specific BMPs as well as numeric action levels (NALs) and numeric effluent limitations (NELs) in order to achieve these minimum federal standards. In addition, the General Permit requires a SWPPP and REAP (another dynamic, site-specific plan) to be developed but has removed all language requiring the discharger to implement these plans – instead, the discharger is required to comply with specific requirements. By requiring the dischargers to implement these specific BMPs, NALs, and NELs, this General Permit ensures that the dischargers do not "write their own permits." As a result this General Permit does not require each discharger's SWPPP and REAP to be reviewed and approved by the Regional Water Boards.

This General Permit also requires dischargers to electronically file all permit-related compliance documents. These documents include, but are not limited to, NOIs, SWPPPs, annual reports, Notice of Terminations (NOTs), and numeric action level (NAL) exceedance reports. Electronically submitted compliance information is immediately available to the public, as well as the Regional Water Quality Control Board (Regional Water Board) offices, via the Internet. In addition, this General Permit enables public review and hearings on permit applications when appropriate. Under this General Permit, the public clearly has a meaningful opportunity to participate in the permitting process.

C. Blue Ribbon Panel of Experts and Feasibility of Numeric Effluent Limitations

In 2005 and 2006, the State Water Board convened an expert panel (panel) to address the feasibility of numeric effluent limitations (NELs) in California's storm water permits. Specifically, the panel was asked to address:

"Is it technically feasible to establish numeric effluent limitations, or some other quantifiable limit, for inclusion in storm water permits? How would such limitations or criteria be established, and what information and data would be required?"

"The answers should address industrial general permits, construction general permits, and area-wide municipal permits. The answers should also address both technology-based limitations or criteria and water quality-based limitations or criteria. In evaluating establishment of any objective criteria, the panel should address all of the following:

The ability of the State Water Board to establish appropriate objective limitations or criteria;

How compliance determinations would be made;

The ability of dischargers and inspectors to monitor for compliance; and

The technical and financial ability of dischargers to comply with the limitations or criteria."

Through a series of public participation processes (State Water Board meetings, State Water Board workshops, and the solicitation of written comments), a number of water quality, public process and overall program effectiveness problems were identified. Some of these problems are addressed through this General Permit.

D. Summary of Panel Findings on Construction Activities

The panel's final report can be downloaded and viewed through links at www.waterboards.ca.gov or by clicking here[2].

The panel made the following observations:

"Limited field studies indicate that traditional erosion and sediment controls are highly variable in performance, resulting in highly variable turbidity levels in the site discharge."

"Site-to-site variability in runoff turbidity from undeveloped sites can also be quite large in many areas of California, particularly in more arid regions with less natural vegetative cover and steep slopes."

"Active treatment technologies involving the use of polymers with relatively large storage systems now exist that can provide much more consistent and very low discharge turbidity. However, these technologies have as yet only been applied to larger construction sites, generally five acres or greater. Furthermore, toxicity has been observed at some locations, although at the vast majority of sites, toxicity has not occurred. There is also the potential for an accidental large release of such chemicals with their use."

"To date most of the construction permits have focused on TSS and turbidity, but have not addressed other, potentially significant pollutants such as phosphorus and an assortment of chemicals used at construction sites."

"Currently, there is no required training or certification program for contractors, preparers of soil erosion and sediment control Storm Water Pollution Prevention Plans, or field inspectors."

"The quality of storm water discharges from construction sites that effectively employ BMPs likely varies due to site conditions such as climate, soil, and topography."

"The States of Oregon and Washington have recently adopted similar concepts to the Action Levels described earlier."

In addition, the panel made the following conclusions:

"It is the consensus of the Panel that active treatment technologies make Numeric Limits technically feasible for pollutants commonly associated with storm water discharges from construction sites (e.g. TSS and turbidity) for larger construction sites. Technical practicalities and cost-effectiveness may make these technologies less feasible for smaller sites, including small drainages within a larger site, as these technologies have seen limited use at small construction sites. If chemical addition is not permitted, then Numeric Limits are not likely feasible."

"The Board should consider Numeric Limits or Action Levels for other pollutants of relevance to construction sites, but in particular pH. It is of particular concern where fresh concrete or wash water from cement mixers/equipment is exposed to storm water."

"The Board should consider the phased implementation of Numeric Limits and Action Levels, commensurate with the capacity of the dischargers and support industry to respond."

---

[2] http://www.waterboards.ca.gov/stormwtr/docs/numeric/swpanel_final_report.pdf

E. How the Panel's Findings are Used in this General Permit

The State Water Board carefully considered the findings of the panel and related public comments. The State Water Board also reviewed and considered the comments regarding statewide storm water policy and the reissuance of the Industrial General Permit. From the input received the State Water Board identified some permit and program performance gaps that are addressed in this General Permit. The Summary of Significant Changes (below) in this General Permit are a direct result of this process.

F. Summary of Significant Changes in This General Permit

The State Water Board has significant changes to Order 99-08-DWQ. This General Permit differs from Order 99-08-DWQ in the following significant ways:

Rainfall Erosivity Waiver: this General Permit includes the option allowing a small construction site (>1 and <5 acres) to self-certify if the rainfall erosivity value (R value) for their site's given location and time frame compute to be less than or equal to 5.

Technology-Based Numeric Action Levels: this General Permit includes NALs for pH and turbidity.

Technology-Based Numeric Effluent Limitations: this General Permit contains daily average NELs for pH during any construction phase where there is a high risk of pH discharge and daily average NELs turbidity for all discharges in Risk Level 3. The daily average NEL for turbidity is set at 500 NTU to represent the minimum technology that sites need to employ (to meet the traditional Best Available Technology Economically Achievable (BAT)/ Best Conventional Pollutant Control Technology (BCT) standard) and the traditional, numeric receiving water limitations for turbidity.

Risk-Based Permitting Approach: this General Permit establishes three levels of risk possible for a construction site. Risk is calculated in two parts: 1) Project Sediment Risk, and 2) Receiving Water Risk.

Minimum Requirements Specified: this General Permit imposes more minimum BMPs and requirements that were previously only required as elements of the SWPPP or were suggested by guidance.

Project Site Soil Characteristics Monitoring and Reporting: this General Permit provides the option for dischargers to monitor and report the soil characteristics at their project location. The primary purpose of this requirement is to provide better risk determination and eventually better program evaluation.

Effluent Monitoring and Reporting: this General Permit requires effluent monitoring and reporting for pH and turbidity in storm water discharges. The purpose of this monitoring is to determine compliance with the NELs and evaluate whether NALs included in this General Permit are exceeded.

Receiving Water Monitoring and Reporting: this General Permit requires some Risk Level 3 dischargers to monitor receiving waters and conduct bioassessments.

Post-Construction Storm Water Performance Standards: this General Permit specifies runoff reduction requirements for all sites not covered by a Phase I or Phase II MS4 NPDES permit, to avoid, minimize and/or mitigate post-construction storm water runoff impacts.

Rain Event Action Plan: this General Permit requires certain sites to develop and implement a Rain Event Action Plan (REAP) that must be designed to protect all exposed portions of the site within 48 hours prior to any likely precipitation event.

Annual Reporting: this General Permit requires all projects that are enrolled for more than one continuous three-month period to submit information and annually certify that their site is in compliance

with these requirements. The primary purpose of this requirement is to provide information needed for overall program evaluation and pubic information.

Certification/Training Requirements for Key Project Personnel: this General Permit requires that key personnel (e.g., SWPPP preparers, inspectors, etc.) have specific training or certifications to ensure their level of knowledge and skills are adequate to ensure their ability to design and evaluate project specifications that will comply with General Permit requirements.

Linear Underground/Overhead Projects: this General Permit includes requirements for all Linear Underground/Overhead Projects (LUPs).

II. RATIONALE

A. General Permit Approach

A general permit for construction activities is an appropriate permitting approach for the following reasons:

1. A general permit is an efficient method to establish the essential regulatory requirements for a broad range of construction activities under differing site conditions;

2. A general permit is the most efficient method to handle the large number of construction storm water permit applications;

3. The application process for coverage under a general permit is far less onerous than that for individual permit and hence more cost effective;

4. A general permit is consistent with USEPA's four-tier permitting strategy, the purpose of which is to use the flexibility provided by the CWA in designing a workable and efficient permitting system; and

5. A general permit is designed to provide coverage for a group of related facilities or operations of a specific industry type or group of industries. It is appropriate when the discharge characteristics are sufficiently similar, and a standard set of permit requirements can effectively provide environmental protection and comply with water quality standards for discharges. In most cases, the general permit will provide sufficient and appropriate management requirements to protect the quality of receiving waters from discharges of storm water from construction sites.

There may be instances where a general permit is not appropriate for a specific construction project. A Regional Water Board may require any discharger otherwise covered under the General Permit to apply for and obtain an Individual Permit or apply for coverage under a more specific General Permit. The Regional Water Board must determine that this General Permit does not provide adequate assurance that water quality will be protected, or that there is a site-specific reason why an individual permit should be required.

B. Construction Activities Covered

1. **Construction activity subject to this General Permit:**

Any construction or demolition activity, including, but not limited to, clearing, grading, grubbing, or excavation, or any other activity that results in a land disturbance of equal to or greater than one acre.

Construction activity that results in land surface disturbances of less than one acre if the construction activity is part of a larger common plan of development or sale of one or more acres of disturbed land surface.

Construction activity related to residential, commercial, or industrial development on lands currently used for agriculture including, but not limited to, the construction of buildings related to agriculture that are considered industrial pursuant to USEPA regulations, such as dairy barns or food processing facilities.

Construction activity associated with LUPs including, but not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete

and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/borrow locations.

Discharges of sediment from construction activities associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities.[3]

Storm water discharges from dredge spoil placement that occur outside of U.S. Army Corps of Engineers jurisdiction[4] (upland sites) and that disturb one or more acres of land surface from construction activity are covered by this General Permit. Construction projects that intend to disturb one or more acres of land within the jurisdictional boundaries of a CWA § 404 permit should contact the appropriate Regional Water Board to determine whether this permit applies to the project.

2. Linear Underground/Overhead Projects (LUPs) subject to this General Permit:

Underground/overhead facilities typically constructed as LUPs include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water, wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g., telephone, telegraph, radio or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/borrow locations.

Water Quality Order 2003-0007-DWQ regulated construction activities associated with small LUPs that resulted in land disturbances greater than one acre, but less than five acres. These projects were considered non-traditional construction projects. Attachment A of this Order now regulates all construction activities from LUPs resulting in land disturbances greater than one acre.

3. Common Plan of Development or Sale

USEPA regulations include the term “common plan of development or sale” to ensure that acreage within a common project does not artificially escape the permit requirements because construction activities are phased, split among smaller parcels, or completed by different owners/developers. In the absence of an exact definition of “common plan of development or sale,” the State Water Board is required to exercise its regulatory discretion in providing a common sense interpretation of the term as it applies to construction projects and permit coverage. An overbroad interpretation of the term would render meaningless the clear “one acre” federal permitting threshold and would potentially trigger permitting of

[3] Pursuant to the Ninth Circuit Court of Appeals’ decision in *NRDC v. EPA* (9th Cir. 2008) 526 F.3d 591, and subsequent denial of the USEPA’s petition for reconsideration in November 2008, oil and gas construction activities discharging storm water contaminated only with sediment are no longer exempt from the NPDES program.

[4] A construction site that includes a dredge and/or fill discharge to any water of the United States (e.g., wetland, channel, pond, or marine water) requires a CWA Section 404 permit from the U.S. Army Corps of Engineers and a CWA Section 401 Water Quality Certification from the Regional Water Board or State Water Board.

almost any construction activity that occurs within an area that had previously received area-wide utility or road improvements.

Construction projects generally receive grading and/or building permits (Local Permits) from local authorities prior to initiating construction activity. These Local Permits spell out the scope of the project, the parcels involved, the type of construction approved, etc. Referring to the Local Permit helps define "common plan of development or sale." In cases such as tract home development, a Local Permit will include all phases of the construction project including rough grading, utility and road installation, and vertical construction. All construction activities approved in the Local Permit are part of the common plan and must remain under the General Permit until construction is completed. For custom home construction, Local Permits typically only approve vertical construction as the rough grading, utilities, and road improvements were already independently completed under the a previous Local Permit. In the case of a custom home site, the homeowner must submit plans and obtain a distinct and separate Local Permit from the local authority in order to proceed. It is not the intent of the State Water Board to require permitting for an individual homeowner building a custom home on a private lot of less than one acre if it is subject to a separate Local Permit. Similarly, the installation of a swimming pool, deck, or landscaping that disturbs less than one acre that was not part of any previous Local Permit are not required to be permitted.

The following are several examples of construction activity of less than one acre that would require permit coverage:

a. A landowner receives a building permit(s) to build tract homes on a 100-acre site split into 200 one-third acre parcels, (the remaining acreage consists of streets and parkways) which are sold to individual homeowners as they are completed. The landowner completes and sells all the parcels except for two. Although the remaining two parcels combined are less than one acre, the landowner must continue permit coverage for the two parcels.

b. One of the parcels discussed above is sold to another owner who intends to complete the construction as already approved in the Local Permit. The new landowner must file Permit Registration Documents (PRDs) to complete the construction even if the new landowner is required to obtain a separate Local Permit.

c. Landowner in (1) above purchases 50 additional one half-acre parcels adjacent to the original 200-acre project. The landowner seeks a Local Permit (or amendment to existing Local permit) to build on 20 parcels while leaving the remaining 30 parcels for future development. The landowner must amend PRDs to include the 20 parcels 14 days prior to commencement of construction activity on those parcels.

C. Construction Activities Not Covered

1. Traditional Construction Projects Not Covered

This General Permit does not apply to the following construction activity:

a. Routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility.

b. Disturbances to land surfaces solely related to agricultural operations such as disking, harrowing, terracing and leveling, and soil preparation.

c. Discharges of storm water from areas on tribal lands; construction on tribal lands is regulated by a federal permit.

d. Discharges of storm water within the Lake Tahoe Hydrologic Unit. The Lahontan Regional Water Board has adopted its own permit to regulate storm water discharges from construction activity in the Lake Tahoe Hydrologic Unit (Regional Water Board 6SLT). Owners of construction projects in this watershed must apply for the Lahontan Regional Water Board permit rather than the statewide Construction General Permit. Construction projects within the Lahontan region must also comply with the Lahontan Region Project Guideline for Erosion Control (R6T-2005-0007 Section), which can be found at **http://www.waterboards.ca.gov/lahontan/Adopted_Orders/2005/r6t_2005_0007.pdf**

e. Construction activity that disturbs less than one acre of land surface, unless part of a larger common plan of development or the sale of one or more acres of disturbed land surface.

f. Construction activity covered by an individual NPDES Permit for storm water discharges.

g. Landfill construction activity that is subject to the Industrial General Permit.

h. Construction activity that discharges to Combined Sewer Systems.

i. Conveyances that discharge storm water runoff combined with municipal sewage.

j. Discharges of storm water identified in CWA § 402(*l*)(2), 33 U.S.C. § 1342(*l*)(2).

2. **Linear Projects Not Covered**

a. LUP construction activity does not include linear routine maintenance projects. Routine maintenance projects are projects associated with operations and maintenance activities that are conducted on existing lines and facilities and within existing right-of-way, easements, franchise agreements, or other legally binding agreements of the discharger. Routine maintenance projects include, but are not limited to projects that are conducted to:

i. Maintain the original purpose of the facility or hydraulic capacity.

ii. Update existing lines[5] and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.

iii. Repairing leaks.

Routine maintenance does not include construction of new[6] lines or facilities resulting from compliance with applicable codes, standards, and regulations.

Routine maintenance projects do not include those areas of maintenance projects that are outside of an existing right-of-way, franchise, easements, or agreements. When a project must secure new areas,

[5]Update existing lines includes replacing existing lines with new materials or pipes.
[6]New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines.

those areas may be subject to this General Permit based on the area of disturbed land outside the original right-of-way, easement, or agreement.

b. LUP construction activity does not include field activities associated with the planning and design of a project (e.g., activities associated with route selection).

c. Tie-ins conducted immediately adjacent to "energized" or "pressurized" facilities by the discharger are not considered construction activities where all other LUP construction activities associated with the tie-in are covered by an NOI and SWPPP of a third party or municipal agency.

3. **EPA's Small Construction Rainfall Erosivity Waiver**

EPA's Storm Water Phase II Final Rule provides the option for a Small Construction Rainfall Erosivity Waiver. This waiver applies to small construction sites between 1 and 5 acres, and allows permitting authorities to waive those sites that do not have adverse water quality impacts.

Dischargers eligible for this waiver are exempt from Construction General Permit Coverage. In order to obtain the waiver, the discharger must certify to the State Water Board that small construction activity will occur only when the rainfall erosivity factor is less than 5 ("R" in the Revised Universal Soil Loss Equation). The period of construction activity begins at initial earth disturbance and ends with final stabilization. Where vegetation will be used for final stabilization, the date of installation of a practice that provides interim non-vegetative stabilization can be used for the end of the construction period. The operator must agree (as a condition waiver eligibility) to periodically inspect and properly maintain the area until the criteria for final stabilization as defined in the General Permit have been met. If use of this interim stabilization eligibility condition was relied on to qualify for the waiver, signature on the waiver with a certification statement constitutes acceptance of and commitment to complete the final stabilization process. The discharger must submit a waiver certification to the State Board prior to commencing construction activities.

USEPA funded a cooperative agreement with Texas A&M University to develop an online rainfall erosivity calculator. Dischargers can access the calculator from EPA's website at: www.epa.gov/npdes/stormwater/cgp. Use of the calculator allows the discharger to determine potential eligibility for the rainfall erosivity waiver. It may also be useful in determining the time periods during which construction activity could be waived from permit coverage.

D. Obtaining and Terminating Permit Coverage

The Legally Responsible Person (LRP) must obtain coverage under this General Permit, except in two limited circumstances. First, where the construction of pipelines, utility lines, fiber-optic cables, or other linear underground/overhead projects will occur across several properties, the utility company, municipality, or other public or private company or agency that owns or operates the linear underground/overhead project is responsible for obtaining coverage under the General Permit. Second, where there is a lease of a mineral estate (oil, gas, geothermal, aggregate, precious metals, and/or industrial metals), the lessee is responsible for obtaining coverage under the General Permit. To obtain coverage, the LRP or other entity described above must file Permit Registration Documents (PRDs) prior to the commencement of construction activity. Failure to obtain coverage under this General Permit for storm water discharges to waters of the United States is a violation of the CWA and the California Water Code.

To obtain coverage under this General Permit, LRPs must electronically file the PRDs, which include a Notice of Intent (NOI), Storm Water Pollution Prevention Plan (SWPPP), and other documents required by this General Permit, and mail the appropriate permit fee to the State Water Board. It is expected that as the storm water program develops, the Regional Water Boards may issue General Permits or

Individual Permits that contain more specific permit provisions. When this occurs, this General Permit will no longer regulate those dischargers that obtain coverage under Individual Permits.

Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

The application requirements of the General Permit establish a mechanism to clearly identify the responsible parties, locations, and scope of operations of dischargers covered by the General Permit and to document the discharger's knowledge of the General Permit's requirements.

This General Permit provides a grandfathering exception to existing dischargers subject to Water Quality Order No. 99-08-DWQ. Construction projects covered under Water Quality Order No. 99-08-DWQ shall obtain permit coverage at Risk Level 1. LUP projects covered under Water Quality Order No. 2003-0007-DWQ shall obtain permit coverage at LUP Type 1. The Regional Water Boards have the authority to require Risk Determination to be performed on projects currently covered under Water Quality Order No. 99-08-DWQ and 2003-0007-DWQ where they deem necessary.

LRPs must file a Notice of Termination (NOT) with the Regional Water Board when construction is complete and final stabilization has been reached or ownership has been transferred. The discharger must certify that all State and local requirements have been met in accordance with this General Permit. In order for construction to be found complete, the discharger must install post-construction storm water management measures and establish a long-term maintenance plan. This requirement is intended to ensure that the post-construction conditions at the project site do not cause or contribute to direct or indirect water quality impacts (i.e., pollution and/or hydromodification) upstream and downstream. Specifically, the discharger must demonstrate compliance with the post-construction standards set forth in this General Permit (Section XIII). The discharger is responsible for all compliance issues including all annual fees until the NOT has been filed and approved by the local Regional Water Board.

E. Discharge Prohibitions

This General Permit authorizes the discharge of storm water to surface waters from construction activities that result in the disturbance of one or more acres of land, provided that the discharger satisfies all permit conditions set forth in the Order. This General Permit prohibits the discharge of pollutants other than storm water and non-storm water discharges authorized by this General Permit or another NPDES permit. This General Permit also prohibits all discharges which contain a hazardous substance in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges. In addition, this General Permit incorporates discharge prohibitions contained in water quality control plans, as implemented by the nine Regional Water Boards. Discharges to Areas of Special Biological Significance (ASBS) are prohibited unless covered by an exception that the State Water Board has approved.

Non-storm water discharges include a wide variety of sources, including improper dumping, spills, or leakage from storage tanks or transfer areas. Non-storm water discharges may contribute significant pollutant loads to receiving waters. Measures to control spills, leakage, and dumping, and to prevent illicit connections during construction must be addressed through structural as well as non-structural BMPs. The State Water Board recognizes, however, that certain non-storm water discharges may be necessary for the completion of construction projects. Authorized non-storm water discharges may include those from de-chlorinated potable water sources such as: fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, uncontaminated ground water dewatering, and other discharges not subject to a separate general NPDES permit adopted by a region. Therefore this General Permit authorizes such discharges provided they meet the following conditions.

These authorized non-storm water discharges must:

1. be infeasible to eliminate;

2. comply with BMPs as described in the SWPPP;

3. filter or treat, using appropriate technology, all dewatering discharges from sedimentation basins;

4. meet the NELs and NALs for pH and turbidity; and

5. not cause or contribute to a violation of water quality standards.

Additionally, authorized non-storm water discharges must not be used to clean up failed or inadequate construction or post-construction BMPs designed to keep materials onsite. Authorized non-storm water dewatering discharges may require a permit because some Regional Water Boards have adopted General Permits for dewatering discharges.

This General Permit prohibits the discharge of storm water that causes or threatens to cause pollution, contamination, or nuisance.

F. Effluent Standards for All Types of Discharges

1. Technology-Based Effluent Limitations

Permits for storm water discharges associated with construction activity must meet all applicable provisions of Sections 301 and 402 of the CWA. These provisions require controls of pollutant discharges that utilize best available technology economically achievable (BAT) for toxic pollutants and non conventional pollutants and best conventional pollutant control technology (BCT) for conventional pollutants. Additionally, these provisions require controls of pollutant discharges to reduce pollutants and any more stringent controls necessary to meet water quality standards. The USEPA has already established such limitations, known as effluent limitation guidelines (ELGs), for some industrial categories. This is not the case with construction discharges. In instances where there are no ELGs the permit writer is to use best professional judgment (BPJ) to establish requirements that the discharger must meet using BAT/BCT technology. This General Permit contains both narrative effluent limitations and new numeric effluent limitations for pH and turbidity, set using the best professional judgment (BPJ) equivalent to BAT and BCT (respectively).

BAT/BCT technologies not only include passive systems such as conventional runoff and sediment control, but also treatment systems such as coagulation/flocculation using sand filtration, when appropriate. Such technologies allow for effective treatment of soil particles less 0.02 mm (medium silt) in diameter. The discharger must install structural controls, as necessary, such as erosion and sediment controls that meet BAT and BCT to achieve compliance with water quality standards. The narrative effluent limitations constitute compliance with the requirements of the CWA.

The numeric effluent limitations for pH and turbidity are based upon BPJ, which authorizes the State Water Board to issue a permit containing “such conditions as the Administrator determines are necessary to carry out the provisions of this Chapter” (CWA § 402(a)(1), 33 U.S.C. § 1342(a)(1).) Because the USEPA has not yet issued an effluent limit guideline for storm water, the State Water Board must use BPJ to consider the appropriate technology for the category or class of point sources, based upon all available information and any unique factors relating to the sources. In addition, the permitting authority must consider a number of factors including the cost of achieving effluent reductions in relation to the effluent reduction benefits, the age of the equipment and facilities, the processes employed and any required process changes, engineering aspects of the control technologies, non-water quality environmental impacts (including energy requirements), and other such other factors as the State Water Board deems appropriate (CWA 304(b)(1)(B)).

Because the permit is an NPDES permit, there is no legal requirement to address the factors set forth in Water Code sections 13241 and 13263, unless the permit is more stringent than what federal law requires. (See *City of Burbank v. State Water Resources Control Bd.* (2005) 35 Cal.4th 613, 618, 627.) None of the requirements in this permit are more stringent than the minimum federal requirements, which include technology-based requirements achieving BAT/BCT and strict compliance with water quality standards. The inclusion of numeric effluent limitations (NELs) in the permit do not cause the permit to be more stringent than current federal law. NELs and best management practices are simply two different methods of achieving the same federal requirement: strict compliance with state water quality standards. Federal law authorizes both narrative and numeric effluent limitations to meet state water quality standards. The use of NELs to achieve compliance with water quality standards is not a more stringent requirement than the use of BMPs. (State Water Board Order No. WQ 2006-0012 (*Boeing*).) Accordingly, the State Water Board does not need to take into account the factors in Water Code sections 13241 and 13263.

The State Water Board has concluded that the establishment of BAT/BCT will not create or aggravate other environmental problems through increases in air pollution, solid waste generation, or energy consumption. While there may be a slight increase in non-water quality impacts due to the implementation of additional monitoring or the construction of additional BMPs, these impacts will be negligible in comparison with the construction activities taking place on site and would be justified by the water quality benefits associated with compliance.

Considerations related to the processes employed and the changes necessitated by the adoption of the BAT/BCT effluent limits have been assessed throughout the stakeholder process (e.g., the Blue Ribbon Panel and the March 2007 preliminary draft) and are discussed in detail in Section I.C of this Fact Sheet. The following sections set forth the engineering aspects of the control technologies and the rationale for the determination of the numeric effluents for pH and turbidity.

In consideration of the costs for the establishment of BAT and BCT limits for pH and turbidity, existing requirements for the control of storm water pollution from construction sites have been established by USEPA and the previous Construction General Permit (State Water Board Order No. 99-08-DWQ) issued by the State Water Board. The General Permit establishes one, consistent set of performance standards for all levels and types of discharges (i.e., risk, linear utility, and ATS).The only difference is that for each level or type of discharge there may be more or less specific effluent limitations (e.g., the addition of numeric effluent limitations for turbidity applies to level/type 3 discharges). And the numeric effluent limitations themselves represent a minimum technology standard. In other words, the additional numeric effluent limitations, compared to the existing permit's narrative effluent limitations, do not increase compliance requirements; rather, they simply represent a point where one can quantitatively measure compliance with the lower end of the range of required technologies. Therefore, the compliance costs associated with the BAT/BCT numeric effluent limitations in this permit only differ by the costs required to measure compliance with the NELs when compared to the baseline compliance costs to comply with the limitations already established through EPA regulations and the existing Construction General Permit.

The State Water Board estimates these measurement costs to be approximately $1000 per construction site for the duration of the project. This represents the estimated cost of purchasing (or renting) monitoring equipment, in this case a turbidimeter (~$600) and a pH meter (~$400). In some cases the costs may be higher or lower. Costs could be lower if the discharger chooses to design and implement the project in a manner where effluent monitoring is likely to be avoided (e.g., no exposure during wet weather seasons, no discharge due to containment, etc.). Costs could be more if the project is subject to many effluent monitoring events or if the discharger exceeds NALs and/or NELs, resulting in additional monitoring requirements.

i. ***pH NEL***

Given the potential contaminants, the minimum standard method for control of pH in runoff requires the use of preventive measures such as avoiding concrete pours during rainy weather, covering concrete and directing flow away from fresh concrete if a pour occurs during rain, covering scrap drywall and stucco

materials when stored outside and potentially exposed to rain, and other housekeeping measures. If necessary, pH-impaired storm water from construction sites can be treated in a filter or settling pond or basin, with additional natural or chemical treatment required to meet pH limits set forth in this permit. The basin or pond acts as a collection point and holds storm water for a sufficient period for the contaminants to be settled out, either naturally or artificially, and allows any additional treatment to take place. The State Water Board considers these techniques to be equivalent to BCT. In determining the pH concentration limit for discharges, the State Water Board used BPJ to set these limitations.

The chosen limits were established by calculating three standard deviations above and below the mean pH of runoff from highway construction sites[7] in California. Proper implementation of BMPs should result in discharges that are within the range of 6.0 to 9.0 pH Units.

ii. ***Turbidity NEL***

The Turbidity NEL of 500 NTU is a technology-based numeric effluent limitation and was developed using three different analyses aimed at finding the appropriate threshold to set the technology-based limit to ensure environmental protection, effluent quality and cost-effectiveness. The analyses fell into three, main types: (1) an ecoregion-specific dataset developed by Simon et. al. (2004)[8]; (2) Statewide Regional Water Quality Control Board enforcement data; and (3) published, peer-reviewed studies and reports on in-situ performance of best management practices in terms of erosion and sediment control on active construction sites.

A 1:3 relationship between turbidity (expressed as NTU) and suspended sediment concentration (expressed as mg/L) is assumed based on a review of suspended sediment and turbidity data from three gages used in the USGS National Water Quality Assessment Program:

USGS 11074000 SANTA ANA R BL PRADO DAM CA
USGS 11447650 SACRAMENTO R A FREEPORT CA
USGS 11303500 SAN JOAQUIN R NR VERNALIS CA

The turbidity NEL represents a feasible and cost effective performance standard that is demonstrated to be achievable. Although data has been collected to demonstrate that lower effluent levels may be achievable at some sites, staff cannot conclude at this time that a lower NEL is achievable within all the ecoregions of the state. The NEL represents staff determination that the NEL is the most practicable based on available data. The turbidity NEL represents a bridge between the narrative effluent limitations and receiving water limitations. The NEL limit may be considered an interim performance standard as additional data becomes available for evaluation during the next permit cycle. To support this NEL, State Water Board staff analyzed construction site discharge information (monitoring data, estimates) and receiving water monitoring information.

Since the turbidity NEL represents an appropriate threshold level expected at a site, compliance with this value does not necessarily represent compliance with either the narrative effluent limitations (as enforced through the BAT/BCT standard) or the receiving water limitations. In the San Diego region, some inland surface waters have a receiving water objective for turbidity equal to 20 NTU. Obviously a discharge up to, but not exceeding, the turbidity NEL of 500 NTU may still cause or contribute to the exceedance of the 20 NTU standard. Most of the waters of the State are protected by turbidity objectives based on background conditions**.**

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[7] Caltrans Construction Sites Runoff Characterization Study, 2002. Available at: http://www.dot.ca.gov/hq/env/stormwater/pdf/CTSW-RT-02-055.pdf.

[8] Simon, A., W.D. Dickerson, and A. Heins. 2004. Suspended-sediment transport rates at the 1.5-year recurrence interval for ecoregions of the United States: transport conditions at the bankfull and effective discharge. Geomorphology 58: pp. 243-262.

Table 1 - Regional Water Board Basin Plans, Water Quality Objectives for Turbidity

REGIONAL WATER BOARD	WQ Objective	Background/Natural Turbidity	Maximum Increase
1 Based	on background	All levels	20%
2 Based	on background	> 50 NTU	10%
3 Based	on background	0-50 JTU 50-100 JTU > 100 JTU	20% 10 NTU 10%
4 Based	on background	0-50 NTU > 50 NTU	20% 10%
5 Based	on background	0-5 NTU 5-50 NTU 50-100 NTU >100 NTU	1 NTU 20% 10 NTU 10%
6 Based	on background	All levels	10%
7 Based	on background	N/A N/A	
8 Based	on background	0-50 NTU 50-100 NTU >100 NTU	20% 10 NTU 10%
9 Inland	Surface Waters, 20 NTU All others, based on background	 0-50 NTU 50-100 NTU >100 NTU	 20% 10 NTU 10%

Table 2 shows the suspended sediment concentrations at the 1.5 year flow recurrence interval for the 12 ecoregions in California from Simon et. al (2004).

Table 2 - Results of Ecoregion Analysis

Ecoregion	Percent of California Land Area	Median Suspended Sediment Concentration (mg/L)
1 9.1		874
4 0.2		120
5 8.8		35.6
6 20.7		1530
7 7.7		122
8 3.0		47.4
9 9.4		284
13 5.2		143
14 21.7		5150
78 8.1		581
80 2.4		199
81 3.7		503
Area-weighted average		1633

If a 1:3 relationship between turbidity and suspended sediment is assumed, the median turbidity is 544 NTU.

The following table is composed of turbidity readings measured in NTUs from administrative civil liberty (ACL) actions for construction sites from 2003 - 2009. This data was derived from the complete listing of construction-related ACLs for the six year period. All ACLs were reviewed and those that included turbidimeter readings at the point of storm water discharge were selected for this dataset.

Table 3 – ACL Sampling Data taken by Regional Water Board Staff

WDID# Regi	on	Discharger	Turbidity (NTU)
5S34C331884	5S Brad	shaw Interceptor Section 6B	1800
5S05C325110	5S Bridal	wood Subdivision	1670
5S48C336297	5S Cheye	nne at Browns Valley	1629
5R32C314271	5R Gri	zzly Ranch Construction	1400
6A090406008	6T	El Dorado County Department of Transportation, Angora Creek	97.4
5S03C346861	5S	TML Development, LLC	1600
6A31C325917	6T	Northstar Village	See Subdata Set

Subdata Set - Turbidity for point of storm water runoff discharge at Northstar Village

Date Turbi	dity (NTU)	Location
10/5/2006	900	Middle Martis Creek
11/2/2006	190	Middle Martis Creek
01/04/2007	36	West Fork, West Martis Creek
02/08/2007	180	Middle Martis Creek
02/09/2007	130	Middle Martis Creek
02/09/2007	290	Middle Martis Creek
02/09/2007	100	West Fork, West Martis Creek
02/10/2007	28	Middle Martis Creek
02/10/2007	23	Middle Martis Creek
02/10/2007	32	Middle Martis Creek
02/10/2007	12	Middle Martis Creek
02/10/2007	60	West Fork, West Martis Creek
02/10/2007	34	West Fork, West Martis Creek

A 95% confidence interval for mean turbidity in an ACL order was constructed. The data set used was a small sample size, so the 500 NTU (the value derived as the NEL for this General Permit) needed to be verified as a possible population mean. In this case, the population refers to a hypothetical population of turbidity measurements of which our sample of 20 represents. A t-distribution was assumed due to the small sample size:

Mean: 512.23 NTU
Standard Deviation: 686.85
Margin of Error: 321.45
Confidence Interval: 190.78 NTU (Low)
833.68 NTU (High)

Based on a constructed 95% confidence interval, an ACL order turbidity measurement will be between 190.78 – 833.68 NTU. 500 NTU falls within this range. Using the same data set, a small-sample hypothesis test was also performed to test if the ACL turbidity data set contains enough information to cast doubt on choosing a 500 NTU as a mean. 500 NTU was again chosen due to its proposed use as an acceptable NEL value. The test was carried out using a 95% confidence interval. Results indicated that the ACL turbidity data set *does not* contain significant sample evidence to reject the claim of 500 NTU as an acceptable mean for the ACL turbidity population.

There are not many published, peer-reviewed studies and reports on in-situ performance of best management practices in terms of erosion and sediment control on active construction sites. The most often cited study is a report titled, "Improving the Cost Effectiveness of Highway Construction Site Erosion and Pollution Control" (Horner, Guedry, and Kortenhof 1990, http://www.wsdot.wa.gov/Research/Reports/200/200.1.htm). In a comment letter summarizing this report sent to the State Water Board, the primary author, Dr. Horner, states:

"The most effective erosion control product was wood fiber mulch applied at two different rates along with a bonding agent and grass seed in sufficient time before the tests to achieve germination. Plots treated in this way reduced influent turbidity by more than 97 percent and discharged effluent exhibiting mean and maximum turbidity values of 21 and 73 NTU, respectively. Some other mulch and blanket materials performed nearly as well. These tests demonstrated the control ability of widely available BMPs over a very broad range of erosion potential."

Other technologies studied in this report produced effluent quality at or near 100 NTU. It is the BPJ of the State Water Board staff that erosion control, while preferred, is not always an option on construction sites and that technology performance in a controlled study showing effluent quality directly leaving a BMP is always easier and cheaper to control than effluent being discharged from the project (edge of property, etc.). As a result, it is the BPJ of the State Water Board staff that it is not cost effective or feasible, at this time, for all risk level and type 3 sites in California to achieve effluent discharges with turbidity values that are less than 100 NTU.

To summarize, the analysis showed that: (1) results of the Simon et. al dataset reveals turbidity values in background receiving water in California's ecoregions range from 16 NTU to 1716 NTU (with a mean of 544 NTU); (2) based on a constructed 95% confidence interval, construction sites will be subject to administrative civil liability (ACL) when their turbidity measurement falls between 190.78 – 833.68 NTU; and (3) sites with highly controlled discharges employing and maintaining good erosion control practices can discharge effluent from the BMP with turbidity values less than 100 NTU. Therefore, the appropriate threshold to set the technology-based limit to ensure environmental protection, effluent quality, and cost-effectiveness ranges from 100 NTU to over 1700 NTU. To keep this parameter and the costs of compliance as low as possible, State Water Board staff has determined, using its BPJ, that it is most cost effective to set the numeric effluent limitation for turbidity at 500 NTU.

a. Compliance Storm Event

In response to public comments on the last draft and the recommendations of the expert panel, this General Permit contains "compliance storm event" exceptions from the technology-based NELs. The rationale is that technology-based requirements are developed assuming a certain design storm (defined as the storm producing a rainfall amount for a specified BMPs capacity). Compliance thresholds are needed for storm events above and beyond the design storms assumed to determine the technology-based NELs. For Risk Level 3 project sites applicable to NELs, this General Permit establishes a compliance storm event as the equivalent rainfall in a 5-year, 24-hour storm. This compliance storm was

chosen due to its relative infrequent occurrence and the fact that the runoff volume associated with it is not as large as a 10-year, 24-hour storm event. The discharger shall determine this value using Western Regional Climate Center Precipitation Frequency Maps[9] for 5-year 24-hour storm events in Northern and Southern California (note that these are expressed in tenths of inches – divide by 10 to get inches).

b. TMDLs and Waste Load Allocations

Dischargers located within the watershed of a CWA § 303(d) impaired water body, for which a TMDL for sediment has been adopted by the Regional Water Board or USEPA, must comply with the approved TMDL if it identifies "construction activity" or land disturbance as a source of sediment. If it does, the TMDL should include a specific waste load allocation for this activity/source. The discharger, in this case, may be required by a separate Regional Water Board order to implement additional BMPs, conduct additional monitoring activities, and/or comply with an applicable waste load allocation and implementation schedule. If a specific waste load allocation has been established that would apply to a specific discharge, the Regional Water Board may adopt an order requiring specific implementation actions necessary to meet that allocation. In the instance where an approved TMDL has specified a general waste load allocation to construction storm water discharges, but no specific requirements for construction sites have been identified in the TMDL, dischargers must consult with the state TMDL authority[10] to confirm that adherence to a SWPPP that meets the requirements of the General Permit will be consistent with the approved TMDL.

2. Determining Compliance with Effluent Standards

a. Technology-Based Numeric Action Levels (NALs)

This General Permit contains technology-based NALs for pH and turbidity, and requirements for effluent monitoring at all Risk level 2 & 3, and LUP Type 2 & 3 sites. Numeric action levels are essentially numeric benchmark values for certain parameters that, if exceeded in effluent sampling, trigger the discharger to take actions. Exceedance of an NAL does not itself constitute a violation of the General Permit. If the discharger fails to take the corrective action required by the General Permit, though, that may consititute a violation.

The primary purpose of NALs is to assist dischargers in evaluating the effectiveness of their on-site measures. Construction sites need to employ many different systems that must work together to achieve compliance with the permit's requirements. The NALs chosen should indicate whether the systems are working as intended.

Another purpose of NALs is to provide information regarding construction activities and water quality impacts. This data will provide the State and Regional Water Boards and the rest of the storm water community with more information about levels and types of pollutants present in runoff and how effective the dischargers BMPs are at reducing pollutants in effluent. The State Water Board also hopes to learn more about the linkage between effluent and receiving water quality. In addition, these requirements will provide information on the mechanics needed to establish compliance monitoring programs at construction sites in future permit deliberations.

i. *pH*

[9] http://www.wrcc.dri.edu/pcpnfreq/nca5y24.gif & http://www.wrcc.dri.edu/pcpnfreq/sca5y24.gif .
[10] http://www.waterboards.ca.gov/tmdl/tmdl.html.

The chosen limits were established by calculating one standard deviation above and below the mean pH of runoff from highway construction sites[11] in California. Proper implementation of BMPs should result in discharges that are within the range of 6.5 to 8.5 pH Units.

The Caltrans study included 33 highway construction sites throughout California over a period of four years, which included 120 storm events. All of these sites had BMPs in place that would be generally implemented at all types of construction sites in California.

ii. ***Turbidity***

BPJ was used to develop an NAL that can be used as a learning tool to help dischargers improve their site controls, and to provide meaningful information on the effectiveness of storm water controls. A statewide turbidity NAL has been set at 250 NTU.

G. Receiving Water Limitations

Construction-related activities that cause or contribute to an exceedance of water quality standards must be addressed. The dynamic nature of construction activity gives the discharger the ability to quickly identify and monitor the source of the exceedances. This is because when storm water mobilizes sediment, it provides visual cues as to where corrective actions should take place and how effective they are once implemented.

This General Permit requires that storm water discharges and authorized non-storm water discharges must not contain pollutants that cause or contribute to an exceedance of any applicable water quality objective or water quality standards. The monitoring requirements in this General Permit for sampling and analysis procedures will help determine whether BMPs installed and maintained are preventing pollutants in discharges from the construction site that may cause or contribute to an exceedance of water quality standards.

Water quality standards consist of designated beneficial uses of surface waters and the adoption of ambient criteria necessary to protect those uses. When adopted by the State Water Board or a Regional Water Board, the ambient criteria are termed “water quality objectives.” If storm water runoff from construction sites contains pollutants, there is a risk that those pollutants could enter surface waters and cause or contribute to an exceedance of water quality standards. For that reason, dischargers should be aware of the applicable water quality standards in their receiving waters. (The best method to ensure compliance with receiving water limitations is to implement BMPs that prevent pollutants from contact with storm water or from leaving the construction site in runoff.)

In California, water quality standards are published in the Basin Plans adopted by each Regional Water Board, the California Toxics Rule (CTR), the National Toxics Rule (NTR), and the Ocean Plan.

Dischargers can determine the applicable water quality standards by contacting Regional Water Board staff or by consulting one of the following sources. The actual Basin Plans that contain the water quality standards can be viewed at the website of the appropriate Regional Water Board. (http://www.waterboards.ca.gov/regions.html), the State Water Board site for statewide plans (http://www.waterboards.ca.gov/plnspols/index.html), or the USEPA regulations for the NTR and CTR (40 C.F.R. §§ 131.36-38). Basin Plans and statewide plans are also available by mail from the appropriate Regional Water Board or the State Water Board. The USEPA regulations are available at http://www.epa.gov/. Additional information concerning water quality standards can be accessed through http://www.waterboards.ca.gov/stormwtr/gen_const.html.

[11] Caltrans Construction Sites Runoff Characterization Study, 2002. Available at: http://www.dot.ca.gov/hq/env/stormwater/pdf/CTSW-RT-02-055.pdf.

H. Training Qualifications and Requirements

The Blue Ribbon Panel (BRP) made the following observation about the lack of industry-specific training requirements:

"Currently, there is no required training or certification program for contractors, preparers of soil erosion and sediment control Storm Water Pollution Prevention Plans, or field inspectors."

Order 99-08-DWQ required that all dischargers train their employees on how to comply with the permit, but it did not specificy a curriculum or certification program. This has resulted in inconsistent implementation by all affected parties - the dischargers, the local governments where the construction activity occurs, and the regulators required to enforce 99-08-DWQ. This General Permit requires Qualified SWPPP Developers and practitioners to obtain appropriate training, and makes this curriculum mandatory two years after adoption, to allow time for course completion. The State and Regional Water Board are working with many stakeholders to develop the curriculum and mechanisms needed to develop and deliver the courses.

To ensure that the preparation, implementation, and oversight of the SWPPP is sufficient for effective pollution prevention, the Qualified SWPPP Developer and Qualified SWPPP Practitioners responsible for creating, revising, overseeing, and implementing the SWPPP must attend a State Water Board-sponsored or approved Qualified SWPPP Developer and Qualified SWPPP Practitioner training course.

I. Sampling, Monitoring, Reporting and Record Keeping

1. Traditional Construction Monitoring Requirements

This General Permit requires visual monitoring at all sites, and effluent water quality at all Risk Level 2 & 3 sites. It requires receiving water monitoring at some Risk Level 3 sites. All sites are required to submit annual reports, which contain various types of information, depending on the site characteristics and events. A summary of the monitoring and reporting requirements is found in Table 4.

Table 4 - Required Monitoring Elements for Risk Levels

	Visual	Non-visible Pollutant	Effluent	Receiving Water
Risk Level 1	three types required for all Risk Levels: non-storm water, pre-rain and post-rain	As needed for all Risk Levels (see below)	where applicable	not required
Risk Level 2			pH, turbidity	not required
Risk Level 3			(if NEL exceeded) pH, turbidity and SSC	(if NEL exceeded) pH, turbidity and SSC. Bioassessment for sites 30 acres or larger.

a. Visual

All dischargers are required to conduct quarterly, non-storm water visual inspections. For these inspections, the discharger must visually observe each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources. For storm-related inspections, dischargers must visually observe storm water discharges at all discharge locations within two business days after a qualifying event. For this requirement, a qualifying rain event is one producing precipitation of ½ inch or more of discharge. Dischargers must conduct a post-storm event inspection to

(1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify any additional BMPs necessary and revise the SWPPP accordingly. Dischargers must maintain on-site records of all visual observations, personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

b. Non-Visible Pollutant Monitoring

This General Permit requires that all dischargers develop a sampling and analysis strategy for monitoring pollutants that are not visually detectable in storm water. Monitoring for non-visible pollutants must be required at any construction site when the exposure of construction materials occurs and where a discharge can cause or contribute to an exceedance of a water quality objective.

Of significant concern for construction discharges are the pollutants found in materials used in large quantities at construction sites throughout California and exposed throughout the rainy season, such as cement, flyash, and other recycled materials or by-products of combustion. The water quality standards that apply to these materials will depend on their composition. Some of the more common storm water pollutants from construction activity are not CTR pollutants. Examples of non-visible pollutants include glyphosate (herbicides), diazinon and chlorpyrifos (pesticides), nutrients (fertilizers), and molybdenum (lubricants). The use of diazinon and chlorpyrifos is a common practice among landscaping professionals and may trigger sampling and analysis requirements if these materials come into contact with storm water. High pH values from cement and gypsum, high pH and SSC from wash waters, and chemical/fecal contamination from portable toilets, also are not CTR pollutants. Although some of these constituents do have numeric water quality objectives in individual Basin Plans, many do not and are subject only to narrative water quality standards (i.e. not causing toxicity). Dischargers are encouraged to discuss these issues with Regional Water Board staff and other storm water quality professionals.

The most effective way to avoid the sampling and analysis requirements, and to ensure permit compliance, is to avoid the exposure of construction materials to precipitation and storm water runoff. Materials that are not exposed do not have the potential to enter storm water runoff, and therefore receiving waters sampling is not required. Preventing contact between storm water and construction materials is one of the most important BMPs at any construction site.

Preventing or eliminating the exposure of pollutants at construction sites is not always possible. Some materials, such as soil amendments, are designed to be used in a manner that will result in exposure to storm water. In these cases, it is important to make sure that these materials are applied according to the manufacturer's instructions and at a time when they are unlikely to be washed away. Other construction materials can be exposed when storage, waste disposal or the application of the material is done in a manner not protective of water quality. For these situations, sampling is required unless there is capture and containment of all storm water that has been exposed. In cases where construction materials may be exposed to storm water, but the storm water is contained and is not allowed to run off the site, sampling will only be required when inspections show that the containment failed or is breached, resulting in potential exposure or discharge to receiving waters.

The discharger must develop a list of potential pollutants based on a review of potential sources, which will include construction materials soil amendments, soil treatments, and historic contamination at the site. The discharger must review existing environmental and real estate documentation to determine the potential for pollutants that could be present on the construction site as a result of past land use activities.

Good sources of information on previously existing pollution and past land uses include:

i. Environmental Assessments;

ii. Initial Studies;

iii. Phase 1 Assessments prepared for property transfers; and

iv. Environmental Impact Reports or Environmental Impact Statements prepared under the requirements of the National Environmental Policy Act or the California Environmental Quality Act.

In some instances, the results of soil chemical analyses may be available and can provide additional information on potential contamination.

The potential pollutant list must include all non-visible pollutants that are known or should be known to occur on the construction site including, but not limited to, materials that:

i. are being used in construction activities;

ii. are stored on the construction site;

iii. were spilled during construction operations and not cleaned up;

iv. were stored (or used) in a manner that created the potential for a release of the materials during past land use activities;

v. were spilled during previous land use activities and not cleaned up; or

vi. were applied to the soil as part of past land use activities.

C. Effluent Monitoring

Federal regulations[12] require effluent monitoring for discharges subject to NALs and NELs. Subsequently, all Risk Level 2 and 3 dischargers must perform sampling and analysis of effluent discharges to characterize discharges associated with construction activity from the entire area disturbed by the project. Dischargers must collect samples of stored or contained storm water that is discharged subsequent to a storm event producing precipitation of ½ inch or more at the time of discharge.

Table 5 - Storm Water Effluent Monitoring Requirements by Risk Level

	Frequency	Effluent Monitoring (Section E, below)
Risk Level 1	when applicable	non-visible pollutant parameters (if applicable)
Risk Level 2	Minimum of 3 samples per day during qualifying rain event characterizing discharges associated with construction activity from the entire project disturbed area.	pH, turbidity, and non-visible pollutant parameters (if applicable)
Risk Level 3	Minimum of 3 samples per day during qualifying rain event characterizing discharges associated with construction activity from the entire project disturbed area.	If NEL exceeded: pH, turbidity and suspended sediment concentration (SSC)., Plus non-visible pollutant parameters if applicable

Risk Level 1 dischargers must analyze samples for:

[12] 40 C.F.R. § 122.44.

i. any parameters indicating the presence of pollutants identified in the pollutant source assessment required in Attachment C contained in the General Permit.

Risk Level 2 dischargers must analyze samples for:

i. pH and turbidity;

ii. any parameters indicating the presence of pollutants identified in the pollutant source assessment required in Attachment D contained in the General Permit, and

iii. any additional parameters for which monitoring is required by the Regional Water Board.

Risk Level 3 dischargers must analyze samples for:

i. pH, turbidity and SSC;

ii. any parameters indicating the presence of pollutants identified in the pollutant source assessment required in Attachment E contained in the General Permit, and

iii. any additional parameters for which monitoring is required by the Regional Water Board.

2. **Linear Monitoring and Sampling Requirements**

Attachment A, establishes minimum monitoring and reporting requirements for all LUPs. It establishes different monitoring requirements depending on project complexity and risk to water quality. The monitoring requirements for Type 1 LUPs are less than Type 2 & 3 projects because Type 1 projects have a lower potential to impact water quality.

A discharger shall prepare a monitoring program prior to the start of construction and immediately implement the program at the start of construction for LUPs. The monitoring program must be implemented at the appropriate level to protect water quality at all times throughout the life of the project.

a. **Type 1 LUP Monitoring Requirements**

A discharger must conduct daily visual inspections of Type 1 LUPs during working hours while construction activities are occurring. Inspections are to be conducted by qualified personnel and can be conducted in conjunction with other daily activities. Inspections will be conducted to ensure the BMPs are adequate, maintained, and in place at the end of the construction day. The discharger will revise the SWPPP, as appropriate, based on the results of the daily inspections. Inspections can be discontinued in non-active construction areas where soil disturbing activities have been completed and final stabilization has been achieved (e.g., trench has been paved, substructures have been installed, and successful final vegetative cover or other stabilization criteria have been met).

A discharger shall implement the monitoring program for inspecting Type 1 LUPs. This program requires temporary and permanent stabilization BMPs after active construction is completed. Inspection activities will continue until adequate permanent stabilization has been established and will continue in areas where re-vegetation is chosen until minimum vegetative coverage has been established. Photographs shall be taken during site inspections and submitted to the State Water Board.

b. Type 2 & 3 LUP Monitoring Requirements

A discharger must conduct daily visual inspections of Type 2 & 3 LUPs during working hours while construction activities are occurring. Inspections are to be conducted by qualified personnel and can be in conjunction with other daily activities.

All dischargers of Type 2 & 3 LUPs are required to conduct inspections by qualified personnel of the construction site during normal working hours prior to all anticipated storm events and after actual storm events. During extended storm events, the discharger shall conduct inspections during normal working hours for each 24-hour period. Inspections can be discontinued in non-active construction areas where soil disturbing activities have been completed and final stabilization has been achieved (e.g., trench has been paved, substructures installed, and successful vegetative cover or other stabilization criteria have been met).

The goals of these inspections are (1) to identify areas contributing to a storm water discharge; (2) to evaluate whether measures to reduce pollutant loadings identified in the SWPPP are adequate and properly installed and functioning in accordance with the terms of the General Permit; and (3) to determine whether additional control practices or corrective maintenance activities are needed. Equipment, materials, and workers must be available for rapid response to failures and emergencies. All corrective maintenance to BMPs shall be performed as soon as possible, depending upon worker safety.

All dischargers shall develop and implement a monitoring program for inspecting Type 2 & 3 LUPs that require temporary and permanent stabilization BMPs after active construction is completed. Inspections will be conducted to ensure the BMPs are adequate and maintained. Inspection activities will continue until adequate permanent stabilization has been established and will continue in areas where revegetation is chosen until minimum vegetative coverage has been established.

A log of inspections conducted before, during, and after the storm events must be maintained in the SWPPP. The log will provide the date and time of the inspection and who conducted the inspection. Photographs must be taken during site inspections and submitted to the State Water Board.

c. Sampling Requirements for all LUP Project Types

LUPs are also subject to sampling and analysis requirements for visible pollutants (i.e., sedimentation/siltation, turbidity) and for non-visible pollutants.

Sampling for visible pollutants is required for Type 2 & 3 LUPs.

Non-visible pollutant monitoring is required for pollutants associated with construction sites and activities that (1) are not visually detectable in storm water discharges, and (2) are known or should be known to occur on the construction site, and (3) could cause or contribute to an exceedance of water quality objectives in the receiving waters. Sample collection for non-visible pollutants must only be required (1) during a storm event when pollutants associated with construction activities may be discharged with storm water runoff due to a spill, or in the event there was a breach, malfunction, failure, and/or leak of any BMP, and (2) when the discharger has failed to adequately clean the area of material and pollutants. Failure to implement appropriate BMPs will trigger the same sampling requirements as those required for a breach, malfunction and/or leak, or when the discharger has failed to implement appropriate BMPs prior to the next storm event.

Additional monitoring parameters may be required by the Regional Water Boards.

It is not anticipated that many LUPs will be required to collect samples for pollutants not visually detected in runoff due to the nature and character of the construction site and activities as previously described in this fact sheet. Most LUPs are constructed in urban areas with public access (e.g., existing roadways, road shoulders, parking areas, etc.). This raises a concern regarding the potential contribution of pollutants from vehicle use and/or from normal activities of the public (e.g., vehicle washing, landscape fertilization, pest spraying, etc.) in runoff from the project site. Since the dischargers are not the land

owners of the project area and are not able to control the presence of these pollutants in the storm water that runs through their projects, it is not the intent of this General Permit to require dischargers to sample for these pollutants. This General Permit does not require the discharger to sample for these types of pollutants except where the discharger has brought materials onsite that contain these pollutants and when a condition (e.g., breach, failure, etc.) described above occurs.

3. Receiving Water Monitoring

In order to ensure that receiving water limitations are met, discharges subject to numeric effluent limitations (i.e., Risk Level 3, LUP Type 3, and ATS with direct discharges into receiving waters) must also monitor the downstream receiving water(s) for turbidity, SSC, and pH (if applicable) when an NEL is exceeded.

a. Bioassessment Monitoring

This General Permit requires a bioassessment of receiving waters for dischargers of Risk Level 3 or LUP Type 3 construction projects equal to or larger than 30 acres with direct discharges into receiving waters. Benthic macroinvertebrate samples will be taken upstream and downstream of the site's discharge point in the receiving water. Bioassessments measure the quality of the stream by analyzing the aquatic life present. Higher levels of appropriate aquatic species tend to indicate a healthy stream; whereas low levels of organisms can indicate stream degradation. Active construction sites have the potential to discharge large amounts of sediment and pollutants into receiving waters. Requiring a bioassessment for large project sites, with the most potential to impact water quality, provides a snapshot of the health of the receiving water prior to initiation of construction activities. This snapshot can be used in comparison to the health of the receiving water after construction has commenced.

Each ecoregion (biologically and geographically related area) in the State has a specific yearly peak time where stream biota is in a stable and abundant state. This time of year is called an Index Period. The bioassessment requirements in this General Permit, requires benthic macroinvertebrate sampling within a sites index period. The State Water Board has developed a map designating index periods for the ecoregions in the State (see State Water Board Website).

This General Permit requires the bioassessment methods to be in accordance with the Surface Water Ambient Monitoring Program (SWAMP) in order to provide data consistency within the state as well as generate useable biological stream data.

Table 6 - Receiving Water Monitoring Requirements

	Receiving Water Monitoring Parameters
Risk Level 1 /LUP Type 1	not required
Risk Level 2 / LUP Type 2	not required
Risk Level 3 / LUP Type 3	If NEL exceeded: pH (if applicable), turbidity, and SSC. Bioassessment for sites 30 acres or larger.

4. Reporting Requirements

a. NEL Violation Report

All Risk Level 3 and LUP Type 3 dischargers must electronically submit all storm event sampling results to the State and Regional Water Boards, via SMARTS, no later than 5 days after the conclusion of the storm event. The purpose of the electronic filing of the NEL Violation Report is to 1) inform stakeholder agencies and organizations and the general public, and 2) notify the State and Regional Water Boards of

the exceedance so that they can determine whether any follow-up (e.g., inspection, enforcement, etc.) is necessary to bring the site into compliance.

In the event that an applicable NEL has been exceeded during a storm event equal to or larger than the Compliance Storm Event, Risk level 3/LUP Type 3 dischargers shall report the on-site rain gauge reading and nearby governmental rain gauge readings for verification. Specifically, the NEL Exceedance Report is required to contain:

- the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit are to be reported as "less than the method detection limit or <MDL");
- the date, place, and time of sampling;
- any visual observation (inspections);
- any measurements, including precipitation; and
- a description of the current BMPs associated with the effluent sample that exceeded the NEL and any proposed corrective actions taken.

b. **NAL Exceedance Report**

All Risk Level 3 and LUP Type 3 dischargers must electronically submit all storm event sampling results to the State and Regional Water Boards, via the electronic data system, no later than 5 days after the conclusion of the storm event. In the event that any effluent sample exceeds an applicable NAL, all Risk Level 2 and LUP Type 2 dischargers must electronically submit all storm event sampling results to the State and Regional Water Boards no later than 10 days after the conclusion of the storm event. The Regional Water Boards have the authority to require the submittal of an NAL Exceedance Report.

Specifically, the NAL Exceedance Report is required to contain:

- the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit are to be reported as "less than the method detection limit or <MDL");
- the date, place, and time of sampling;
- any visual observation (inspections);
- any measurements, including precipitation; and
- a description of the current BMPs associated with the effluent sample that exceeded the NAL and any proposed corrective actions taken.

c. **Annual Report**

All dischargers must prepare and electronically submit an annual report no later than September 1 of each year using the Storm water Multi-Application Reporting and Tracking System (SMARTS). The Annual Report must include a summary and evaluation of all sampling and analysis results, original laboratory reports, chain of custody forms, a summary of all corrective actions taken during the compliance year, and identification of any compliance activities or corrective actions that were not implemented.

5. Record Keeping

According to 40 C.F.R. Parts 122.21(p) and 122.41(j), the discharger is required to retain paper or electronic copies of all records required by this General Permit for a period of at least three years from the date generated or the date submitted to the State Water Board or Regional Water Boards. A discharger must retain records for a period beyond three years as directed by Regional Water Board.

J. Risk Determination

1. Traditional Projects

a. Overall Risk Determination

There are two major requirements related to site planning and risk determination in this General Permit. The project's overall risk is broken up into two elements – (1) project sediment risk (the relative amount of sediment that can be discharged, given the project and location details) and (2) receiving water risk (the risk sediment discharges pose to the receiving waters).

Project Sediment Risk:
Project Sediment Risk is determined by multiplying the R, K, and LS factors from the Revised Universal Soil Loss Equation (RUSLE) to obtain an estimate of project-related bare ground soil loss expressed in tons/acre. The RUSLE equation is as follows:

A = (R)(K)(LS)(C)(P)

Where: A = the rate of sheet and rill erosion
R = rainfall-runoff erosivity factor
K = soil erodibility factor
LS = length-slope factor
C = cover factor (erosion controls)
P = management operations and support practices (sediment controls)

The C and P factors are given values of 1.0 to simulate bare ground conditions.

There is a map option and a manual calculation option for determining soil loss. For the map option, the R factor for the project is calculated using the online calculator at http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm. The product of K and LS are shown on Figure 1. To determine soil loss in tons per acre, the discharger multiplies the R factor times the value for K times LS from the map.

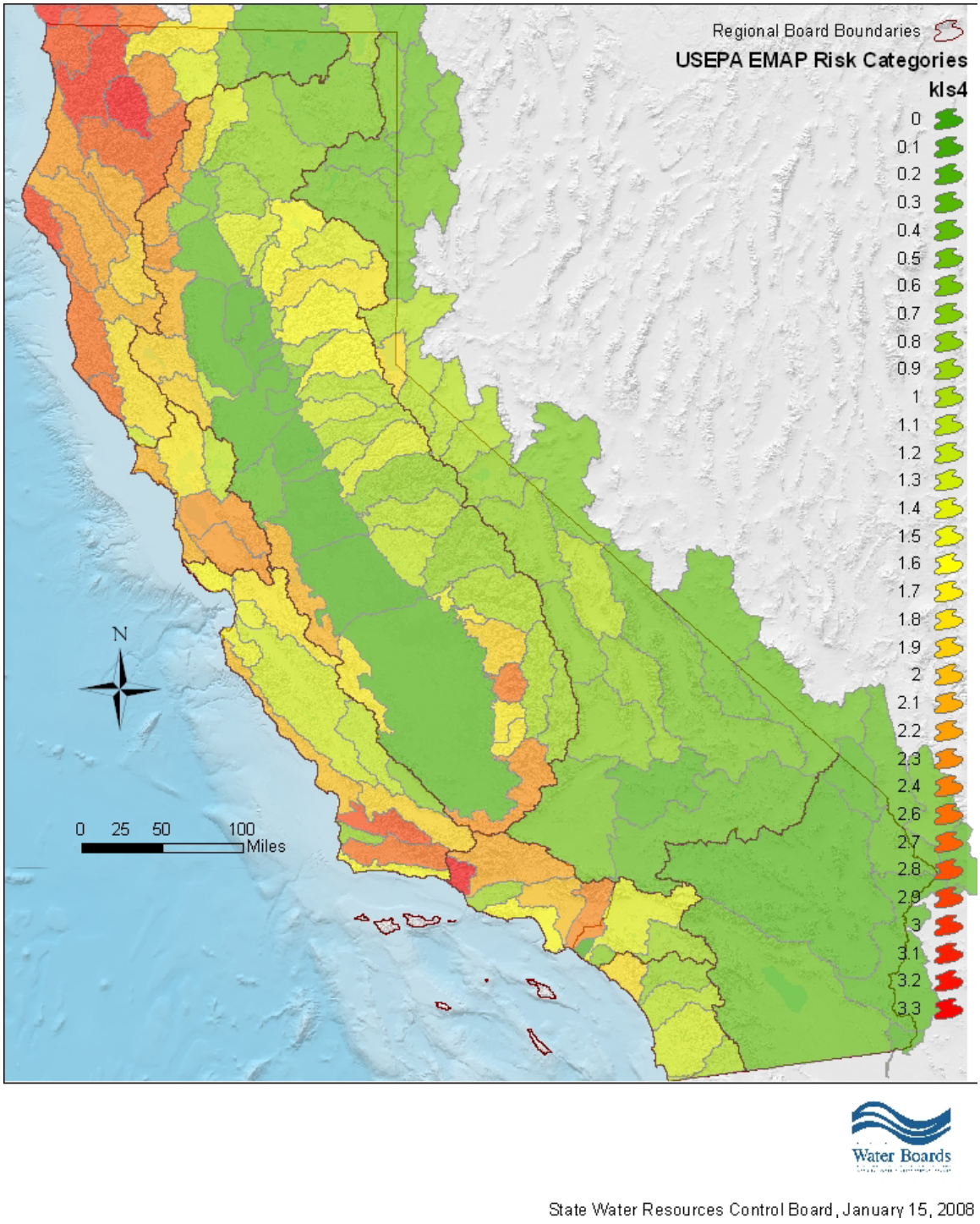


Figure 1 -Statewide Map of K * LS

For the manual calculation option, the R factor for the project is calculated using the online calculator at http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm. The K and LS factors are determined using Appendix 1.

Soil loss of less than 15 tons/acre is considered **low** sediment risk.
Soil loss between 15 and 75 tons/acre is **medium** sediment risk.
Soil loss over 75 tons/acre is considered **high** sediment risk.

The soil loss values and risk categories were obtained from mean and standard deviation RKLS values from the USEPA EMAP program. High risk is the mean RKLS value plus two standard deviations. Low risk is the mean RKLS value minus two standard deviations.

Receiving Water Risk:
Receiving water risk is based on whether a project drains to a sediment-sensitive waterbody. A sediment-sensitive waterbody is either

on the most recent 303d list for waterbodies impaired for sediment;
has a USEPA-approved Total Maximum Daily Load implementation plan for sediment; **or**
has the beneficial uses of COLD, SPAWN, and MIGRATORY.

A project that meets at least one of the three criteria has a high receiving water risk. A list of sediment-sensitive waterbodies will be posted on the State Water Board's website. It is anticipated that an interactive map of sediment sensitive water bodies in California will be available in the future.

The Risk Levels have been altered by eliminating the possibility of a Risk Level 4, and expanding the constraints for Risk Levels 1, 2, and 3. Therefore, projects with high receiving water risk and high sediment risk will be considered a Risk Level 3 risk to water quality.

In response to public comments, the Risk Level requirements have also been changed such that Risk Level 1 projects will be subject to minimum BMP and visual monitoring requirements, Risk Level 2 projects will be subject to NALs and some additional monitoring requirements, and Risk Level 3 projects will be subject to NELs, and more rigorous monitoring requirements such as receiving water monitoring and in some cases bioassessment.

Table 7 - Combined Risk Level Matrix

Combined Risk Level Matrix				
Receiving Water Risk		Sediment Risk		
		Low Medium		High
	Low	Level 1	Level 2	
	High	Level 2		Level 3

b. **Effluent Standards**

All dischargers are subject to the narrative effluent limitations specified in the General Permit. The narrative effluent limitations require storm water discharges associated with construction activity to meet all applicable provisions of Sections 301 and 402 of the CWA. These provisions require controls of pollutant discharges that utilize BAT and BCT to reduce pollutants and any more stringent controls necessary to meet water quality standards.

Risk Level 2, and 3 dischargers are subject to numeric effluent standards comparable to the project's risk to water quality. Risk Level 2 dischargers that pose a medium risk to water quality are subject to technology-based NALs for pH and turbidity. Risk Level 3 dischargers that pose a high risk to water quality are subject to technology-based NALs and technology-based NELs for pH and turbidity.

c. Good Housekeeping

Proper handling and managing of construction materials can help minimize threats to water quality. The discharger must consider good housekeeping measures for: construction materials, waste management, vehicle storage & maintenance, landscape materials, and potential pollutant sources. Examples include; conducting an inventory of products used, implementing proper storage & containment, and properly cleaning all leaks from equipment and vehicles.

d. Non-Storm Water Management

Non-storm water discharges directly connected to receiving waters or the storm drain system have the potential to negatively impact water quality. The discharger must implement measures to control all non-storm water discharges during construction, and from dewatering activities associated with construction. Examples include; properly washing vehicles in contained areas, cleaning streets, and minimizing irrigation runoff.

e. Erosion Control

The best way to minimize the risk of creating erosion and sedimentation problems during construction is to disturb as little of the land surface as possible by fitting the development to the terrain. When development is tailored to the natural contours of the land, little grading is necessary and, consequently, erosion potential is lower.[14] Other effective erosion control measures include: preserving existing vegetation where feasible, limiting disturbance, and stabilizing and re-vegetating disturbed areas as soon as possible after grading or construction activities. Particular attention must be paid to large, mass-graded sites where the potential for soil exposure to the erosive effects of rainfall and wind is great and where there is potential for significant sediment discharge from the site to surface waters. Until permanent vegetation is established, soil cover is the most cost-effective and expeditious method to protect soil particles from detachment and transport by rainfall. Temporary soil stabilization can be the single most important factor in reducing erosion at construction sites. The discharger is required to consider measures such as: covering disturbed areas with mulch, temporary seeding, soil stabilizers, binders, fiber rolls or blankets, temporary vegetation, and permanent seeding. These erosion control measures are only examples of what should be considered and should not preclude new or innovative approaches currently available or being developed. Erosion control BMPs should be the primary means of preventing storm water contamination, and sediment control techniques should be used to capture any soil that becomes eroded.[13]

Risk Level 3 dischargers pose a higher risk to water quality and are therefore additionally required to ensure that post-construction soil loss is equivalent to or less than the pre-construction levels.

f. Sediment Control

Sediment control BMPs should be the secondary means of preventing storm water contamination. When erosion control techniques are ineffective, sediment control techniques should be used to capture any soil that becomes eroded. The discharger is required to consider perimeter control measures such as: installing silt fences or placing straw wattles below slopes. These sediment control measures are only examples of what should be considered and should not preclude new or innovative approaches currently available or being developed.

Because Risk Level 2 and 3 dischargers pose a higher risk to water quality, additional requirements for the application of sediment controls are imposed on these projects. This General Permit also authorizes the Regional Water Boards to require Risk Level 3 dischargers to implement additional site-specific

[13] U.S. Environmental Protection Agency. 2007. Developing Your Storm Water Pollution Prevention Plan: A Guide for Construction Sites.

sediment control requirements if the implementation of other erosion or sediment controls are not adequately protecting the receiving waters.

g. Run-on and Runoff Control

Inappropriate management of run-on and runoff can result in excessive physical impacts to receiving waters from sediment and increased flows. The discharger is required to manage all run-on and runoff from a project site. Examples include: installing berms and other temporary run-on and runoff diversions.

Risk Level 1 dischargers with lower risks to impact water quality are not subject to the run-on and runoff control requirements unless an evaluation deems them necessary or visual inspections show that such controls are required.

h. Inspection, Maintenance and Repair

All measures must be periodically inspected, maintained and repaired to ensure that receiving water quality is protected. Frequent inspections coupled with thorough documentation and timely repair is necessary to ensure that all measures are functioning as intended.

i. Rain Event Action Plan (REAP)

A Rain Event Action Plan (REAP) is a written document, specific for each rain event. A REAP should be designed that when implemented it protects all exposed portions of the site within 48 hours of any likely precipitation event forecast of 50% or greater probability.

This General Permit requires Risk Level 2 and 3 dischargers to develop and implement a REAP designed to protect all exposed portions of their sites within 48 hours prior to any likely precipitation event. The REAP requirement is designed to ensure that the discharger has adequate materials, staff, and time to implement erosion and sediment control measures that are intended to reduce the amount of sediment and other pollutants generated from the active site. A REAP must be developed when there is likely a forecast of 50% or greater probability of precipitation in the project area. (The National Oceanic and Atmospheric Administration (NOAA) defines a chance of precipitation as a probability of precipitation of 30% to 50% chance of producing precipitation in the project area.[14] NOAA defines the probability of precipitation (PoP) as the likelihood of occurrence (expressed as a percent) of a measurable amount (0.01 inch or more) of liquid precipitation (or the water equivalent of frozen precipitation) during a specified period of time at any given point in the forecast area.) Forecasts are normally issued for 12-hour time periods. Descriptive terms for uncertainty and aerial coverage are used as follows:

Table 8 -National Oceanic and Atmospheric Administration (NOAA) Definition of Probability of Precipitation (PoP)

PoP	Expressions of Uncertainty	Aerial Coverage
0%	none used	none used
10%	none used	isolated
20%	slight chance	isolated
30-50%	chance	scattered

[14] http://www.crh.noaa.gov/lot/severe/wxterms.php.

60-70%	likely	numerous
80-100%	none used	none used

The discharger must obtain the precipitation forecast information from the National Weather Service Forecast Office (http://www.srh.noaa.gov/).

2. Linear Projects

a. Linear Risk Determination

LUPs vary in complexity and water quality concerns based on the type of project. This General Permit has varying application requirements based on the project's risk to water quality. Factors that lead to the characterization of the project include location, sediment risk, and receiving water risk.

Based on the location and complexity of a project area or project section area, LUPs are separated into project types. As described below, LUPs have been categorized into three project types.

i. *Type 1 LUPs*

Type 1 LUPs are those construction projects where:

(1) 70 percent or more of the construction activity occurs on a paved surface and where areas disturbed during construction will be returned to preconstruction conditions or equivalent protection established at the end of the construction activities for the day, or

(2) greater than 30 percent of construction activities occur within the non-paved shoulders or land immediately adjacent to paved surfaces, or where construction occurs on unpaved improved roads, including their shoulders or land immediately adjacent to them where:

Areas disturbed during construction will be returned to pre-construction conditions or equivalent protection established at the end of the construction activities for the day to minimize the potential for erosion and sediment deposition, and

Areas where established vegetation was disturbed during construction will be stabilized and re-vegetated by the end of project. When required, adequate temporary stabilization Best Management Practices (BMPs) will be installed and maintained until vegetation is established to meet minimum cover requirements established in this General Permit for final stabilization.

Type 1 LUPs typically do not have a high potential to impact storm water quality because (1) these construction activities are not typically conducted during a rain event, (2) these projects are normally constructed over a short period of time[15], minimizing the duration that pollutants could potentially be exposed to rainfall; and (3) disturbed soils such as those from trench excavation are required to be hauled away, backfilled into the trench, and/or covered (e.g., metal plates, pavement, plastic covers over spoil piles) at the end of the construction day.

[15] Short period of time refers to a project duration of weeks to months, but typically less than one year in duration.

Type 1 LUPs are determined during the risk assessment found in Attachment A.1 to be 1) low sediment risk and low receiving water risk; 2) low sediment risk and medium receiving water risk; and 3) medium sediment risk and low receiving water risk.

This General Permit requires the discharger to ensure a SWPPP is developed for these construction activities that is specific to project type, location and characteristics.

ii. ***Type 2 LUPs:***

Type 2 projects are determined to have a combination of High, Medium, and Low project sediment risk along with High, Medium, and Low receiving water risk. Like Type 1 projects, Type 2 projects are typically constructed over a short period of time. However, these projects have a higher potential to impact water quality because they:

(1) typically occur outside the more urban/developed areas;

(2) have larger areas of soil disturbance that are not closed or restored at the end of the day;

(3) may have onsite stockpiles of soil, spoil and other materials;

(4) cross or occur in close proximity to a wide variety of sensitive resources that may include, but are not limited to, steep topography and/or water bodies; and

(5) have larger areas of disturbed soils that may be exposed for a longer time interval before final stabilization, cleanup and/or reclamation occurs.

This General Permit requires the discharger to develop and implement a SWPPP for these construction activities that are specific for project type, location and characteristics.

iii. ***Type 3 LUPs:***

Type 3 projects are determined to have a combination of High and Medium project sediment risk along with High and Medium receiving water risk. Similar to Type 2 projects, Type 3 projects have a higher potential to impact water quality because they:

(1) typically occur outside of the more urban/developed areas;

(2) have larger areas of soil disturbance that are not closed or restored at the end of the day;

(3) may have onsite stockpiles of soil, spoil and other materials;

(4) cross or occur in close proximity to a wide variety of sensitive resources that may include, but are not limited to, steep topography and/or water bodies; and

(5) have larger areas of disturbed soils that may be exposed for a longer time interval before final stabilization, cleanup and/or reclamation occurs.

This General Permit requires the discharger to develop and implement a SWPPP for these construction activities that are specific for project type, location, and characteristics.

b. **Linear Effluent Standards**

All LUPs are subject to the narrative effluent limitations specified in the General Permit.

Type 2 and 3 LUPs are subject to NELs comparable to the project type's risk to water quality. Type 2 projects that pose an intermediate risk to water quality are subject to technology-based NALs for pH and turbidity. Type 3 projects posing a high risk to water quality are subject to technology-based NALs and NELs for pH and turbidity.

c. Linear Good Housekeeping

Improper use and handling of construction materials could potentially cause a threat to water quality. In order to ensure proper site management of these construction materials, all LUP dischargers must comply with a minimum set of Good Housekeeping measures specified in Attachment A of this General Permit.

d. Linear Non-Storm Water Management

In order to ensure control of all non-storm water discharges during construction, all LUP dischargers must comply with the Non-Storm Water Management measures specified in Attachment A of this General Permit.

e. Linear Erosion Control

This General Permit requires all LUP dischargers to implement effective wind erosion control measures, and soil cover for inactive areas. Type 3 LUPs posing a higher risk to water quality are additionally required to ensure the post-construction soil loss is equivalent to or less than the pre-construction levels.

f. Linear Sediment Control

In order to ensure control and containment of all sediment discharges, all LUP dischargers must comply with the general Sediment Control measures specified in Attachment A or this General Permit. Additional requirements for sediment controls are imposed on Type 2 & 3 LUPs due to their higher risk to water quality.

g. Linear Run-on and Runoff Control

Discharges originating outside of a project's perimeter and flowing onto the property can adversely affect the quantity and quality of discharges originating from a project site. In order to ensure proper management of run-on and runoff, all LUPs must comply with the run-on and runoff control measures specified in Attachment A of this General Permit. Due to the lower risk of impacting water quality, Type 1 LUPs are not required to implement run-on and runoff controls unless deemed necessary by the discharger.

h. Linear Inspection, Maintenance and Repair

Proper inspection, maintenance, and repair activities are important to ensure the effectiveness of on-site measures to control water quality. In order to ensure that inspection, maintenance, and repair activities are adequately performed, the all LUP dischargers a re required to comply with the Inspection, Maintenance, and Repair requirements specified in Attachment A of this General Permit.

K. ATS[16] Requirements

There are instances on construction sites where traditional erosion and sediment controls do not effectively control accelerated erosion. Under such circumstances, or under circumstances where storm water discharges leaving the site may cause or contribute to an exceedance of a water quality standard, the use of an Active Treatment System (ATS) may be necessary. Additionally, it may be appropriate to use an ATS when site constraints inhibit the ability to construct a correctly sized sediment basin, when clay and/or highly erosive soils are present, or when the site has very steep or long slope lengths.[17]

Although treatment systems have been in use in some form since the mid-1990s, the ATS industry in California is relatively young, and detailed regulatory standards have not yet been developed. Many developers are using these systems to treat storm water discharges from their construction sites. The new ATS requirements set forth in this General Permit are based on those in place for small wastewater treatment systems, ATS regulations from the Central Valley Regional Water Quality Control Board (September 2005 memorandum "2005/2006 Rainy Season – Monitoring Requirements for Storm Water Treatment Systems that Utilize Chemical Additives to Enhance Sedimentation"), the Construction Storm Water Program at the State of Washington's Department of Ecology, as well as recent advances in technology and knowledge of coagulant performance and aquatic safety.

The effective design of an ATS requires a detailed survey and analysis of site conditions. With proper planning, ATS performance can provide exceptional water quality discharge and prevent significant impacts to surface water quality, even under extreme environmental conditions.

These systems can be very effective in reducing the sediment in storm water runoff, but the systems that use additives/polymers to enhance sedimentation also pose a potential risk to water quality (e.g., operational failure, equipment failure, additive/polymer release, etc.). The State Water Board is concerned about the potential acute and chronic impacts that the polymers and other chemical additives may have on fish and aquatic organisms if released in sufficient quantities or concentrations. In addition to anecdotal evidence of polymer releases causing aquatic toxicity in California, the literature supports this concern.[18] For example, cationic polymers have been shown to bind with the negatively charged gills of fish, resulting in mechanical suffocation.[19] Due to the potential toxicity impacts, which may be caused by the release of additives/polymers into receiving waters, this General Permit establishes residual polymer monitoring and toxicity testing requirements have been established in this General Permit for discharges from construction sites that utilize an ATS in order to protect receiving water quality and beneficial uses.

The primary treatment process in an ATS is coagulation/flocculation. ATS's operate on the principle that the added coagulant is bound to suspended sediment, forming floc, which is gravitationally settled in tanks or a basin, or removed by sand filters. A typical installation utilizes an injection pump upstream from the clarifier tank, basin, or sand filters, which is electronically metered to both flow rate and suspended solids level of the influent, assuring a constant dose. The coagulant mixes and reacts with the influent, forming a dense floc. The floc may be removed by gravitational setting in a clarifier tank or basin, or by filtration. Water from the clarifier tank, basin, or sand filters may be routed through cartridge(s) and/or bag filters for final polishing. Vendor-specific systems use various methods of dose control, sediment/floc removal, filtration, etc., that are detailed in project-specific documentation. The

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[16] An ATS is a treatment system that employs chemical coagulation, chemical flocculation, or electrocoagulation in order to reduce turbidity caused by fine suspended sediment.

[17] Pitt, R., S. Clark, and D. Lake. 2006. Construction Site Erosion and Sediment Controls: Planning, Design, and Performance. DEStech Publications. Lancaster, PA. 370pp.

[18] RomØen, K., B. Thu, and Ø. Evensen. 2002. Immersion delivery of plasmid DNA II. A study of the potentials of a chitosan based delivery system in rainbow trout (*Oncorhynchus mykiss*) fry. *Journal of Controlled Release* **85**: 215-225.

[19] Bullock, G., V. Blazer, S. Tsukuda, and S. Summerfelt. 2000. Toxicity of acidified chitosan for cultured rainbow trout (*Oncorhynchus mykiss*). *Aquaculture* **185**:273-280.

particular coagulant/flocculant to be used for a given project is determined based on the water chemistry of the site because the coagulants are specific in their reactions with various types of sediments. Appropriate selection of dosage must be carefully matched to the characteristics of each site.

ATS's are operated in two differing modes, either Batch or Flow-Through. Batch treatment can be defined as Pump-Treat-Hold-Test-Release. In Batch treatment, water is held in a basin or tank, and is not discharged until treatment is complete. Batch treatment involves holding or recirculating the treated water in a holding basin or tank(s) until treatment is complete or the basin or storage tank(s) is full. In Flow-Through treatment, water is pumped into the ATS directly from the runoff collection system or storm water holding pond, where it is treated and filtered as it flows through the system, and is then directly discharged. "Flow-Through Treatment" is also referred to as "Continuous Treatment."

1. **Effluent Standards**

This General Permit establishes NELs for discharges from construction sites that utilize an ATS. These systems lend themselves to NELs for turbidity and pH because of their known reliable treatment. Advanced systems have been in use in some form since the mid-1990s. An ATS is considered reliable, can consistently produce a discharge of less than 10 NTU, and has been used successfully at many sites in several states since 1995 to reduce turbidity to very low levels.[20]

This General Permit contains "compliance storm event" exceptions from the technology-based NELs for ATS discharges. The rationale is that technology-based requirements are developed assuming a certain design storm. In the case of ATS the industry-standard design storm is 10-year, 24-hour (as stated in Attachment F of this General Permit), so the compliance storm event has been established as the 10-year 24-hour event as well to provide consistency.

2. **Training**

Operator training is critical to the safe and efficient operation and maintenance of the ATS, and to ensure that all State Water Board monitoring and sampling requirements are met. The General Permit requires that all ATS operators have training specific to using ATS's liquid coagulants.

L. Post-Construction Requirements

Under past practices, new and redevelopment construction activities have resulted in modified natural watershed and stream processes. This is caused by altering the terrain, modifying the vegetation and soil characteristics, introducing impervious surfaces such as pavement and buildings, increasing drainage density through pipes and channels, and altering the condition of stream channels through straightening, deepening, and armoring. These changes result in a drainage system where sediment transport capacity is increased and sediment supply is decreased. A receiving channel's response is dependent on dominant channel materials and its stage of adjustment.

Construction activity can lead to impairment of beneficial uses in two main ways. First, during the actual construction process, storm water discharges can negatively affect the chemical, biological, and physical properties of downstream receiving waters. Due to the disturbance of the landscape, the most likely pollutant is sediment, however pH and other non-visible pollutants are also of great concern. Second, after most construction activities are completed at a construction site, the finished project may result in significant modification of the site's response to precipitation. New development and redevelopment

[20] Currier, B., G. Minton, R. Pitt, L. Roesner, K. Schiff, M. Stenstrom, E. Strassler, and E. Strecker. 2006. The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities.

projects have almost always resulted in permanent post-construction water quality impacts because more precipitation ends up as runoff and less precipitation is intercepted, evapotranspired, and infiltrated.

General Permit 99-08-DWQ required the SWPPP to include a description of all post-construction BMPs on a site and a maintenance schedule. An effective storm water management strategy must address the full suite of storm events (water quality, channel protection, overbank flood protection, extreme flood protection) (Figure 2).

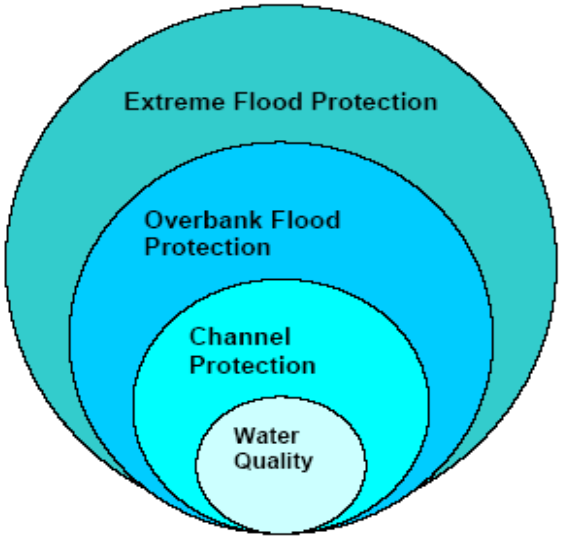


Figure 2 - Suite of Storm Events

The post-construction storm water performance standards in this General Permit specifically address water quality and channel protection events. Overbank flood protection and extreme flood protection events are traditionally dealt with in local drainage and flood protection ordinances. However, measures in this General Permit to address water quality and channel protection also reduce overbank and extreme flooding impacts. This General Permit aims to match post-construction runoff to pre-construction runoff for the 85th percentile storm event, which not only reduces the risk of impact to the receiving water's channel morphology but also provides some protection of water quality.

This General Permit clarifies that its runoff reduction requirements only apply to projects that lie outside of jurisdictions covered by a Standard Urban Storm water Management Plan (SUSMP) (or other more protective) post-construction requirements in either Phase I or Phase II permits.

Figures 3 and 4, below, show the General Permit enrollees (to Order 99-08-DWQ, as of March 10, 2008) overlaid upon a map with SUSMP (or more protective) areas in blue and purple. Areas without blue or purple indicate where the General Permit's runoff reduction requirements would actually apply.

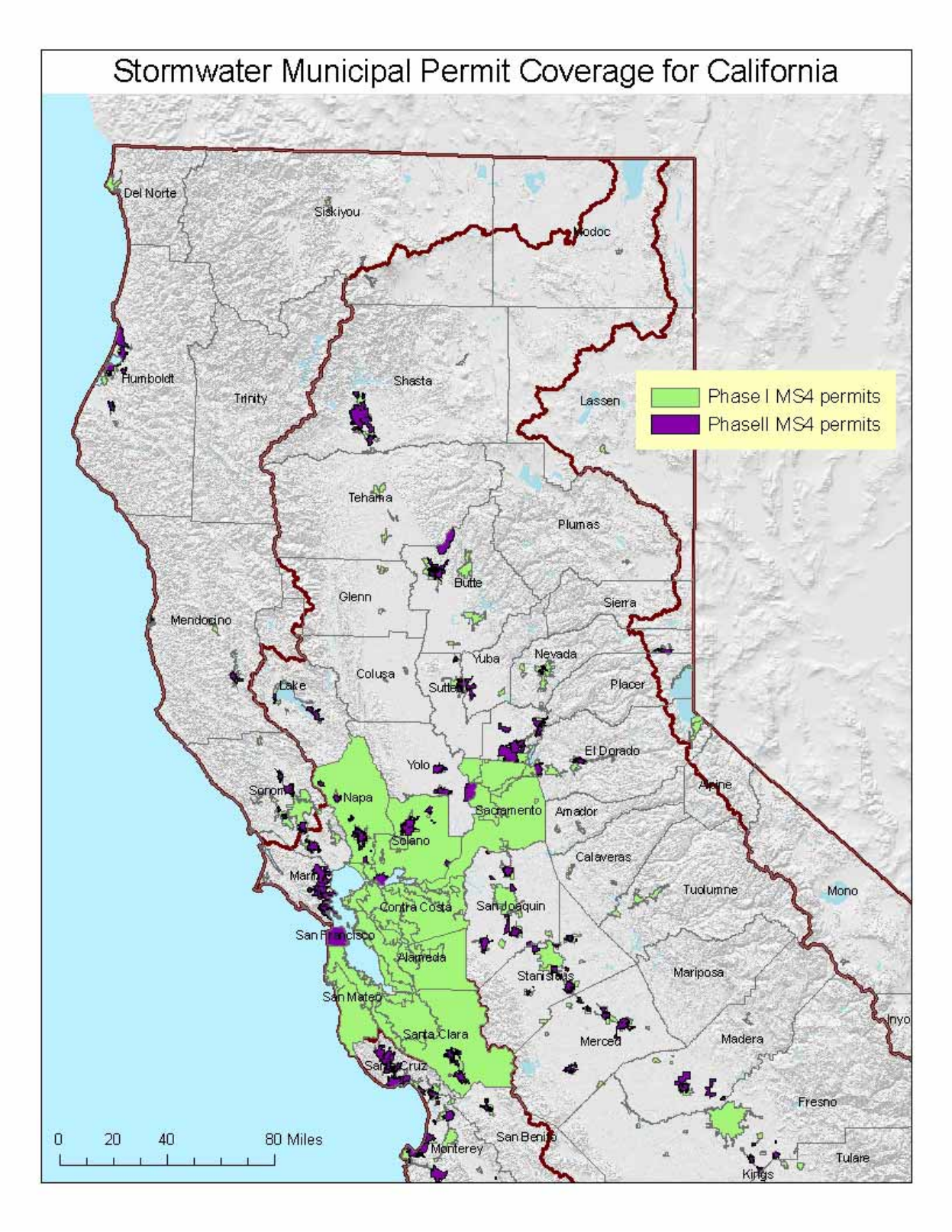


Figure 3 - Northern CA (2009) Counties / Cities With SUSMP-Plus Coverage



Figure 4 - Southern CA (2009) Counties / Cities With SUSMP-Plus Coverage

Water Quality:
This General Permit requires dischargers to replicate the pre-project runoff water balance (defined as the amount of rainfall that ends up as runoff) for the smallest storms up to the 85th percentile storm event, or the smallest storm event that generates runoff, whichever is larger. Contemporary storm water management generally routes these flows directly to the drainage system, increasing pollutant loads and potentially causing adverse effects on receiving waters. These smaller water quality events happen much more frequently than larger events and generate much higher pollutant loads on an annual basis. There are other adverse hydrological impacts that result from not designing according to the site's pre-construction water balance. In Maryland, Klein[21] noted that baseflow decreases as the extent of urbanization increases. Ferguson and Suckling[22] noted a similar relation in watersheds in Georgia. On Long Island, Spinello and Simmons[23] noted substantial decreases in base flow in intensely urbanized watersheds.

The permit emphasizes runoff reduction through on-site storm water reuse, interception, evapo-transpiration and infiltration through non-structural controls and conservation design measures (e.g., downspout disconnection, soil quality preservation/enhancement, interceptor trees). Employing these measures close to the source of runoff generation is the easiest and most cost-effective way to comply with the pre-construction water balance standard. Using low-tech runoff reduction techniques close to the source is consistent with a number of recommendations in the literature.[24] In many cases, BMPs implemented close to the source of runoff generation cost less than end-of the pipe measures.[25] Dischargers are given the option of using Appendix 2 to calculate the required runoff volume or a watershed process-based, continuous simulation model such as the EPA's Storm Water Management Model (SWMMM) or Hydrologic Simulation Program Fortran (HSPF). Such methods used by the discharger will be reviewed by the Regional Water Board upon NOT application.

Channel Protection:
In order to address channel protection, a basic understanding of fluvial geomorphic concepts is necessary. A dominant paradigm in fluvial geomorphology holds that streams adjust their channel dimensions (width and depth) in response to long-term changes in sediment supply and bankfull discharge (1.5 to 2 year recurrence interval). The bankfull stage corresponds to the discharge at which channel maintenance is the most effective, that is, the discharge at which the moving sediment, forming or removing bars, forming or changing bends and meanders, and generally doing work that results in the average morphologic characteristics of channels.[26] Lane (1955 as cited in Rosgen 1996[27]) showed the generalized relationship between sediment load, sediment size, stream discharge and stream slope in Figure 5. A change in any one of these variables sets up a series of mutual adjustments in the companion variables with a resulting direct change in the physical characteristics of the stream channel.

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[21] Klein 1979 as cited in Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE. 117 pp.
[22] Ferguson and Suckling 1990 as cited Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE. 117 pp.
[23] Center for Watershed Protection (CWP). 2000. The Practice of Watershed Protection: Techniques for protecting our nation's streams, lakes, rivers, and estuaries. Ellicott City, MD. 741 pp.
[24] Bay Area Storm Water Management Agencies Association (BASMAA). 1997. Start at the Source: Residential Site Planning and Design Guidance Manual for Storm Water Quality Protection. Palo Alto, CA;
McCuen, R.H. 2003 Smart Growth: hydrologic perspective. Journal of Professional Issues in Engineering Education and Practice. Vol (129), pp.151-154;
Moglen, G.E. and S. Kim. 2007. Impervious imperviousness-are threshold based policies a good idea? Journal of the American Planning Association, Vol 73 No. 2. pp 161-171.
[25] Delaware Department of natural Resources (DDNR). 2004. Green technology: The Delaware urban Runoff Management Approcah. Dover, DE. 117 pp.
[26] Dunne, T and L.B. Leopold. 1978. Water in Environmental Planning. San Francisco W.H. Freeman and Company
[27] Rosgen. D.L. 1996. Applied River Morphology. Pagosa Springs. Wildland Hydrology

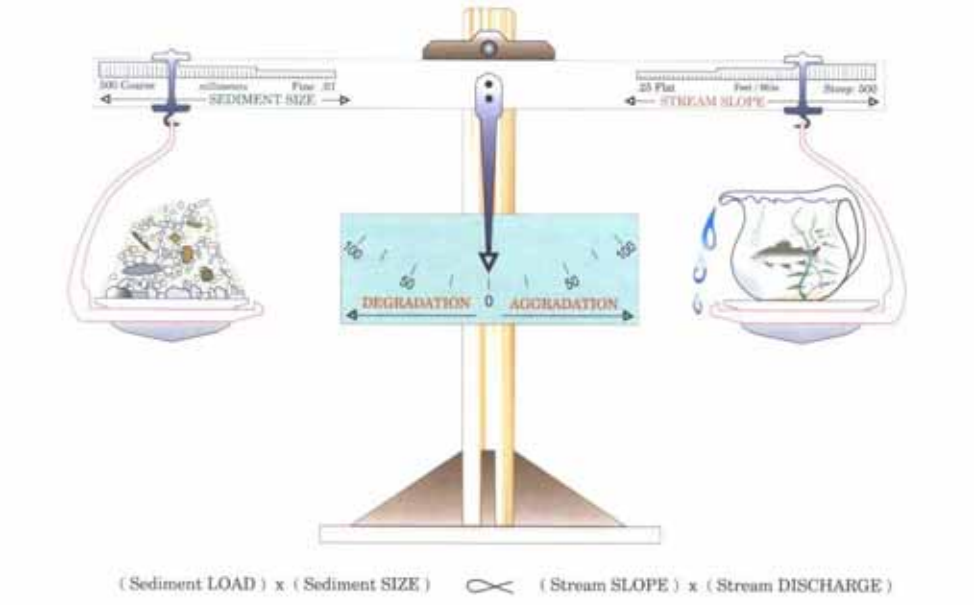


Figure 5 - Schematic of the Lane Relationship

After Lane (1955) as cited in Rosgen (1996)

Stream slope multiplied by stream discharge (the right side of the scale) is essentially an approximation of stream power, a unifying concept in fluvial geomorphology (Bledsoe 1999). Urbanization generally increases stream power and affects the resisting forces in a channel (sediment load and sediment size represented on the left side of the scale).

During construction, sediment loads can increase from 2 to 40,000 times over pre-construction levels.[28] Most of this sediment is delivered to stream channels during large, episodic rain events.[29] This increased sediment load leads to an initial aggradation phase where stream depths may decrease as sediment fills the channel, leading to a decrease in channel capacity and increase in flooding and overbank deposition. A degradation phase initiates after construction is completed.

Schumm et. al (1984) developed a channel evolution model that describes the series of adjustments from initial downcutting, to widening, to establishing new floodplains at lower elevations (Figure 6).

[28] Goldman S.J., K. Jackson, and T.A. Bursztynsky. 1986. Erosion and Sediment Control Handbook. McGraw Hill. San Francisco.
[29] Wolman 1967 as cited in Paul, M.P. and J.L. Meyer. 2001. Streams in the Urban Landscape. *Annu. Rev.Ecol. Syst.* 32: 333-365.

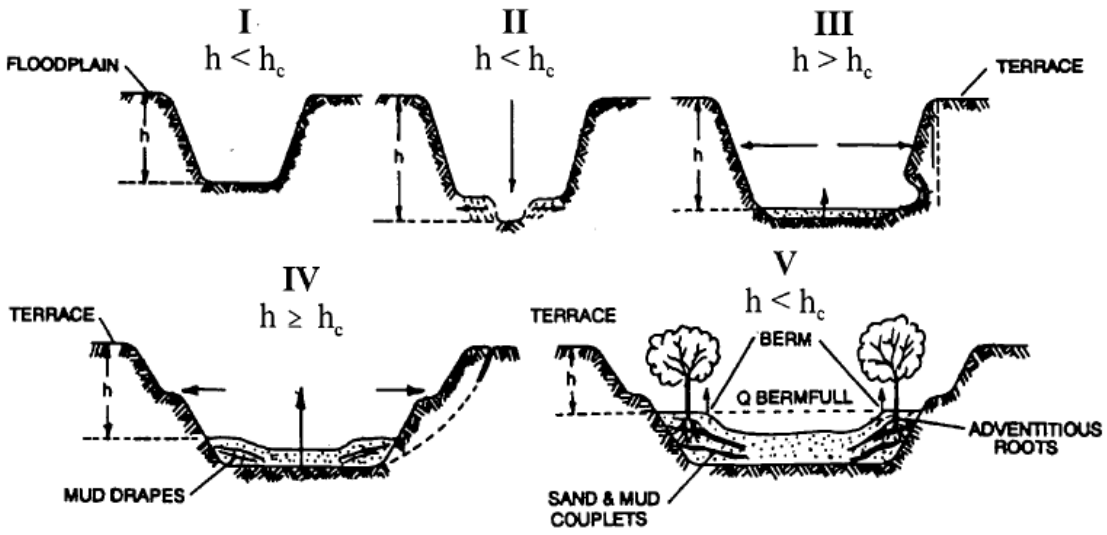


Figure 6 - Channel Changes Associated with Urbanization

After Incised Channel Evolution Sequence in Schumm et. al 1984

Channel incision (Stage II) and widening (Stages III and to a lesser degree, Stage IV) are due to a number of fundamental changes on the landscape. Connected impervious area and compaction of pervious surfaces increase the frequency and volume of bankfull discharges.[30] Increased drainage density (miles of stream length per square mile of watershed) also negatively impacts receiving stream channels.[31] Increased drainage density and hydraulic efficiency leads to an increase in the frequency and volume of bankfull discharges because the time of concentration is shortened. Flows from engineered pipes and channels are also often "sediment starved" and seek to replenish their sediment supply from the channel.

Encroachment of stream channels can also lead to an increase in stream slope, which leads to an increase in stream power. In addition, watershed sediment loads and sediment size (with size generally represented as the median bed and bank particle size, or d_{50}) decrease during urbanization.[32] This means that even if pre- and post-development stream power are the same, more erosion will occur in the post-development stage because the smaller particles are less resistant (provided they are non-cohesive).

[30] Booth, D. B. and C. R. Jackson. 1997. Urbanization of Aquatic Systems: Degradation Thresholds, Storm Water Detection, and the Limits of Mitigation. Journal of the American Water Resources Association Vol. 33, No.5, pp. 1077-1089.

[31] May, C.W. 1998. Cumulative effects of urbanization on small streams in the Puget Sound Lowland ecoregion. Conference proceedings from Puget Sound Research '98 held March 12, 13 1998 in Seattle, WA;
Santa Clara Valley Urban Runoff Pollution Prevention Program. 2002. Hydromodification Management Plan Literature Review. 80 pp.

[32] Finkenbine, J.K., D.S. Atwater, and D.S. Mavinic. 2000. Stream health after urbanization. *J. Am. Water Resour. Assoc.* 36:1149-60;
Pizzuto, J.E. W.S. Hession, and M. McBride. 2000. Comparing gravel-bed rivers in paired urban and rural catchments of southeastern Pennsylvania. *Geology* 28:79-82.

As shown in Stages II and III, the channel deepens and widens to accommodate the increased stream power [33]and decrease in sediment load and sediment size. Channels may actually narrow as entrained sediment from incision is deposited laterally in the channel. After incised channels begin to migrate laterally (Stage III), bank erosion begins, which leads to general channel widening.[34] At this point, a majority of the sediment that leaves a drainage area comes from within the channel, as opposed to the background and construction related hillslope contribution. Stage IV is characterized by more aggradation and localized bank instability. Stage V represents a new quasi-equilibrium channel morphology in balance with the new flow and sediment supply regime. In other words, stream power is in balance with sediment load and sediment size.

The magnitude of the channel morphology changes discussed above varies along a stream network as well as with the age of development, slope, geology (sand-bedded channels may cycle through the evolution sequence in a matter of decades whereas clay-dominated channels may take much longer), watershed sediment load and size, type of urbanization, and land use history. It is also dependent on a channel's stage in the channel evolution sequence when urbanization occurs. Management strategies must take into account a channel's stage of adjustment and account for future changes in the evolution of channel form (Stein and Zaleski 2005). [35]

Traditional structural water quality BMPs (e.g. detention basins and other devices used to store volumes of runoff) unless they are highly engineered to provide adequate flow duration control, do not adequately protect receiving waters from accelerated channel bed and bank erosion, do not address post-development increases in runoff volume, and do not mitigate the decline in benthic macroinvertebrate communities in the receiving waters[36] suggest that structural BMPs are not as effective in protecting aquatic communities as a continuous riparian buffer of native vegetation. This is supported by the findings of Zucker and White[37], where instream biological metrics were correlated with the extent of forested buffers.

This General Permit requires dischargers to maintain pre-development drainage densities and times of concentration in order to protect channels and encourages dischargers to implement setbacks to reduce channel slope and velocity changes that can lead to aquatic habitat degradation.

There are a number of other approaches for modeling fluvial systems, including statistical and physical models and simpler stream power models.[38] The use of these models in California is described in Stein and Zaleski (2005).[39] Rather than prescribe a specific one-size-fits-all modeling method in this permit, the State Water Board intends to develop a stream power and channel evolution model-based framework to assess channels and develop a hierarchy of suitable analysis methods and management strategies. In time, this framework may become a State Water Board water quality control policy.

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[33] Hammer 1973 as cited in Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE. 117 pp;
Booth, D.B. 1990. Stream Channel Incision Following Drainage Basin Urbanization. *Water Resour. Bull.* 26:407-417.

[34] Trimble, S.W. 1997. Contribution of Stream Channel Erosion to Sediment Yield from an Urbanizing Watershed. *Science*: Vol. 278 (21), pp. 1442-1444.

[35] Stein, E.S. and S. Zaleski. 2005.Managing runoff to protect natural stream: the latest developments on investigation and management of hydromodification in California. Southern California Coastal Water Research Project Technical Report 475. 26 pp.

[36] Horner, R.R. 2006. Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices (LID) for the San Diego Region. Available at: http://www.projectcleanwater.org/pdf/permit/case-study_lid.pdf.

[37] Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE. 117 pp.

[38] Finlayson, D.P. and D.R. Montgomery. 2003. Modeling large-scale fluvial erosion in geographic information systems. Geomorphology (53), pp. 147-164).

[39] Stein, E.S. and S. Zaleski. 2005.Managing runoff to protect natural stream: the latest developments on investigation and management of hydromodification in California. Southern California Coastal Water Research Project Technical Report 475. 26 pp.

Permit Linkage to Overbank and Extreme Flood Protection
Site design BMPs (e.g. rooftop and impervious disconnection, vegetated swales, setbacks and buffers) filter and settle out pollutants and provide for more infiltration than is possible for traditional centralized structural BMPs placed at the lowest point in a site. They provide source control for runoff and lead to a reduction in pollutant loads. When implemented, they also help reduce the magnitude and volume of larger, less frequent storm events (e.g., 10-yr, 24-hour storm and larger), thereby reducing the need for expensive flood control infrastructure. Nonstructural BMPs can also be a landscape amenity, instead of a large isolated structure requiring substantial area for ancillary access, buffering, screening and maintenance facilities.[25] The multiple benefits of using non-structural benefits will be critically important as the state's population increases and imposes strains upon our existing water resources.

Maintaining predevelopment drainage densities and times of concentration will help reduce post-development peak flows and volumes in areas not covered under a municipal permit. The most effective way to preserve drainage areas and maximize time of concentration is to implement landform grading, incorporate site design BMPs and implement distributed structural BMPs (e.g., bioretention cells, rain gardens, rain cisterns).

M. Storm Water Pollution Prevention Plans

USEPA's Construction General Permit requires that qualified personnel conduct inspections. USEPA defines qualified personnel as "a person knowledgeable in the principles and practice of erosion and sediment controls who possesses the skills to assess conditions at the construction site that could impact storm water quality and to assess the effectiveness of any sediment and erosion control measures selected to control the quality of storm water discharges from the construction activity."[40] USEPA also suggests that qualified personnel prepare SWPPPs and points to numerous states that require certified professionals to be on construction sites at all times. States that currently have certification programs are Washington, Georgia, Florida, Delaware, Maryland, and New Jersey. The Permit 99-08-DWQ did not require that qualified personnel prepare SWPPPs or conduct inspections. However, to ensure that water quality is being protected, this General Permit requires that all SWPPPs be written, amended, and certified by a Qualified SWPPP Developer. A Qualified SWPPP Developer must possess one of the eight certifications and or registrations specified in this General Permit and effective two years after the adoption date of this General Permit, must have attended a State Water Board-sponsored or approved Qualified SWPPP Developer training course. Table 9 provides an overview of the criteria used in determining qualified certification titles for a QSD and QSP.

40 US Environmental Protection Agency. Stormwater Pollution Prevention Plans for Construction Activities. <http://cfpub.epa.gov/npdes/stormwater/swppp.cfm> and <http://www.epa.gov/npdes/pubs/sw_swppp_guide.pdf>.

Table 9 - Qualified SWPPP Developer/ Qualified SWPPP Practitioner Certification Criteria

Certification/ Title	Registered By	QSD/QSP	Certification Criteria
Professional Civil Engineer	California	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Professional Geologist or Engineering Geologist	California	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Landscape Architect	California	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Professional Hydrologist	American Institute of Hydrology	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Certified Professional in Erosion and Sediment Control™ (CPESC)	Enviro Cert International Inc.	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education
Certified Inspector of Sediment and Erosion Control™ (CISEC)	Certified Inspector of Sediment and Erosion Control, Inc.	QSP	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education
Certified Erosion, Sediment and Storm Water Inspector™ (CESSWI)	Enviro Cert International Inc.	QSP	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education
Certified Professional in Storm Water Quality™ (CPSWQ)	Enviro Cert International Inc.	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education

The previous versions of the General Permit required development and implementation of a SWPPP as the primary compliance mechanism. The SWPPP has two major objectives: (1) to help identify the sources of sediment and other pollutants that affect the quality of storm water discharges; and (2) to describe and ensure the implementation of BMPs to reduce or eliminate sediment and other pollutants in storm water and non-storm water discharges. The SWPPP must include BMPs that address source control, BMPs that address pollutant control, and BMPs that address treatment control.

This General Permit shifts some of the measures that were covered by this general requirement to specific permit requirements, each individually enforceable as a permit term. This General Permit emphasizes the use of appropriately selected, correctly installed and maintained pollution reduction BMPs. This approach provides the flexibility necessary to establish BMPs that can effectively address source control of pollutants during changing construction activities. These specific requirements also improve both the clarity and the enforceability of the General Permit so that the dischargers understand, and the public can determine whether the discharges are in compliance with, permit requirements.

The SWPPP must be implemented at the appropriate level to protect water quality at all times throughout the life of the project. The SWPPP must remain on the site during construction activities, commencing with the initial mobilization and ending with the termination of coverage under the General Permit. For LUPs the discharger shall make the SWPPP available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio or telephone. Once construction activities are complete, until stabilization is achieved, the SWPPP shall be available from the SWPPP contact listed in the PRDs

A SWPPP must be appropriate for the type and complexity of a project and will be developed and implemented to address project specific conditions. Some projects may have similarities or complexities, yet each project is unique in its progressive state that requires specific description and selection of BMPs needed to address all possible generated pollutants

N. Regional Water Board Authorities

Because this General Permit will be issued to thousands of construction sites across the State, the Regional Water Boards retain discretionary authority over certain issues that may arise from the discharges in their respective regions. This General Permit does not grant the Regional Water Boards any authority they do not otherwise have; rather, it merely emphasizes that the Regional Water Boards can take specific actions related to this General Permit. For example, the Regional Water Boards will be enforcing this General Permit and may need to adjust some requirements for a discharger based on the discharger's compliance history.

Linda S. Adams
Secretary for
Environmental Protection

State Water Resources Control Board

Arnold Schwarzenegger
Governor

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NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR
STORM WATER DISCHARGES
ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE
ACTIVITIES

ORDER NO. 2009-0009-DWQ
NPDES NO**. CAS000002**

This Order was adopted by the State Water Resources Control Board on:	**September 2, 2009**
This Order shall become effective on:	**July 1, 2010**
This Order shall expire on:	**September 2, 2014**

IT IS HEREBY ORDERED, that this Order supersedes Order No. 99-08-DWQ except for enforcement purposes. The Discharger shall comply with the requirements in this Order to meet the provisions contained in Division 7 of the California Water Code (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on September 2, 2009.

AYE: Vice Chair Frances Spivy-Weber
Board Member Arthur G. Baggett, Jr.
Board Member Tam M. Doduc

NAY: Chairman Charles R. Hoppin

ABSENT: None

ABSTAIN: None

Jeanine Townsend
Clerk to the Board

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STATE WATER RESOURCES CONTROL BOARD
ORDER NO. 2009-0009-DWQ
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
GENERAL PERMIT NO. CAS000002

WASTE DISCHARGE REQUIREMENTS
FOR
DISCHARGES OF STORM WATER RUNOFF ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES

I. FINDINGS

A. General Findings

The State Water Resources Control Board (State Water Board) finds that:

1. The federal Clean Water Act (CWA) prohibits certain discharges of storm water containing pollutants except in compliance with a National Pollutant Discharge Elimination System (NPDES) permit (Title 33 United States Code (U.S.C.) §§ 1311 and 1342(p); also referred to as Clean Water Act (CWA) §§ 301 and 402(p)). The U.S. Environmental Protection Agency (U.S. EPA) promulgates federal regulations to implement the CWA's mandate to control pollutants in storm water runoff discharges. (Title 40 Code of Federal Regulations (C.F.R.) Parts 122, 123, and 124). The federal statutes and regulations require discharges to surface waters comprised of storm water associated with construction activity, including demolition, clearing, grading, and excavation, and other land disturbance activities (except operations that result in disturbance of less than one acre of total land area and which are not part of a larger common plan of development or sale), to obtain coverage under an NPDES permit. The NPDES permit must require implementation of Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT) to reduce or eliminate pollutants in storm water runoff. The NPDES permit must also include additional requirements necessary to implement applicable water quality standards.

2. This General Permit authorizes discharges of storm water associated with construction activity so long as the dischargers comply with all requirements, provisions, limitations and prohibitions in the permit. In addition, this General Permit regulates the discharges of storm water associated with construction activities from all Linear Underground/Overhead Projects resulting in the disturbance of greater than or equal to one acre (Attachment A).

3. This General Permit regulates discharges of pollutants in storm water associated with construction activity (storm water discharges) to waters of the United States from construction sites that disturb one or more acres of land surface, or that are part of a common plan of development or sale that disturbs more than one acre of land surface.

4. This General Permit does not preempt or supersede the authority of local storm water management agencies to prohibit, restrict, or control storm water discharges to municipal separate storm sewer systems or other watercourses within their jurisdictions.

5. This action to adopt a general NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21100, et seq.), pursuant to Section 13389 of the California Water Code.

6. Pursuant to 40 C.F.R. § 131.12 and State Water Board Resolution No. 68-16,[1] which incorporates the requirements of § 131.12 where applicable, the State Water Board finds that discharges in compliance with this General Permit will not result in the lowering of water quality standards, and are therefore consistent with those provisions. Compliance with this General Permit will result in improvements in water quality.

7. This General Permit serves as an NPDES permit in compliance with CWA § 402 and will take effect on July 1, 2010 by the State Water Board provided the Regional Administrator of the U.S. EPA has no objection. If the U.S. EPA Regional Administrator objects to its issuance, the General Permit will not become effective until such objection is withdrawn.

8. Following adoption and upon the effective date of this General Permit, the Regional Water Quality Control Boards (Regional Water Boards) shall enforce the provisions herein.

9. Regional Water Boards establish water quality standards in Basin Plans. The State Water Board establishes water quality standards in various statewide plans, including the California Ocean Plan. U.S. EPA establishes water quality standards in the National Toxic Rule (NTR) and the California Toxic Rule (CTR).

[1] Resolution No. 68-16 generally requires that existing water quality be maintained unless degradation is justified based on specific findings.

10. This General Permit does not authorize discharges of fill or dredged material regulated by the U.S. Army Corps of Engineers under CWA § 404 and does not constitute a waiver of water quality certification under CWA § 401.

11. The primary storm water pollutant at construction sites is excess sediment. Excess sediment can cloud the water, which reduces the amount of sunlight reaching aquatic plants, clog fish gills, smother aquatic habitat and spawning areas, and impede navigation in our waterways. Sediment also transports other pollutants such as nutrients, metals, and oils and greases.

12. Construction activities can impact a construction site's runoff sediment supply and transport characteristics. These modifications, which can occur both during and after the construction phase, are a significant cause of degradation of the beneficial uses established for water bodies in California. Dischargers can avoid these effects through better construction site design and activity practices.

13. This General Permit recognizes four distinct phases of construction activities. The phases are Grading and Land Development Phase, Streets and Utilities Phase, Vertical Construction Phase, and Final Landscaping and Site Stabilization Phase. Each phase has activities that can result in different water quality effects from different water quality pollutants. This General Permit also recognizes inactive construction as a category of construction site type.

14. Compliance with any specific limits or requirements contained in this General Permit does not constitute compliance with any other applicable requirements.

15. Following public notice in accordance with State and Federal laws and regulations, the State Water Board heard and considered all comments and testimony in a public hearing on 06/03/2009. The State Water Board has prepared written responses to all significant comments.

16. Construction activities obtaining coverage under the General Permit may have multiple discharges subject to requirements that are specific to general, linear, and/or active treatment system discharge types.

17. The State Water Board may reopen the permit if the U.S. EPA adopts a final effluent limitation guideline for construction activities.

B. Activities Covered Under the General Permit

18. Any construction or demolition activity, including, but not limited to, clearing, grading, grubbing, or excavation, or any other activity that results in a land disturbance of equal to or greater than one acre.

19. Construction activity that results in land surface disturbances of less than one acre if the construction activity is part of a larger common plan of development or the sale of one or more acres of disturbed land surface.

20. Construction activity related to residential, commercial, or industrial development on lands currently used for agriculture including, but not limited to, the construction of buildings related to agriculture that are considered industrial pursuant to U.S. EPA regulations, such as dairy barns or food processing facilities.

21. Construction activity associated with Linear Underground/Overhead Utility Projects (LUPs) including, but not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/borrow locations.

22. Discharges of sediment from construction activities associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities.[2]

23. Storm water discharges from dredge spoil placement that occur outside of U.S. Army Corps of Engineers jurisdiction (upland sites) and that disturb one or more acres of land surface from construction activity are covered by this General Permit. Construction sites that intend to disturb one or more acres of land within the jurisdictional boundaries of a CWA § 404 permit should contact the appropriate Regional Water Board to determine whether this permit applies to the site.

[2] Pursuant to the Ninth Circuit Court of Appeals' decision in *NRDC v. EPA* (9th Cir. 2008) 526 F.3d 591, and subsequent denial of the U.S. EPA's petition for reconsideration in November 2008, oil and gas construction activities discharging storm water contaminated only with sediment are no longer exempt from the NPDES program.

C. Activities Not Covered Under the General Permit

24. Routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility.

25. Disturbances to land surfaces solely related to agricultural operations such as disking, harrowing, terracing and leveling, and soil preparation.

26. Discharges of storm water from areas on tribal lands; construction on tribal lands is regulated by a federal permit.

27. Construction activity and land disturbance involving discharges of storm water within the Lake Tahoe Hydrologic Unit. The Lahontan Regional Water Board has adopted its own permit to regulate storm water discharges from construction activity in the Lake Tahoe Hydrologic Unit (Regional Water Board 6SLT). Owners of construction sites in this watershed must apply for the Lahontan Regional Water Board permit rather than the statewide Construction General Permit.

28. Construction activity that disturbs less than one acre of land surface, and that is not part of a larger common plan of development or the sale of one or more acres of disturbed land surface.

29. Construction activity covered by an individual NPDES Permit for storm water discharges.

30. Discharges from small (1 to 5 acre) construction activities with an approved Rainfall Erosivity Waiver authorized by U.S. EPA Phase II regulations certifying to the State Board that small construction activity will occur only when the Rainfall Erosivity Factor is less than 5 (“R” in the Revised Universal Soil Loss Equation).

31. Landfill construction activity that is subject to the Industrial General Permit.

32. Construction activity that discharges to Combined Sewer Systems.

33. Conveyances that discharge storm water runoff combined with municipal sewage.

34. Discharges of storm water identified in CWA § 402(*l*)(2), 33 U.S.C. § 1342(*l*)(2).

35. Discharges occurring in basins that are not tributary or hydrologically connected to waters of the United States (for more information contact your Regional Water Board).

D. Obtaining and Modifying General Permit Coverage

36. This General Permit requires all dischargers to electronically file all Permit Registration Documents (PRDs), Notices of Termination (NOT), changes of information, annual reporting, and other compliance documents required by this General Permit through the State Water Board's Storm water Multi-Application and Report Tracking System (SMARTS) website.

37. Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

38. This General Permit grants an exception from the Risk Determination requirements for existing sites covered under Water Quality Orders No. 99-08-DWQ, and No. 2003-0007-DWQ. For certain sites, adding additional requirements may not be cost effective. Construction sites covered under Water Quality Order No. 99-08-DWQ shall obtain permit coverage at the Risk Level 1. LUPs covered under Water Quality Order No. 2003-0007-DWQ shall obtain permit coverage as a Type 1 LUP. The Regional Water Boards have the authority to require Risk Determination to be performed on sites currently covered under Water Quality Orders No. 99-08-DWQ and No. 2003-0007-DWQ where they deem it necessary. The State Water Board finds that there are two circumstances when it may be appropriate for the Regional Water Boards to require a discharger that had filed an NOI under State Water Board Order No. 99-08-DWQ to recalculate the site's risk level. These circumstances are: (1) when the discharger has a demonstrated history of noncompliance with State Water Board Order No. 99-08-DWQ or; (2) when the discharger's site poses a significant risk of causing or contributing to an exceedance of a water quality standard without the implementation of the additional Risk Level 2 or 3 requirements.

E. Prohibitions

39. All discharges are prohibited except for the storm water and non-storm water discharges specifically authorized by this General Permit or another NPDES permit. Non-storm water discharges include a wide variety of sources, including improper dumping, spills, or leakage from storage tanks or transfer areas. Non-storm water discharges may

contribute significant pollutant loads to receiving waters. Measures to control spills, leakage, and dumping, and to prevent illicit connections during construction must be addressed through structural as well as non-structural Best Management Practices (BMPs)[3]. The State Water Board recognizes, however, that certain non-storm water discharges may be necessary for the completion of construction.

40. This General Permit prohibits all discharges which contain a hazardous substance in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

41. This General Permit incorporates discharge prohibitions contained in water quality control plans, as implemented by the State Water Board and the nine Regional Water Boards.

42. Pursuant to the Ocean Plan, discharges to Areas of Special Biological Significance (ASBS) are prohibited unless covered by an exception that the State Water Board has approved.

43. This General Permit prohibits the discharge of any debris[4] from construction sites. Plastic and other trash materials can cause negative impacts to receiving water beneficial uses. The State Water Board encourages the use of more environmentally safe, biodegradable materials on construction sites to minimize the potential risk to water quality.

F. Training

44. In order to improve compliance with and to maintain consistent enforcement of this General Permit, all dischargers are required to appoint two positions - the Qualified SWPPP Developer (QSD) and the Qualified SWPPP Practitioner (QSP) - who must obtain appropriate training. Together with the key stakeholders, the State and Regional Water Boards are leading the development of this curriculum through a collaborative organization called The Construction General Permit (CGP) Training Team.

45. The Professional Engineers Act (Bus. & Prof. Code section 6700, et seq.) requires that all engineering work must be performed by a California licensed engineer.

[3] BMPs are scheduling of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the United States. BMPs also include treatment requirements, operating procedures, and practice to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

[4] Litter, rubble, discarded refuse, and remains of destroyed inorganic anthropogenic waste.

G. Determining and Reducing Risk

46. The risk of accelerated erosion and sedimentation from wind and water depends on a number of factors, including proximity to receiving water bodies, climate, topography, and soil type.

47. This General Permit requires dischargers to assess the risk level of a site based on both sediment transport and receiving water risk. This General Permit contains requirements for Risk Levels 1, 2 and 3, and LUP Risk Type 1, 2, and 3 (Attachment A). Risk levels are established by determining two factors: first, calculating the site's sediment risk; and second, receiving water risk during periods of soil exposure (i.e. grading and site stabilization). Both factors are used to determine the site-specific Risk Level(s). LUPs can be determined to be Type 1 based on the flowchart in Attachment A.1.

48. Although this General Permit does not mandate specific setback distances, dischargers are encouraged to set back their construction activities from streams and wetlands whenever feasible to reduce the risk of impacting water quality (e.g., natural stream stability and habitat function). Because there is a reduced risk to receiving waters when setbacks are used, this General Permit gives credit to setbacks in the risk determination and post-construction storm water performance standards. The risk calculation and runoff reduction mechanisms in this General Permit are expected to facilitate compliance with any Regional Water Board and local agency setback requirements, and to encourage voluntary setbacks wherever practicable.

49. Rain events can occur at any time of the year in California. Therefore, a Rain Event Action Plan (REAP) is necessary for Risk Level 2 and 3 traditional construction projects (LUPs exempt) to ensure that active construction sites have adequate erosion and sediment controls implemented prior to the onset of a storm event, even if construction is planned only during the dry season.

50. Soil particles smaller than 0.02 millimeters (mm) (i.e., finer than medium silt) do not settle easily using conventional measures for sediment control (i.e., sediment basins). Given their long settling time, dislodging these soils results in a significant risk that fine particles will be released into surface waters and cause unacceptable downstream impacts. If operated correctly, an Active Treatment System (ATS[5]) can prevent or reduce the release of fine particles from construction sites.

[5] An ATS is a treatment system that employs chemical coagulation, chemical flocculation, or electro coagulation in order to reduce turbidity caused by fine suspended sediment.

Use of an ATS can effectively reduce a site's risk of impacting receiving waters.

51. Dischargers located in a watershed area where a Total Maximum Daily Load (TMDL) has been adopted or approved by the Regional Water Board or U.S. EPA may be required by a separate Regional Water Board action to implement additional BMPs, conduct additional monitoring activities, and/or comply with an applicable waste load allocation and implementation schedule. Such dischargers may also be required to obtain an individual Regional Water Board permit specific to the area.

H. Effluent Standards

52. The State Water Board convened a blue ribbon panel of storm water experts that submitted a report entitled, “The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities,” dated June 19, 2006. The panel concluded that numeric limits or action levels are technically feasible to control construction storm water discharges, provided that certain conditions are considered. The panel also concluded that numeric effluent limitations (NELs) are feasible for discharges from construction sites that utilize an ATS. The State Water Board has incorporated the expert panel’s suggestions into this General Permit, which includes both numeric action levels (NALs) and NELs for pH and turbidity, and special numeric limits for ATS discharges.

Numeric Effluent Limitations

53. Discharges of storm water from construction activities may become contaminated from alkaline construction materials resulting in high pH (greater than pH 7). Alkaline construction materials include, but are not limited to, hydrated lime, concrete, mortar, cement kiln dust (CKD), Portland cement treated base (CTB), fly ash, recycled concrete, and masonry work. This General Permit includes an NEL for pH (6.0-9.0) that applies only at sites that exhibit a "high risk of high pH discharge." A "high risk of high pH discharge" can occur during the complete utilities phase, the complete vertical build phase, and any portion of any phase where significant amounts of materials are placed directly on the land at the site in a manner that could result in significant alterations to the background pH of any discharges.

54. For Risk Level 3 discharges, this General Permit establishes technology-based, numeric effluent limitations (NELs) for turbidity of 500 NTU. Exceedances of the turbidity NEL constitutes a violation of this General Permit.

55. This General Permit establishes a 5 year, 24 hour (expressed in inches of rainfall) Compliance Storm Event exemption from the technology-based NELs for Risk Level 3 dischargers.

Determining Compliance with Numeric Limitations

56. This General Permit sets a pH NAL of 6.5 to 8.5, and a turbidity NAL of 250 NTU. The purpose of the NAL and its associated monitoring requirement is to provide operational information regarding the performance of the measures used at the site to minimize the discharge of pollutants and to protect beneficial uses and receiving waters from the adverse effects of construction-related storm water discharges. The NALs in this General Permit for pH and turbidity are not directly enforceable and do not constitute NELs.

57. This General Permit requires dischargers with NAL exceedances to immediately implement additional BMPs and revise their Storm Water Pollution Prevention Plans (SWPPPs) accordingly to either prevent pollutants and authorized non-storm water discharges from contaminating storm water, or to substantially reduce the pollutants to levels consistently below the NALs. NAL exceedances are reported in the State Water Boards SMARTS system, and the discharger is required to provide an NAL Exceedance Report when requested by a Regional Water Board.

58. If run-on is caused by a forest fire or any other natural disaster, then NELs do not apply.

59. Exceedances of the NELs are a violation of this Permit. This General Permit requires dischargers with NEL exceedances to implement additional monitoring, BMPs, and revise their SWPPPs accordingly. Dischargers are required to notify the State and Regional Water Boards of the violation through the State Water Boards SMARTs system, and provide an NEL Violation Report sharing additional information concerning the NEL exceedance.

I. Receiving Water Limitations

60. This General Permit requires all enrolled dischargers to determine the receiving waters potentially affected by their discharges and to comply with all applicable water quality standards, including any more stringent standards applicable to a water body.

J. Sampling, Monitoring, Reporting and Record Keeping

61. Visual monitoring of storm water and non-storm water discharges is required for all sites subject to this General Permit.

62. Records of all visual monitoring inspections are required to remain on-site during the construction period and for a minimum of three years.

63. For all Risk Level 3 and Risk Level 2 sites, this General Permit requires effluent monitoring for pH and turbidity. Sampling, analysis and monitoring requirements for effluent monitoring for pH and turbidity are contained in this General Permit.

64. Risk Level 3 sites in violation of the Numeric Effluent Limitations contained in this General Permit and with direct discharges to receiving water are required to conduct receiving water monitoring.

65. For Risk Level 3 sites larger than 30 acres and with direct discharges to receiving waters, this General Permit requires bioassessment sampling before and after site completion to determine if significant degradation to the receiving water's biota has occurred. Bioassessment sampling guidelines are contained in this General Permit.

66. A summary and evaluation of the sampling and analysis results will be submitted in the Annual Reports.

67. This General Permit contains sampling, analysis and monitoring requirements for non-visible pollutants at all sites subject to this General Permit.

68. Compliance with the General Permit relies upon dischargers to electronically self-report any discharge violations and to comply with any Regional Water Board enforcement actions.

69. This General Permit requires that all dischargers maintain a paper or electronic copy of all required records for three years from the date generated or date submitted, whichever is last. These records must be available at the construction site until construction is completed. For LUPs, these documents may be retained in a crew member's vehicle and made available upon request.

K. Active Treatment System (ATS) Requirements

70. Active treatment systems add chemicals to facilitate flocculation, coagulation and filtration of suspended sediment particles. The uncontrolled release of these chemicals to the environment can negatively affect the beneficial uses of receiving waters and/or degrade water quality (e.g., acute and chronic toxicity). Additionally, the batch storage and treatment of storm water through an ATS' can potentially

cause physical impacts on receiving waters if storage volume is inadequate or due to sudden releases of the ATS batches and improperly designed outfalls.

71. If designed, operated and maintained properly an ATS can achieve very high removal rates of suspended sediment (measured as turbidity), albeit at sometimes significantly higher costs than traditional erosion/sediment control practices. As a result, this General Permit establishes NELs consistent with the expected level of typical ATS performance.

72. This General Permit requires discharges of storm water associated with construction activity that undergo active treatment to comply with special operational and effluent limitations to ensure that these discharges do not adversely affect the beneficial uses of the receiving waters or cause degradation of their water quality.

73. For ATS discharges, this General Permit establishes technology-based NELs for turbidity.

74. This General Permit establishes a 10 year, 24 hour (expressed in inches of rainfall) Compliance Storm Event exemption from the technology-based numeric effluent limitations for ATS discharges. Exceedances of the ATS turbidity NEL constitutes a violation of this General Permit.

L. Post-Construction Requirements

75. This General Permit includes performance standards for post-construction that are consistent with State Water Board Resolution No. 2005-0006, "Resolution Adopting the Concept of Sustainability as a Core Value for State Water Board Programs and Directing Its Incorporation," and 2008-0030, “Requiring Sustainable Water Resources Management.“ The requirement for all construction sites to match pre-project hydrology will help ensure that the physical and biological integrity of aquatic ecosystems are sustained. This “runoff reduction” approach is analogous in principle to Low Impact Development (LID) and will serve to protect related watersheds and waterbodies from both hydrologic-based and pollution impacts associated with the post-construction landscape.

76. LUP projects are not subject to post-construction requirements due to the nature of their construction to return project sites to pre-construction conditions.

M. Storm Water Pollution Prevention Plan Requirements

77. This General Permit requires the development of a site-specific SWPPP. The SWPPP must include the information needed to demonstrate compliance with all requirements of this General Permit, and must be kept on the construction site and be available for review. The discharger shall ensure that a QSD develops the SWPPP.

78. To ensure proper site oversight, this General Permit requires a Qualified SWPPP Practitioner to oversee implementation of the BMPs required to comply with this General Permit.

N. Regional Water Board Authorities

79. Regional Water Boards are responsible for implementation and enforcement of this General Permit. A general approach to permitting is not always suitable for every construction site and environmental circumstances. Therefore, this General Permit recognizes that Regional Water Boards must have some flexibility and authority to alter, approve, exempt, or rescind permit authority granted under this General Permit in order to protect the beneficial uses of our receiving waters and prevent degradation of water quality.

IT IS HEREBY ORDERED that all dischargers subject to this General Permit shall comply with the following conditions and requirements (including all conditions and requirements as set forth in Attachments A, B, C, D, E and F)[6]:

II. CONDITIONS FOR PERMIT COVERAGE

A. Linear Underground/Overhead Projects (LUPs)

1. Linear Underground/Overhead Projects (LUPs) include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water and wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g. telephone, telegraph, radio or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to, (a) those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment, and associated ancillary facilities); and include, but are not limited to, (b) underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/ or pavement repair or replacement, and stockpile/borrow locations.

2. The utility company, municipality, or other public or private company or agency that owns or operates the linear underground/overhead project is responsible for obtaining coverage under the General Permit where the construction of pipelines, utility lines, fiber-optic cables, or other linear underground/overhead projects will occur across several properties unless the LUP construction activities are covered under another construction storm water permit.

3. Only LUPs shall comply with the conditions and requirements in Attachment A, A.1 & A.2 of this Order. The balance of this Order is not applicable to LUPs except as indicated in Attachment A.

B. Obtaining Permit Coverage Traditional Construction Sites

[6] These attachments are part of the General Permit itself and are not separate documents that are capable of being updated independently by the State Water Board.

1. The Legally Responsible Person (LRP) (see Special Provisions, Electronic Signature and Certification Requirements, Section IV.I.1) must obtain coverage under this General Permit.

2. To obtain coverage, the LRP must electronically file Permit Registration Documents (PRDs) prior to the commencement of construction activity. Failure to obtain coverage under this General Permit for storm water discharges to waters of the United States is a violation of the CWA and the California Water Code.

3. PRDs shall consist of:

   a. Notice of Intent (NOI)
   b. Risk Assessment (Section VIII)
   c. Site Map
   d. Storm Water Pollution Prevention Plan (Section XIV)
   e. Annual Fee
   f. Signed Certification Statement

   Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

   Attachment B contains additional PRD information. Dischargers must electronically file the PRDs, and mail the appropriate annual fee to the State Water Board.

4. This permit is effective on July 1, 2010.

   a. **Dischargers Obtaining Coverage On or After July 1, 2010:** All dischargers requiring coverage on or after July 1, 2010, shall electronically file their PRDs prior to the commencement of construction activities, and mail the appropriate annual fee no later than seven days prior to the commencement of construction activities. Permit coverage shall not commence until the PRDs and the annual fee are received by the State Water Board, and a WDID number is assigned and sent by SMARTS.

   b. **Dischargers Covered Under 99-08-DWQ and 2003-0007-DWQ:** Existing dischargers subject to State Water Board Order No. 99-08-DWQ (existing dischargers) will continue coverage under 99-08-DWQ until July 1, 2010. After July 1, 2010, all NOIs subject to State Water Board Order No. 99-08-DWQ will be terminated. Existing dischargers shall electronically file their PRDs no later than

July 1, 2010. If an existing discharger's site acreage subject to the annual fee has changed, it shall mail a revised annual fee no less than seven days after receiving the revised annual fee notification, **or else lose permit coverage**. All existing dischargers shall be exempt from the risk determination requirements in Section VIII of this General Permit until two years after permit adoption. All existing dischargers are therefore subject to Risk Level 1 requirements regardless of their site's sediment and receiving water risks. However, a Regional Board retains the authority to require an existing discharger to comply with the Section VIII risk determination requirements.

5. The discharger is only considered covered by this General Permit upon receipt of a Waste Discharger Identification (WDID) number assigned and sent by the State Water Board Storm water Multi-Application and Report Tracking System (SMARTS). In order to demonstrate compliance with this General Permit, the discharger must obtain a WDID number and must present documentation of a valid WDID upon demand.

6. During the period this permit is subject to review by the U.S. EPA, the prior permit (State Water Board Order No. 99-08-DWQ) remains in effect. Existing dischargers under the prior permit will continue to have coverage under State Water Board Order No. 99-08-DWQ until this General Permit takes effect on July 1, 2010. Dischargers who complete their projects and electronically file an NOT prior to July 1, 2010, are not required to obtain coverage under this General Permit.

7. Small Construction Rainfall Erosivity Waiver

   EPA's Small Construction Erosivity Waiver applies to sites between one and five acres demonstrating that there are no adverse water quality impacts.

   Dischargers eligible for a Rainfall Erosivity Waiver based on low erosivity potential shall complete the electronic Notice of Intent (NOI) and Sediment Risk form through the State Water Board's SMARTS system, certifying that the construction activity will take place during a period when the value of the rainfall erosivity factor is less than five. Where the LRP changes or another LRP is added during construction, the new LRP must also submit a waiver certification through the SMARTS system.

   If a small construction site continues beyond the projected completion date given on the waiver certification, the LRP shall recalculate the rainfall erosivity factor for the new project duration and submit this

information through the SMARTS system. If the new R factor is below five (5), the discharger shall update through SMARTS all applicable information on the waiver certification and retain a copy of the revised waiver onsite. The LRP shall submit the new waiver certification 30 days prior to the projected completion date listed on the original waiver form to assure exemption from permitting requirements is uninterrupted. If the new R factor is five (5) or above, the LRP shall be required to apply for coverage under this Order.

8. In the case of a public emergency that requires immediate construction activities, a discharger shall submit a brief description of the emergency construction activity within five days of the onset of construction, and then shall submit all PRDs within thirty days.

C. Revising Permit Coverage for Change of Acreage or New Ownership

1. The discharger may reduce or increase the total acreage covered under this General Permit when a portion of the site is complete and/or conditions for termination of coverage have been met (See Section II.D Conditions for Termination of Coverage); when ownership of a portion of the site is sold to a different entity; or when new acreage, subject to this General Permit, is added to the site.

2. Within 30 days of a reduction or increase in total disturbed acreage, the discharger shall electronically file revisions to the PRDs that include:

   a. A revised NOI indicating the new project size;

   b. A revised site map showing the acreage of the site completed, acreage currently under construction, acreage sold/transferred or added, and acreage currently stabilized in accordance with the Conditions for Termination of Coverage in Section II.D below.

   c. SWPPP revisions, as appropriate; and

   d. Certification that any new landowners have been notified of applicable requirements to obtain General Permit coverage. The certification shall include the name, address, telephone number, and e-mail address of the new landowner.

   e. If the project acreage has increased, dischargers shall mail payment of revised annual fees within 14 days of receiving the revised annual fee notification.

3. The discharger shall continue coverage under the General Permit for any parcel that has not achieved "Final Stabilization" as defined in Section II.D.

4. When an LRP owns property with active General Permit coverage, and the LRP sells the property, or a parcel thereof, to another person, that person shall become an LRP with respect to whatever parcel was sold. The existing LRP shall inform the new LRP of the General Permit's requirements. In order for the new LRP to continue the construction activity on its parcel of property, the new LRP, or the new LRP's approved signatory, must submit PRDs in accordance with this General Permit's requirements.

D. Conditions for Termination of Coverage

1. Within 90 days of when construction is complete or ownership has been transferred, the discharger shall electronically file a Notice of Termination (NOT), a final site map, and photos through the State Water Boards SMARTS system. Filing a NOT certifies that all General Permit requirements have been met. The Regional Water Board will consider a construction site complete only when all portions of the site have been transferred to a new owner, or all of the following conditions have been met:

   a. For purposes of "final stabilization," the site will not pose any additional sediment discharge risk than it did prior to the commencement of construction activity;

   b. There is no potential for construction-related storm water pollutants to be discharged into site runoff;

   c. Final stabilization has been reached;

   d. Construction materials and wastes have been disposed of properly;

   e. Compliance with the Post-Construction Standards in Section XIII of this General Permit has been demonstrated;

   f. Post-construction storm water management measures have been installed and a long-term maintenance plan[7] has been established; and

[7] For the purposes of this requirement a long-term maintenance plan will be designed for a minimum of five years, and will describe the procedures to ensure that the post-construction storm water management measures are adequately maintained.

g. All construction-related equipment, materials and any temporary BMPs no longer needed are removed from the site.

2. The discharger shall certify that final stabilization conditions are satisfied in their NOT. Failure to certify shall result in continuation of permit coverage and annual billing.

3. The NOT must demonstrate through photos, RUSLE or RUSLE2, or results of testing and analysis that the site meets all of the conditions above (Section II.D.1) and the final stabilization condition (Section II.D.1.a) is attained by one of the following methods:

   a. "70% final cover method," no computational proof required

      OR:

   b. "RUSLE or RUSLE2 method," computational proof required

      OR:

   c. "Custom method", the discharger shall demonstrate in some other manner than a or b, above, that the site complies with the "final stabilization" requirement in Section II.D.1.a.

III. DISCHARGE PROHIBITIONS

A. Dischargers shall not violate any discharge prohibitions contained in applicable Basin Plans or statewide water quality control plans. Waste discharges to Areas of Special Biological Significance (ASBS) are prohibited by the California Ocean Plan, unless granted an exception issued by the State Water Board.

B. All discharges are prohibited except for the storm water and non-storm water discharges specifically authorized by this General Permit or another NPDES permit.

C. Authorized non-storm water discharges may include those from de-chlorinated potable water sources such as: fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, uncontaminated ground water from dewatering, and other discharges not subject to a separate general NPDES permit adopted by a Regional Water Board. The discharge of non-storm water is authorized under the following conditions:

1. The discharge does not cause or contribute to a violation of any water quality standard;

2. The discharge does not violate any other provision of this General Permit;

3. The discharge is not prohibited by the applicable Basin Plan;

4. The discharger has included and implemented specific BMPs required by this General Permit to prevent or reduce the contact of the non-storm water discharge with construction materials or equipment.

5. The discharge does not contain toxic constituents in toxic amounts or (other) significant quantities of pollutants;

6. The discharge is monitored and meets the applicable NALs and NELs; and

7. The discharger reports the sampling information in the Annual Report.

If any of the above conditions are not satisfied, the discharge is not authorized by this General Permit. The discharger shall notify the Regional Water Board of any anticipated non-storm water discharges not already authorized by this General Permit or another NPDES permit, to determine whether a separate NPDES permit is necessary.

D. Debris resulting from construction activities are prohibited from being discharged from construction sites.

E. When soil contamination is found or suspected and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action, the discharger shall have those soils sampled and tested to ensure proper handling and public safety measures are implemented. The discharger shall notify the appropriate local, State, and federal agency(ies) when contaminated soil is found at a construction site, and will notify the appropriate Regional Water Board.

IV. SPECIAL PROVISIONS

A. Duty to Comply

1. The discharger shall comply with all of the conditions of this General Permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and the Porter-Cologne Water Quality Control Act and is grounds for enforcement action and/or removal from General Permit coverage.

2. The discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this General Permit has not yet been modified to incorporate the requirement.

B. General Permit Actions

1. This General Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the discharger for a General Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not annul any General Permit condition.

2. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this General Permit, this General Permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the dischargers so notified.

C. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this General Permit.

D. Duty to Mitigate

The discharger shall take all responsible steps to minimize or prevent any discharge in violation of this General Permit, which has a reasonable likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance

The discharger shall at all times properly operate and maintain any facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this General Permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance may require the operation of backup or auxiliary facilities or similar systems installed by a discharger when necessary to achieve compliance with the conditions of this General Permit.

F. Property Rights

This General Permit does not convey any property rights of any sort or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor does it authorize any infringement of Federal, State, or local laws or regulations.

G. Duty to Maintain Records and Provide Information

1. The discharger shall maintain a paper or electronic copy of all required records, including a copy of this General Permit, for three years from the date generated or date submitted, whichever is last. These records shall be available at the construction site until construction is completed.

2. The discharger shall furnish the Regional Water Board, State Water Board, or U.S. EPA, within a reasonable time, any requested information to determine compliance with this General Permit. The discharger shall also furnish, upon request, copies of records that are required to be kept by this General Permit.

H. Inspection and Entry

The discharger shall allow the Regional Water Board, State Water Board, U.S. EPA, and/or, in the case of construction sites which discharge through a municipal separate storm sewer, an authorized representative of the municipal operator of the separate storm sewer system receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the discharger's premises at reasonable times where a regulated construction activity is being conducted or where records must be kept under the conditions of this General Permit;

2. Access and copy at reasonable times any records that must be kept under the conditions of this General Permit;

3. Inspect at reasonable times the complete construction site, including any off-site staging areas or material storage areas, and the erosion/sediment controls; and

4. Sample or monitor at reasonable times for the purpose of ensuring General Permit compliance.

I. Electronic Signature and Certification Requirements

1. All Permit Registration Documents (PRDs) and Notice of Terminations (NOTs) shall be electronically signed, certified, and submitted via SMARTS to the State Water Board. Either the Legally Responsible Person (LRP) or a person legally authorized to sign and certify PRDs and NOTs on behalf of the LRP (the LRP's Approved Signatory) must submit all information electronically via SMARTS.

    a. The LRP's Approved Signatory must be one of the following:

        i. For a corporation: a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (a) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or (b) the manager of the facility if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

        ii. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;

        iii. For a municipality, State, Federal, or other public agency: either a principal executive officer or ranking elected official. The principal executive officer of a Federal agency includes the chief executive officer of the agency or the senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA);

        iv. For the military: Any military officer who has been designated.

        v. For a public university: An authorized university official

b. Changes to Authorization. If an approved signatory's authorization is no longer accurate, a new authorization satisfying the requirements of paragraph (a) of this section must be submitted via SMARTS prior to or together with any reports, information or applications to be signed by an approved signatory.

2. All Annual Reports, or other information required by the General Permit (other than PRDs and NOTs) or requested by the Regional Water Board, State Water Board, U.S. EPA, or local storm water management agency shall be certified and submitted by the LRP or the LRP's approved signatory as described above.

J. Certification

Any person signing documents under Section IV.I above, shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

K. Anticipated Noncompliance

The discharger shall give advance notice to the Regional Water Board and local storm water management agency of any planned changes in the construction activity, which may result in noncompliance with General Permit requirements.

L. Bypass

Bypass[8] is prohibited. The Regional Water Board may take enforcement action against the discharger for bypass unless:

1. Bypass was unavoidable to prevent loss of life, personal injury or severe property damage;[9]

[8] The intentional diversion of waste streams from any portion of a treatment facility

[9] Severe property damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

2. There were no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that could occur during normal periods of equipment downtime or preventative maintenance;

3. The discharger submitted a notice at least ten days in advance of the need for a bypass to the Regional Water Board; or

4. The discharger may allow a bypass to occur that does not cause effluent limitations to be exceeded, but only if it is for essential maintenance to assure efficient operation. In such a case, the above bypass conditions are not applicable. The discharger shall submit notice of an unanticipated bypass as required.

M. Upset

1. A discharger that wishes to establish the affirmative defense of an upset[10] in an action brought for noncompliance shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

   a. An upset occurred and that the discharger can identify the cause(s) of the upset

   b. The treatment facility was being properly operated by the time of the upset

   c. The discharger submitted notice of the upset as required; and

   d. The discharger complied with any remedial measures required

2. No determination made before an action of noncompliance occurs, such as during administrative review of claims that noncompliance was caused by an upset, is final administrative action subject to judicial review.

3. In any enforcement proceeding, the discharger seeking to establish the occurrence of an upset has the burden of proof

[10] An exceptional incident in which there is unintentional and temporary noncompliance the technology based numeric effluent limitations because of factors beyond the reasonable control of the discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

N. Penalties for Falsification of Reports

Section 309(c)(4) of the CWA provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained under this General Permit, including reports of compliance or noncompliance shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years or by both.

O. Oil and Hazardous Substance Liability

Nothing in this General Permit shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the discharger is or may be subject to under Section 311 of the CWA.

P. Severability

The provisions of this General Permit are severable; and, if any provision of this General Permit or the application of any provision of this General Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this General Permit shall not be affected thereby.

Q. Reopener Clause

This General Permit may be modified, revoked and reissued, or terminated for cause due to promulgation of amended regulations, receipt of U.S. EPA guidance concerning regulated activities, judicial decision, or in accordance with 40 Code of Federal Regulations (CFR) 122.62, 122.63, 122.64, and 124.5.

R. Penalties for Violations of Permit Conditions

1. Section 309 of the CWA provides significant penalties for any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the CWA or any permit condition or limitation implementing any such section in a permit issued under Section 402. Any person who violates any permit condition of this General Permit is subject to a civil penalty not to exceed $37,500[11] per calendar day of such violation, as well as any other appropriate sanction provided by Section 309 of the CWA.

[11] May be further adjusted in accordance with the Federal Civil Penalties Inflation Adjustment Act.

2. The Porter-Cologne Water Quality Control Act also provides for civil and criminal penalties, which in some cases are greater than those under the CWA.

S. Transfers

This General Permit is not transferable.

T. Continuation of Expired Permit

This General Permit continues in force and effect until a new General Permit is issued or the SWRCB rescinds this General Permit. Only those dischargers authorized to discharge under the expiring General Permit are covered by the continued General Permit.

V. EFFLUENT STANDARDS

A. Narrative Effluent Limitations

1. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

2. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

B. Numeric Effluent Limitations (NELs)

Table 1- Numeric Effluent Limitations, Numeric Action Levels, Test Methods, Detection Limits, and Reporting Units

Parameter	Test Method	Discharge Type	Min. Detection Limit	Units	Numeric Action Level	Numeric Effluent Limitation
pH	Field test with calibrated portable instrument	Risk Level 2	0.2	pH units	lower NAL = 6.5 upper NAL = 8.5	N/A
		Risk Level 3			lower NAL = 6.5 upper NAL = 8.5	lower NEL = 6.0 upper NEL = 9.0
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	Risk Level 2	1	NTU	250 NTU	N/A
		Risk Level 3			250 NTU	500 NTU

1. Numeric Effluent Limitations (NELs):

   a. **Storm Event, Daily Average pH Limits –** For Risk Level 3 dischargers, the pH of storm water and non-storm water discharges

shall be within the ranges specified in Table 1 during any site phase where there is a "high risk of pH discharge."[12]

b. **Storm Event Daily Average Turbidity Limit –** For Risk Level 3 dischargers, the turbidity of storm water and non-storm water discharges shall not exceed 500 NTU.

2. If daily average sampling results are outside the range of pH NELs (i.e., is below the lower NEL for pH or exceeds the upper NEL for pH) or exceeds the turbidity NEL (as listed in Table 1), the discharger is in violation of this General Permit and shall electronically file monitoring results in violation within 5 business days of obtaining the results.

3. **Compliance Storm Event**:

   Discharges of storm water from Risk Level 3 sites shall comply with applicable NELs (above) unless the storm event causing the discharges is determined after the fact to be equal to or larger than the Compliance Storm Event (expressed in inches of rainfall). The Compliance Storm Event for Risk Level 3 discharges is the 5 year, 24 hour storm (expressed in tenths of an inch of rainfall), as determined by using these maps:

   http://www.wrcc.dri.edu/pcpnfreq/nca5y24.gif
   http://www.wrcc.dri.edu/pcpnfreq/sca5y24.gif

   Compliance storm event verification shall be done by reporting on-site rain gauge readings as well as nearby governmental rain gauge readings.

4. Dischargers shall not be required to comply with NELs if the site receives run-on from a forest fire or any other natural disaster.

C. Numeric Action Levels (NALs)

1. For Risk Level 2 and 3 dischargers, the lower storm event average NAL for pH is 6.5 pH units and the upper storm event average NAL for pH is 8.5 pH units. The discharger shall take actions as described below if the discharge is outside of this range of pH values.

[12] A period of high risk of pH discharge is defined as a project's complete utilities phase, complete vertical build phase, and any portion of any phase where significant amounts of materials are placed directly on the land at the site in a manner that could result in significant alterations of the background pH of the discharges.

2. For Risk Level 2 and 3 dischargers, the NAL storm event daily average for turbidity is 250 NTU. The discharger shall take actions as described below if the discharge is outside of this range of turbidity values.

3. Whenever the results from a storm event daily average indicate that the discharge is below the lower NAL for pH, exceeds the upper NAL for pH, or exceeds the turbidity NAL (as listed in Table 1), the discharger shall conduct a construction site and run-on evaluation to determine whether pollutant source(s) associated with the site's construction activity may have caused or contributed to the NAL exceedance and shall immediately implement corrective actions if they are needed.

4. The site evaluation shall be documented in the SWPPP and specifically address whether the source(s) of the pollutants causing the exceedance of the NAL:

    a. Are related to the construction activities and whether additional BMPs are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) determine what corrective action(s) were taken or will be taken and with a description of the schedule for completion.

        AND/OR:

    b. Are related to the run-on associated with the construction site location and whether additional BMPs measures are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) what corrective action(s) were taken or will be taken with a description of the schedule for completion.

VI. RECEIVING WATER LIMITATIONS

A. The discharger shall ensure that storm water discharges and authorized non-storm water discharges to any surface or ground water will not adversely affect human health or the environment.

B. The discharger shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants in quantities that threaten to cause pollution or a public nuisance.

C. The discharger shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants that cause or contribute to an exceedance of any applicable water quality objectives or water quality standards (collectively, WQS) contained in a Statewide Water Quality Control Plan, the California Toxics Rule, the National Toxics Rule, or the applicable Regional Water Board's Water Quality Control Plan (Basin Plan).

D. Dischargers located within the watershed of a CWA § 303(d) impaired water body, for which a TMDL has been approved by the U.S. EPA, shall comply with the approved TMDL if it identifies "construction activity" or land disturbance as a source of the pollution.

VII. TRAINING QUALIFICATIONS AND CERTIFICATION REQUIREMENTS

A. General

The discharger shall ensure that all persons responsible for implementing requirements of this General Permit shall be appropriately trained in accordance with this Section. Training should be both formal and informal, occur on an ongoing basis, and should include training offered by recognized governmental agencies or professional organizations. Those responsible for preparing and amending SWPPPs shall comply with the requirements in this Section VII.

The discharger shall provide documentation of all training for persons responsible for implementing the requirements of this General Permit in the Annual Reports.

B. SWPPP Certification Requirements

1. **Qualified SWPPP Developer:** The discharger shall ensure that SWPPPs are written, amended and certified by a Qualified SWPPP Developer (QSD). A QSD shall have one of the following registrations or certifications, and appropriate experience, as required for:

   a. A California registered professional civil engineer;

   b. A California registered professional geologist or engineering geologist;

   c. A California registered landscape architect;

   d. A professional hydrologist registered through the American Institute of Hydrology;

   e. A Certified Professional in Erosion and Sediment Control (CPESC) ™ registered through Enviro Cert International, Inc.;

   f. A Certified Professional in Storm Water Quality (CPSWQ) ™ registered through Enviro Cert International, Inc.; or

   g. A professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies (NICET);

Effective two years after the adoption date of this General Permit, a QSD shall have attended a State Water Board-sponsored or approved QSD training course.

2. The discharger shall list the name and telephone number of the currently designated Qualified SWPPP Developer(s) in the SWPPP.

3. **Qualified SWPPP Practitioner:** The discharger shall ensure that all BMPs required by this General Permit are implemented by a Qualified SWPPP Practitioner (QSP). A QSP is a person responsible for non-storm water and storm water visual observations, sampling and analysis. Effective two years from the date of adoption of this General Permit, a QSP shall be either a QSD or have one of the following certifications:

   a. A certified erosion, sediment and storm water inspector registered through Enviro Cert International, Inc.; or

   b. A certified inspector of sediment and erosion control registered through Certified Inspector of Sediment and Erosion Control, Inc.

   Effective two years after the adoption date of this General Permit, a QSP shall have attended a State Water Board-sponsored or approved QSP training course.

4. The LRP shall list in the SWPPP, the name of any Approved Signatory, and provide a copy of the written agreement or other mechanism that provides this authority from the LRP in the SWPPP.

5. The discharger shall include, in the SWPPP, a list of names of all contractors, subcontractors, and individuals who will be directed by the Qualified SWPPP Practitioner. This list shall include telephone numbers and work addresses. Specific areas of responsibility of each subcontractor and emergency contact numbers shall also be included.

6. The discharger shall ensure that the SWPPP and each amendment will be signed by the Qualified SWPPP Developer. The discharger shall include a listing of the date of initial preparation and the date of each amendment in the SWPPP.

VIII. RISK DETERMINATION

The discharger shall calculate the site's sediment risk and receiving water risk during periods of soil exposure (i.e. grading and site stabilization) and use the calculated risks to determine a Risk Level(s) using the methodology in

Appendix 1. For any site that spans two or more planning watersheds,[13] the discharger shall calculate a separate Risk Level for each planning watershed. The discharger shall notify the State Water Board of the site's Risk Level determination(s) and shall include this determination as a part of submitting the PRDs. If a discharger ends up with more than one Risk Level determination, the Regional Water Board may choose to break the project into separate levels of implementation.

IX. RISK LEVEL 1 REQUIREMENTS

Risk Level 1 Dischargers shall comply with the requirements included in Attachment C of this General Permit.

X. RISK LEVEL 2 REQUIREMENTS

Risk Level 2 Dischargers shall comply with the requirements included in Attachment D of this General Permit.

XI. RISK LEVEL 3 REQUIREMENTS

Risk Level 3 Dischargers shall comply with the requirements included in Attachment E of this General Permit.

XII. ACTIVE TREATMENT SYSTEMS (ATS)

Dischargers choosing to implement an ATS on their site shall comply with all of the requirements in Attachment F of this General Permit.

[13] Planning watershed: defined by the Calwater Watershed documents as a watershed that ranges in size from approximately 3,000 to 10,000 acres http://cain.ice.ucdavis.edu/calwater/calwfaq.html, http://gis.ca.gov/catalog/BrowseRecord.epl?id=22175 .

XIII. POST-CONSTRUCTION STANDARDS

A. All dischargers shall comply with the following runoff reduction requirements unless they are located within an area subject to post-construction standards of an active Phase I or II municipal separate storm sewer system (MS4) permit that has an approved Storm Water Management Plan.

1. This provision shall take effect three years from the adoption date of this permit, or later at the discretion of the Executive Officer of the Regional Board.

2. The discharger shall demonstrate compliance with the requirements of this section by submitting with their NOI a map and worksheets in accordance with the instructions in Appendix 2. The discharger shall use non-structural controls unless the discharger demonstrates that non-structural controls are infeasible or that structural controls will produce greater reduction in water quality impacts.

3. The discharger shall, through the use of non-structural and structural measures as described in Appendix 2, replicate the pre-project water balance (for this permit, defined as the volume of rainfall that ends up as runoff) for the smallest storms up to the 85th percentile storm event (or the smallest storm event that generates runoff, whichever is larger). Dischargers shall inform Regional Water Board staff at least 30 days prior to the use of any structural control measure used to comply with this requirement. Volume that cannot be addressed using non-structural practices shall be captured in structural practices and approved by the Regional Water Board. When seeking Regional Board approval for the use of structural practices, dischargers shall document the infeasibility of using non-structural practices on the project site, or document that there will be fewer water quality impacts through the use of structural practices.

4. For sites whose disturbed area exceeds two acres, the discharger shall preserve the pre-construction drainage density (miles of stream length per square mile of drainage area) for all drainage areas within the area serving a first order stream[14] or larger stream and ensure that post-project time of runoff concentration is equal or greater than pre-project time of concentration.

[14] A first order stream is defined as a stream with no tributaries.

B. All dischargers shall implement BMPs to reduce pollutants in storm water discharges that are reasonably foreseeable after all construction phases have been completed at the site (Post-construction BMPs).

XIV. SWPPP REQUIREMENTS

A. The discharger shall ensure that the Storm Water Pollution Prevention Plans (SWPPPs) for all traditional project sites are developed and amended or revised by a QSD. The SWPPP shall be designed to address the following objectives:

1. All pollutants and their sources, including sources of sediment associated with construction, construction site erosion and all other activities associated with construction activity are controlled;

2. Where not otherwise required to be under a Regional Water Board permit, all non-storm water discharges are identified and either eliminated, controlled, or treated;

3. Site BMPs are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water discharges from construction activity to the BAT/BCT standard;

4. Calculations and design details as well as BMP controls for site run-on are complete and correct, and

5. Stabilization BMPs installed to reduce or eliminate pollutants after construction are completed.

B. To demonstrate compliance with requirements of this General Permit, the QSD shall include information in the SWPPP that supports the conclusions, selections, use, and maintenance of BMPs.

C. The discharger shall make the SWPPP available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio/telephone.

XV. REGIONAL WATER BOARD AUTHORITIES

A. In the case where the Regional Water Board does not agree with the discharger's self-reported risk level (e.g., they determine themselves to be a Level 1 Risk when they are actually a Level 2 Risk site), Regional Water Boards may either direct the discharger to reevaluate the Risk Level(s) for their site or terminate coverage under this General Permit.

B. Regional Water Boards may terminate coverage under this General Permit for dischargers who fail to comply with its requirements or where they determine that an individual NPDES permit is appropriate.

C. Regional Water Boards may require dischargers to submit a Report of Waste Discharge / NPDES permit application for Regional Water Board consideration of individual requirements.

D. Regional Water Boards may require additional Monitoring and Reporting Program Requirements, including sampling and analysis of discharges to sediment-impaired water bodies.

E. Regional Water Boards may require dischargers to retain records for more than the three years required by this General Permit.

XVI. ANNUAL REPORTING REQUIREMENTS

A. All dischargers shall prepare and electronically submit an Annual Report no later than September 1 of each year.

B. The discharger shall certify each Annual Report in accordance with the Special Provisions.

C. The discharger shall retain an electronic or paper copy of each Annual Report for a minimum of three years after the date the annual report is filed.

D. The discharger shall include storm water monitoring information in the Annual Report consisting of:

1. a summary and evaluation of all sampling and analysis results, including copies of laboratory reports;

2. the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit");

3. a summary of all corrective actions taken during the compliance year;

4. identification of any compliance activities or corrective actions that were not implemented;

5. a summary of all violations of the General Permit;

6. the names of individual(s) who performed the facility inspections, sampling, visual observation (inspections), and/or measurements;

7. the date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge); and

8. the visual observation and sample collection exception records and reports specified in Attachments C, D, and E.

E. The discharger shall provide training information in the Annual Report consisting of:

1. documentation of all training for individuals responsible for all activities associated with compliance with this General Permit;

2. documentation of all training for individuals responsible for BMP installation, inspection, maintenance, and repair; and

3. documentation of all training for individuals responsible for overseeing, revising, and amending the SWPPP.

ATTACHMENT A
Linear Underground/ Overhead Requirements

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All Linear Underground/Overhead project dischargers who submit permit registration documents (PRDs) indicating their intention to be regulated under the provisions of this General Permit shall comply with the following:

A. DEFINITION OF LINEAR UNDERGROUND/OVERHEAD PROJECTS

1. Linear Underground/Overhead Projects (LUPs) include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water and wastewater for domestic municipal services), liquiescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g., telephone, telegraph, radio, or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to, (a) those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment, and associated ancillary facilities); and include, but are not limited to, (b) underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/ or pavement repair or replacement, and stockpile/borrow locations.

2. LUP evaluation shall consist of two tasks:

a. Confirm that the project or project section(s) qualifies as an LUP. The State Water Board website contains a project determination guidance flowchart. http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml

b. Identify which Type(s) (1, 2 or 3 described in Section I below) are applicable to the project or project sections based on project sediment and receiving water risk. (See Attachment A.1)

3. A Legally Responsible Person (LRP) for a Linear Underground/Overhead project is required to obtain CGP coverage under one or more permit registration document (PRD) electronic submittals to the State Water Board's Storm Water Multi-Application and Report Tracking (SMARTs) system. Attachment A.1 contains a flow chart to be used when determining if a linear project qualifies for coverage and to determine LUP Types. Since a LUP may be constructed within both developed and undeveloped locations and portions of LUPs may be constructed by different contractors, LUPs may be broken into logical permit sections. Sections may be determined based on portions of a project conducted by one contractor. Other situations may also occur, such as the time period in which the sections of a project will be constructed (e.g. project phases), for which separate permit coverage is possible. For projects that are broken into separate sections, a description of how each section relates to the overall project and the definition of the boundaries between sections shall be clearly stated.

4. Where construction activities transverse or enter into different Regional Water Board jurisdictions, LRPs shall obtain permit coverage for each Regional Water Board area involved prior to the commencement of construction activities.

5. Small Construction Rainfall Erosivity Waiver

EPA's Small Construction Erosivity Waiver applies to sites between one and five acres demonstrating that there are no adverse water quality impacts.

Dischargers eligible for a Rainfall Erosivity Waiver based on low erosivity potential shall complete the electronic Notice of Intent (NOI) and Sediment Risk form through the State Water Board's SMARTS system, certifying that the construction activity will take place during a period when the value of the rainfall erosivity factor is less than five. Where the LRP changes or another LRP is added during construction, the new LRP must also submit a waiver certification through the SMARTS system.

If a small linear construction site continues beyond the projected completion date given on the waiver certification, the LRP shall recalculate the rainfall erosivity factor for the new project duration and submit this information through the SMARTS system. If the new R factor is below five (5), the discharger shall update through SMARTS all applicable information on the waiver certification and retain a copy of the revised waiver onsite. The LRP shall submit the new waiver certification 30 days prior to the projected completion date listed on the original waiver form to assure exemption from permitting requirements is uninterrupted. If the new R factor is five (5) or above, the LRP shall be required to apply for coverage under this Order.

B. LINEAR PROJECT PERMIT REGISTRATION DOCUMENTS (PRDs)

Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted. PRDs shall consist of the following:

1. Notice of Intent (NOI)

Prior to construction activities, the LRP of a proposed linear underground/overhead project shall utilize the processes and methods provided in Attachment A.2, Permit Registration Documents (PRDs) – General Instructions for Linear Underground/Overhead Projects to comply with the Construction General Permit.

2. Site Maps

LRPs submitting PRDs shall include at least 3 maps. The first map will be a zoomed[1] 1000-1500 ft vicinity map that shows the starting point of the project. The second will be a zoomed map of 1000-1500 ft showing the ending location of the project. The third will be a larger view vicinity map, 1000 ft to 2000 ft, displaying the entire project location depending on the project size, and indicating the LUP type (1, 2 or 3) areas within the total project footprint.

3. Drawings

LRPs submitting PRDs shall include a construction drawing(s) or other appropriate drawing(s) or map(s) that shows the locations of storm drain

[1] An image with a close-up/enhanced detailed view of site features that show minute details such as streets and neighboring structures.
Or: An image with a close-up/enhanced detailed view of the site's surrounding infrastructure.
Or: An image with a close up detailed view of the project and its surroundings.

inlets and waterbodies[2] that may receive discharges from the construction activities and that shows the locations of BMPs to be installed for all those BMPs that can be illustrated on the revisable drawing(s) or map(s). If storm drain inlets, waterbodies, and/or BMPs cannot be adequately shown on the drawing(s) or map(s) they should be described in detail within the SWPPP.

4. Storm Water Pollution Prevention Plan (SWPPP)

LUP dischargers shall comply with the SWPPP Preparation, Implementation, and Oversight requirements in Section K of this Attachment.

5. Contact information

LUP dischargers shall include contact information for all contractors (or subcontractors) responsible for each area of an LUP project. This should include the names, telephone numbers, and addresses of contact personnel. Specific areas of responsibility of each contact, and emergency contact numbers should also be included.

6. In the case of a public emergency that requires immediate construction activities, a discharger shall submit a brief description of the emergency construction activity within five days of the onset of construction, and then shall submit all PRDs within thirty days.

C. LINEAR PROJECT TERMINATION OF COVERAGE REQUIREMENTS

The LRP may terminate coverage of an LUP when construction activities are completed by submitting an electronic notice of termination (NOT) through the State Water Board's SMARTS system. Termination requirements are different depending on the complexity of the LUP. An LUP is considered complete when: (a) there is no potential for construction-related storm water pollution; (b) all elements of the SWPPP have been completed; (c) construction materials and waste have been disposed of properly; (d) the site is in compliance with all local storm water management requirements; and (e) the LRP submits a notice of termination (NOT) and has received approval for termination from the appropriate Regional Water Board office.

1. LUP Stabilization Requirements

The LUP discharger shall ensure that all disturbed areas of the construction site are stabilized prior to termination of coverage under this General Permit. Final stabilization for the purposes of submitting an NOT

[2] Includes basin(s) that the MS4 storm sewer systems may drain to for Hydromodification or Hydrological Conditional of Concerns under the MS4 permits.

is satisfied when all soil disturbing activities are completed and one of the following criteria is met:

a. In disturbed areas that were vegetated prior to construction activities of the LUP, the area disturbed must be re-established to a uniform vegetative cover equivalent to 70 percent coverage of the preconstruction vegetative conditions. Where preconstruction vegetation covers less than 100 percent of the surface, such as in arid areas, the 70 percent coverage criteria is adjusted as follows: if the preconstruction vegetation covers 50 percent of the ground surface, 70 percent of 50 percent (.70 X .50=.35) would require 35 percent total uniform surface coverage; or

b. Where no vegetation is present prior to construction, the site is returned to its original line and grade and/or compacted to achieve stabilization; or

c. Equiva lent stabilization measures have been employed. These measures include, but are not limited to, the use of such BMPs as blankets, reinforced channel liners, soil cement, fiber matrices, geotextiles, or other erosion resistant soil coverings or treatments.

2. LUP Termination of Coverage Requirements

The LRP shall file an NOT through the State Water Board's SMARTS system. By submitting an NOT, the LRP is certifying that construction activities for an LUP are complete and that the project is in full compliance with requirements of this General Permit and that it is now compliant with soil stabilization requirements where appropriate. Upon approval by the appropriate Regional Water Board office, permit coverage will be terminated.

3. Revising Coverage for Change of Acreage

When the LRP of a portion of an LUP construction project changes, or when a phase within a multi-phase project is completed, the LRP may reduce the total acreage covered by this General Permit. In reducing the acreage covered by this General Permit, the LRP shall electronically file revisions to the PRDs that include:

a. a revised NOI indicating the new project size;

b. a revised site map showing the acreage of the project completed, acreage currently under construction, acreage sold, transferred or added, and acreage currently stabilized.

c. SWPPP revisions, as appropriate; and

d. certification that any new LRPs have been notified of applicable requirements to obtain General Permit coverage. The certification shall include the name, address, telephone number, and e-mail address (if known) of the new LRP.

If the project acreage has increased, dischargers shall mail payment of revised annual fees within 14 days of receiving the revised annual fee notification.

D. DISCHARGE PROHIBITIONS

1. LUP dischargers shall not violate any discharge prohibitions contained in applicable Basin Plans or statewide water quality control plans. Waste discharges to Areas of Special Biological Significance (ASBS) are prohibited by the California Ocean Plan, unless granted an exception issued by the State Water Board.

2. LUP dischargers are prohibited from discharging non-storm water that is not otherwise authorized by this General Permit. Non-storm water discharges authorized by this General Permit[3] may include, fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, street cleaning, dewatering,[4] uncontaminated groundwater from dewatering, and other discharges not subject to a separate general NPDES permit adopted by a Regional Water Board. Such discharges are allowed by this General Permit provided they are not relied upon to clean up failed or inadequate construction or post-construction BMPs designed to keep materials on site. These authorized non-storm water discharges:

[3] Dischargers must identify all authorized non-storm water discharges in the LUP's SWPPP and identify BMPs that will be implemented to either eliminate or reduce pollutants in non-storm water discharges. Regional Water Boards may direct the discharger to discontinue discharging such non-storm water discharges if determined that such discharges discharge significant pollutants or threaten water quality.
[4] Dewatering activities may be prohibited or need coverage under a separate permit issued by the Regional Water Boards. Dischargers shall check with the appropriate Regional Water Boards for any required permit or basin plan conditions prior to initial dewatering activities to land, storm drains, or waterbodies.

a. Shall not cause or contribute to a violation of any water quality standard;

b. Shall not violate any other provision of this General Permit;

c. Shall not violate any applicable Basin Plan;

d. Shall comply with BMPs as described in the SWPPP;

e. Shall not contain toxic constituents in toxic amounts or (other) significant quantities of pollutants;

f. Shall be monitored and meets the applicable NALs and NELs; and

g. Shall be reported by the discharger in the Annual Report.

If any of the above conditions are not satisfied, the discharge is not authorized by this General Permit. The discharger shall notify the Regional Water Board of any anticipated non-storm water discharges not authorized by this General Permit to determine the need for a separate NPDES permit.

Additionally, some LUP dischargers may be required to obtain a separate permit if the applicable Regional Water Board has adopted a General Permit for dewatering discharges. Wherever feasible, alternatives, that do not result in the discharge of non-storm water, shall be implemented in accordance with this Attachment's Section K.2 - SWPPP Implementation Schedule.

3. LUP dischargers shall ensure that trench spoils or any other soils disturbed during construction activities that are contaminated[5] are not discharged with storm water or non-storm water discharges into any storm drain or water body except pursuant to an NPDES permit.

When soil contamination is found or suspected and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action, the LUP discharger shall have those soils sampled and tested to ensure that proper handling and public safety measures are

[5] Contaminated soil contains pollutants in concentrations that exceed the appropriate thresholds that various regulatory agencies set for those substances. Preliminary testing of potentially contaminated soils will be based on odor, soil discoloration, or prior history of the site's chemical use and storage and other similar factors. When soil contamination is found or suspected and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action, the discharger shall have those soils sampled and tested to ensure proper handling and public safety measures are implemented. The legally responsible person will notify the appropriate local, State, or federal agency(ies) when contaminated soil is found at a construction site, and will notify the Regional Water Board by submitting an NOT at the completion of the project.

implemented. The LUP discharger shall notify the appropriate local, State, and federal agency(ies) when contaminated soil is found at a construction site, and will notify the appropriate Regional Water Board.

4. Discharging any pollutant-laden water that will cause or contribute to an exceedance of the applicable Regional Water Board's Basin Plan from a dewatering site or sediment basin into any receiving water or storm drain is prohibited.

5. Debris[6] resulting from construction activities are prohibited from being discharged from construction project sites.

E. SPECIAL PROVISIONS

1. Duty to Comply

a. The LUP discharger must comply with all of the conditions of this General Permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and the Porter-Cologne Water Quality Control Act and is grounds for enforcement action and/or removal from General Permit coverage.

b. The LUP discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this General Permit has not yet been modified to incorporate the requirement.

2. General Permit Actions

a. This General Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the discharger for a General Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not annul any General Permit condition.

[6] Litter, rubble, discarded refuse, and remains of something destroyed.

b. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this General Permit, this General Permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the dischargers so notified.

3. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for an LUP discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this General Permit.

4. Duty to Mitigate

The LUP discharger shall take all responsible steps to minimize or prevent any discharge in violation of this General Permit, which has a reasonable likelihood of adversely affecting human health or the environment.

5. Proper Operation and Maintenance

The LUP discharger shall at all times properly operate and maintain any facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this General Permit and with the requirements of the Storm Water Pollution Prevention Plan (SWPPP). Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance may require the operation of backup or auxiliary facilities or similar systems installed by a discharger when necessary to achieve compliance with the conditions of this General Permit.

6. Property Rights

This General Permit does not convey any property rights of any sort or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor does it authorize any infringement of Federal, State, or local laws or regulations.

7. Duty to Maintain Records and Provide Information

a. The LUP discharger shall maintain a paper or electronic copy of all required records, including a copy of this General Permit, for three years from the date generated or date submitted, whichever is last. These records shall be kept at the construction site or in a crew

member's vehicle until construction is completed, and shall be made available upon request.

b. The LUP discharger shall furnish the Regional Water Board, State Water Board, or USEPA, within a reasonable time, any requested information to determine compliance with this General Permit. The LUP discharger shall also furnish, upon request, copies of records that are required to be kept by this General Permit.

8. Inspection and Entry

The LUP discharger shall allow the Regional Water Board, State Water Board, USEPA, and/or, in the case of construction sites which discharge through a municipal separate storm sewer, an authorized representative of the municipal operator of the separate storm sewer system receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

a. Enter upon the discharger's premises at reasonable times where a regulated construction activity is being conducted or where records must be kept under the conditions of this General Permit;

b. Access and copy at reasonable times any records that must be kept under the conditions of this General Permit;

c. Inspect at reasonable times the complete construction site, including any off-site staging areas or material storage areas, and the erosion/sediment controls; and

d. Sample or monitor at reasonable times for the purpose of ensuring General Permit compliance.

9. Electronic Signature and Certification Requirements

a. All Permit Registration Documents (PRDs) and Notices of Termination (NOTs) shall be electronically signed, certified, and submitted via SMARTS to the State Water Board. Either the Legally Responsible Person (LRP) or a person legally authorized to sign and certify PRDs and NOTs on behalf of the LRP (the LRP's Approved Signatory) must submit all information electronically via SMARTS. For Linear Underground/Overhead projects, the Legally Responsible Person is the person in charge of the utility company, municipality, or other public or private company or agency that owns or operates the LUP. The LRP's Approved Signatory must be one of the following:

i For a corporation: a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

(1) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

(2) the manager of the facility if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

ii For a partnership or sole proprietorship: a general partner or the proprietor, respectively; or

iii For a municipality, State, Federal, or other public agency: either a principal executive officer or ranking elected official. The principal executive officer of a Federal agency includes the chief executive officer of the agency or the senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of U.S. EPA).

b. Changes to Authorization. If an approved signatory's authorization is no longer accurate, a new authorization satisfying the requirements of paragraph (a) of this section must be submitted via SMARTS prior to or together with any reports, information or applications to be signed by an approved signatory.

c. All SWPPP revisions, annual reports, or other information required by the General Permit (other than PRDs and NOTs) or requested by the Regional Water Board, State Water Board, USEPA, or local storm water management agency shall be certified and submitted by the LRP or the LRP's approved signatory as described above.

10. Certification

Any person signing documents under Section E.9 above, shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

11. Anticipated Noncompliance

The LUP discharger shall give advance notice to the Regional Water Board and local storm water management agency of any planned changes in the construction activity, which may result in noncompliance with General Permit requirements.

12. Penalties for Falsification of Reports

Section 309(c)(4) of the CWA provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained under this General Permit, including reports of compliance or noncompliance shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years or by both.

13. Oil and Hazardous Substance Liability

Nothing in this General Permit shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the LUP discharger is or may be subject to under Section 311 of the CWA.

14. Severability

The provisions of this General Permit are severable; and, if any provision of this General Permit or the application of any provision of this General Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this General Permit shall not be affected thereby.

15. Reopener Clause

This General Permit may be modified, revoked and reissued, or terminated for cause due to promulgation of amended regulations, receipt of USEPA guidance concerning regulated activities, judicial decision, or in accordance with 40 Code of Federal Regulations (CFR) 122.62, 122.63, 122.64, and 124.5.

16. Penalties for Violations of Permit Conditions

a. Section 309 of the CWA provides significant penalties for any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the CWA or any permit condition or limitation implementing any such section in a permit issued under Section 402. Any person who violates any permit condition of this General Permit is

subject to a civil penalty not to exceed $37,500[7] per calendar day of such violation, as well as any other appropriate sanction provided by Section 309 of the CWA.

b. The Porter-Cologne Water Quality Control Act also provides for civil and criminal penalties, which in some cases are greater than those under the CWA.

17. Transfers

This General Permit is not transferable. A new LRP of an ongoing construction activity must submit PRDs in accordance with the requirements of this General Permit to be authorized to discharge under this General Permit. An LRP who is a property owner with active General Permit coverage who sells a fraction or all the land shall inform the new property owner(s) of the requirements of this General Permit.

18. Continuation of Expired Permit

This General Permit continues in force and effect until a new General Permit is issued or the SWRCB rescinds this General Permit. Only those dischargers authorized to discharge under the expiring General Permit are covered by the continued General Permit.

F. EFFLUENT STANDARDS

1. Narrative Effluent Limitations

a. LUP dischargers shall ensure that storm water discharges and authorized non-storm water discharges regulated by this General Permit do not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

b. LUP dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of structural or non-structural controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

[7] May be further adjusted in accordance with the Federal Civil Penalties Inflation Adjustment Act

2. Numeric Effluent Limitations (NELs)

Table 1. Numeric Effluent Limitations, Numeric Action Levels, Test Methods, Detection Limits, and Reporting Units

Parameter	Test Method	Discharge Type	Min. Detection Limit	Units	Numeric Action Level	Numeric Effluent Limitation
pH	Field test with calibrated portable instrument	LUP Type 2	0.2	pH units	lower NAL = 6.5 upper NAL = 8.5	N/A
		LUP Type 3			lower NAL = 6.5 upper NAL = 8.5	lower NEL = 6.0 upper NEL = 9.0
Turbidity EPA	0180.1 and/or field test with calibrated portable instrument	LUP Type 2	1 NTU		250 NTU	N/A
		LUP Type 3			250 NTU	500 NTU

a. Numeric Effluent Limitations (NELs):

i **Storm Event, Daily Average pH Limits –** For LUP Type 3 dischargers, the daily average pH of storm water and non-storm water discharges shall be within the ranges specified in Table 1 during any project phase where there is a "high risk of pH discharge."[8]

ii **Storm Event Daily Average Turbidity Limit –** For LUP Type 3 dischargers, the daily average turbidity of storm water and non-storm water discharges shall not exceed 500 NTU.

[8] A period of high risk of pH discharge is defined as a project's complete utilities phase, complete vertical build phase, and any portion of any phase where significant amounts of materials are placed directly on the land at the site in a manner that could result in significant alterations of the background pH of the discharges.

b. If a daily average sample result is outside the range of pH NELs (i.e., is below the lower NEL for pH or exceeds the upper NEL for pH) or exceeds the turbidity NEL (as listed in Table 1), the discharger is in violation of this General Permit and shall electronically file the results in violation within 5 business days of obtaining the results.

c. Compliance Storm Event:

Discharges of storm water from LUP Type 3 sites shall comply with applicable NELs (above) unless the storm event causing the discharges is determined after the fact to be equal to or larger than the Compliance Storm Event (expressed in inches of rainfall). The Compliance Storm Event for LUP Type 3 discharges is the 5-year, 24-hour storm (expressed in tenths of an inch of rainfall), as determined by using these maps:

http://www.wrcc.dri.edu/pcpnfreq/nca5y24.gif
http://www.wrcc.dri.edu/pcpnfreq/sca5y24.gif

Compliance storm event verification shall be done by reporting on-site rain gauge readings as well as nearby governmental rain gauge readings.

d. Dischargers shall not be required to comply with NELs if the site receives run-on from a forest fire or any other natural disaster.

3. Numeric Action Levels (NALs)

a. For LUP Type 2 and 3 dischargers, the lower storm event daily average NAL for pH is 6.5 pH units and the upper storm event daily average NAL for pH is 8.5 pH units. The LUP discharger shall take actions as described below if the storm event daily average discharge is outside of this range of pH values.

b. For LUP Type 2 and 3 dischargers, the storm event daily average NAL for turbidity is 250 NTU. The discharger shall take actions as described below if the storm event daily average discharge is outside of this range of turbidity values.

c. Whenever daily average analytical effluent monitoring results indicate that the discharge is below the lower NAL for pH, exceeds the upper NAL for pH, or exceeds the turbidity NAL (as listed in Table 1), the LUP discharger shall conduct a construction site and run-on evaluation to determine whether pollutant source(s) associated with the site's construction activity may have caused or contributed to the NAL

exceedance and shall immediately implement corrective actions if they are needed.

d. The site evaluation will be documented in the SWPPP and specifically address whether the source(s) of the pollutants causing the exceedance of the NAL:

i Are related to the construction activities and whether additional BMPs or SWPPP implementation measures are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) determine what corrective action(s) were taken or will be taken and with a description of the schedule for completion.

AND/OR:

ii Are related to the run-on associated with the construction site location and whether additional BMPs or SWPPP implementation measures are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) decide what corrective action(s) were taken or will be taken, including a description of the schedule for completion.

G. RECEIVING WATER LIMITATIONS

1. LUP dischargers shall ensure that storm water discharges and authorized non-storm water discharges to any surface or ground water will not adversely affect human health or the environment.

2. LUP dischargers shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants in quantities that threaten to cause pollution or a public nuisance.

3. LUP dischargers shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants that cause or contribute to an exceedance of any applicable water quality objectives or water quality standards (collectively, WQS) contained in a Statewide Water Quality Control Plan, the California Toxics Rule, the National Toxics Rule, or the applicable Regional Water Board's Water Quality Control Plan (Basin Plan).

H. TRAINING QUALIFICATIONS

1. General

All persons responsible for implementing requirements of this General Permit shall be appropriately trained. Training should be both formal and informal, occur on an ongoing basis, and should include training offered by recognized governmental agencies or professional organizations. Persons responsible for preparing, amending and certifying SWPPPs shall comply with the requirements in this Section H.

2. SWPPP Certification Requirements

a. **Qualified SWPPP Developer:** The LUP discharger shall ensure that all SWPPPs be written, amended and certified by a Qualified SWPPP Developer (QSD). A QSD shall have one of the following registrations or certifications, and appropriate experience, as required for:

i A California registered professional civil engineer;

ii A California registered professional geologist or engineering geologist;

iii A California registered landscape architect;

iv A professional hydrologist registered through the American Institute of Hydrology;

v A certified professional in erosion and sediment control (CPESC) ™ registered through Enviro Cert International, Inc;

vi A certified professional in storm water quality (CPSWQ)™ registered through Enviro Cert International, Inc.; or

vii A certified professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies (NICET).

Effective two years after the adoption date of this General Permit, a QSD shall have attended a State Water Board-sponsored or approved QSD training course.

b. The LUP discharger shall ensure that the SWPPP is written and amended, as needed, to address the specific circumstances for each construction site covered by this General Permit prior to commencement of construction activity for any stage.

c. The LUP discharger shall list the name and telephone number of the currently designated Qualified SWPPP Developer(s) in the SWPPP.

d. **Qualified SWPPP Practitioner:** The LUP discharger shall ensure that all elements of any SWPPP for each project will be implemented by a Qualified SWPPP Practitioner (QSP). A QSP is a person responsible for non-storm water and storm water visual observations, sampling and analysis, and for ensuring full compliance with the permit and implementation of all elements of the SWPPP. Effective two years from the date of adoption of this General Permit, a QSP shall be either a QSD or have one of the following certifications:

   i A certified erosion, sediment and storm water inspector registered through Certified Professional in Erosion and Sediment Control, Inc.; or

   ii A certified inspector of sediment and erosion control registered through Certified Inspector of Sediment and Erosion Control, Inc.

   Effective two years after the adoption date of this General Permit, a QSP shall have attended a State Water Board-sponsored or approved QSP training course.

e. The LUP discharger shall ensure that the SWPPP include a list of names of all contractors, subcontractors, and individuals who will be directed by the Qualified SWPPP Practitioner, and who is ultimately responsible for implementation of the SWPPP. This list shall include telephone numbers and work addresses. Specific areas of responsibility of each subcontractor and emergency contact numbers shall also be included.

f. The LUP discharger shall ensure that the SWPPP and each amendment be signed by the Qualified SWPPP Developer. The LUP discharger shall include a listing of the date of initial preparation and the dates of each amendment in the SWPPP.

I. TYPES OF LINEAR PROJECTS

This attachment establishes three types (Type 1, 2 & 3) of complexity for areas within an LUP or project section based on threat to water quality. Project area Types are determined through Attachment A.1.

The Type 1 requirements below establish the baseline requirements for all LUPs subject to this General Permit. Additional requirements for Type 2 and Type 3 LUPs are labeled.

1. Type 1 LUPs*:*

LUP dischargers with areas of a LUP designated as Type 1 shall comply with the requirements in this Attachment. Type 1 LUPs are:

a. Those construction areas where 70 percent or more of the construction activity occurs on a paved surface and where areas disturbed during construction will be returned to preconstruction conditions or equivalent protection established at the end of the construction activities for the day; or

b. Where greater than 30 percent of construction activities occur within the non-paved shoulders or land immediately adjacent to paved surfaces, or where construction occurs on unpaved improved roads, including their shoulders or land immediately adjacent to them where:

   i Areas disturbed during construction will be returned to preconstruction conditions or equivalent protection is established at the end of the construction activities for the day to minimize the potential for erosion and sediment deposition, and

   ii Areas where established vegetation was disturbed during construction will be stabilized and re-vegetated by the end of project. When required, adequate temporary stabilization BMPs will be installed and maintained until vegetation is established to meet minimum cover requirements established in this General Permit for final stabilization.

c. Where the risk determination is as follows:

   i Low sediment risk, low receiving water risk, or

   ii Low sediment risk, medium receiving water risk, or

   iii Medium sediment risk, low receiving water risk

2. Type 2 LUPs:

Type 2 LUPs are determined by the Combined Risk Matrix in Attachment A.1. Type 2 LUPs have the specified combination of risk:

d. High sediment risk, low receiving water risk, or

e. Medium sediment risk, medium receiving water risk, or

f. Low sediment risk, high receiving water risk

Receiving water risk is either considered "Low" for those areas of the project that are not in close proximity to a sensitive receiving watershed, "Medium" for those areas of the project within a sensitive receiving watershed yet outside of the flood plain of a sensitive receiving water body, and "High" where the soil disturbance is within close proximity to a sensitive receiving water body. Project sediment risk is calculated based on the Risk Factor Worksheet in Attachment C of this General Permit.

3. Type 3 LUPs:

Type 3 LUPs are determined by the Combined Risk Matrix in Attachment A.1. Type 3 LUPs have the specified combination of risk:

a. High sediment risk, high receiving water risk, or

b. High sediment risk, medium receiving water risk, or

c. Medium sediment risk, high receiving water risk

Receiving water risk is either considered "Medium" for those areas of the project within a sensitive receiving watershed yet outside of the flood plain of a sensitive receiving water body, or "High" where the soil disturbance is within close proximity to a sensitive receiving water body. Project sediment risk is calculated based on the Risk Factor Worksheet in Attachment C.

J. LUP TYPE-SPECIFIC REQUIREMENTS

1. Effluent Standards

a. Narrative – LUP dischargers shall comply with the narrative effluent standards below.

i Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

ii LUP dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

b. Numeric – LUP Type 1 dischargers are not subject to a numeric effluent standard

c. Numeric –LUP Type 2 dischargers are subject to a pH NAL of 6.5-8.5, and a turbidity NAL of 250 NTU.

d. Numeric – LUP Type 3 dischargers are subject to a pH NAL of 6.5-8.5, and a turbidity NAL of 250 NTU. In addition, LUP Type 3 dischargers are subject to a pH NEL of 6.0-9.0 and a turbidity NEL of 500 NTU.

2. Good Site Management "Housekeeping"

a. LUP dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, the good housekeeping measures shall consist of the following:

i Identify the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

ii Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

iii Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

iv Minimize exposure of construction materials to precipitation (not applicable to materials designed to be outdoors and exposed to the environment).

v Implement BMPs to control the off-site tracking of loose construction and landscape materials.

b. LUP dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

i Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

ii Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

iii Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

iv Cover waste disposal containers at the end of every business day and during a rain event.

v Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

vi Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.

vii Implement procedures that effectively address hazardous and non-hazardous spills.

viii Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that:

(1) Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and

(2) Appropriate spill response personnel are assigned and trained.

ix Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

c. LUP dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

   i Prevent oil, grease, or fuel from leaking into the ground, storm drains or surface waters.

   ii Implement appropriate BMPs whenever equipment or vehicles are fueled, maintained or stored.

   iii Clean leaks immediately and disposing of leaked materials properly.

d. LUP dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

   i Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

   ii Contain fertilizers and other landscape materials when they are not actively being used.

   iii Discontinue the application of any erodible landscape material at least 2 days before a forecasted rain event[9] or during periods of precipitation.

   iv Applying erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

   v Stacking erodible landscape material on pallets and covering or storing such materials when not being used or applied.

e. LUP dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, LUP dischargers shall do the following:

[9] 50% or greater chance of producing precipitation.

i Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

ii Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

iii Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

iv Ensure retention of sampling, visual observation, and inspection records.

v Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

f. LUP dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations.

3. Non-Storm Water Management

a. LUP dischargers shall implement measures to control all non-storm water discharges during construction.

b. LUP dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

c. LUP dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

4. Erosion Control

a. LUP dischargers shall implement effective wind erosion control.

b. LUP dischargers shall provide effective soil cover for inactive[10] areas and all finished slopes, and utility backfill.

[10] Areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days

c. LUP dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

5. Sediment Controls

a. LUP dischargers shall establish and maintain effective perimeter controls as needed, and implement effective BMPs for all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

b. On sites where sediment basins are to be used, LUP dischargers shall, at minimum, design sediment basins according to the guidance provided in CASQA's Construction BMP Handbook.

c. **Additional LUP Type 2 & 3 Requirement:** LUP Type 2 & 3 dischargers shall apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths[11] in accordance with Table 2 below.

Table 2 – Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Sheet flow length not to exceed
0-25% 20	feet
25-50% 15	feet
Over 50%	10 feet

d. **Additional LUP Type 2 & 3 Requirement:** LUP Type 2 & 3 dischargers shall ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent off-site tracking of sediment.

e. **Additional LUP Type 2 & 3 Requirement:** LUP Type 2 & 3 dischargers shall ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire washoff locations) are maintained and protected from activities that reduce their effectiveness.

f. **Additional LUP Type 2 & 3 Requirement:** LUP Type 2 & 3 dischargers shall inspect all immediate access roads. At a minimum daily and prior to any rain event, the discharger shall remove any

[11] Sheet flow length is the length that shallow, low velocity flow travels across a site.

sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).

g. **Additional LUP Type 3 Requirement:** The Regional Water Board may require LUP Type 3 dischargers to implement additional site-specific sediment control requirements if the implementation of the other requirements in this section are not adequately protecting the receiving waters.

6. Run-on and Run-off Controls

a. LUP dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site-shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this Attachment.

b. Run-on and runoff controls are not required for Type 1 LUPs unless the evaluation of quantity and quality of run-on and runoff deems them necessary or visual inspections show that the site requires such controls.

7. Inspection, Maintenance and Repair

a. All inspection, maintenance repair and sampling activities at the discharger's LUP location shall be performed or supervised by a QSP representing the discharger. The QSP may delegate any or all of these activities to an employee trained to do the task(s) appropriately, but shall ensure adequate deployment.

b. LUP dischargers shall conduct visual inspections and observations daily during working hours (not recorded). At least once each 24-hour period during extended storm events, **LUP Type 2 & 3 dischargers** shall conduct visual inspections to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

c. Upon identifying failures or other shortcomings, as directed by the QSP, LUP dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

d. For each pre- and post-rain event inspection required, LUP dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format that includes the information described below.

e. The LUP discharger shall ensure that the checklist remains on-site or with the SWPPP. At a minimum, an inspection checklist should include:

i Inspection date and date the inspection report was written.

ii Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

iii Site information, including stage of construction, activities completed, and approximate area of the site exposed.

iv A description of any BMPs evaluated and any deficiencies noted.

v If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

vi Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

vii Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

viii Photographs taken during the inspection, if any.

ix Inspector's name, title, and signature.

K. STORM WATER POLLUTION PREVENTION PLAN (SWPPP) REQUIREMENTS

1. Objectives

SWPPPs for all LUPs shall be developed and amended or revised by a QSD. The SWPPP shall be designed to address the following objectives:

a. All pollutants and their sources, including sources of sediment, associated with construction activities associated with LUP activity are controlled;

b. All non-storm water discharges are identified and either eliminated, controlled, or treated;

c. BMPs are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water discharges from LUPs during construction; and

d. Stabilization BMPs installed to reduce or eliminate pollutants after construction is completed are effective and maintained.

2. SWPPP Implementation Schedule

a. LUPs for which PRDs have been submitted to the State Water Board shall develop a site/project location SWPPP prior to the start of land-disturbing activity in accordance with this Section and shall implement the SWPPP concurrently with commencement of soil-disturbing activities.

b. For an ongoing LUP involving a change in the LRP, the new LRP shall review the existing SWPPP and amend it, if necessary, or develop a new SWPPP within 15 calendar days to conform to the requirements set forth in this General Permit.

3. Availability

The SWPPP shall be available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio/telephone.

L. REGIONAL WATER BOARD AUTHORITIES

1. Regional Water Boards shall administer the provisions of this General Permit. Administration of this General Permit may include, but is not limited to, requesting the submittal of SWPPPs, reviewing SWPPPs, reviewing monitoring and sampling and analysis reports, conducting compliance inspections, gathering site information by any medium including sampling, photo and video documentation, and taking enforcement actions.

2. Regional Water Boards may terminate coverage under this General Permit for dischargers who fail to comply with its requirements or where they determine that an individual NPDES permit is appropriate.

3. Regional Water Boards may issue separate permits for discharges of storm water associated with construction activity to individual dischargers, categories of dischargers, or dischargers in a geographic area. Upon issuance of such permits by a Regional Water Board, dischargers subject to those permits shall no longer be regulated by this General Permit.

4. Regional Water Boards may direct the discharger to reevaluate the LUP Type(s) for the project (or elements/areas of the project) and impose the appropriate level of requirements.

5. Regional Water Boards may terminate coverage under this General Permit for dischargers who negligently or with willful intent incorrectly determine or report their LUP Type (e.g., they determine themselves to be a LUP Type 1 when they are actually a Type 2).

6. Regional Water Boards may review PRDs and reject or accept applications for permit coverage or may require dischargers to submit a Report of Waste Discharge / NPDES permit application for Regional Water Board consideration of individual requirements.

7. Regional Water Boards may impose additional requirements on dischargers to satisfy TMDL implementation requirements or to satisfy provisions in their Basin Plans.

8. Regional Water Boards may require additional Monitoring and Reporting Program Requirements, including sampling and analysis of discharges to sediment-impaired water bodies.

9. Regional Water Boards may require dischargers to retain records for more than the three years required by this General Permit.

10. Based on an LUP's threat to water quality and complexity, the Regional Water Board may determine on a case-by-case basis that an LUP, or a portion of an LUP, is not eligible for the linear project requirements contained in this Attachment, and require that the discharger comply with all standard requirements in this General Permit.

11. The Regional Water Board may require additional monitoring and reporting program requirements including sampling and analysis of discharges to CWA § 303(d)-listed water bodies. Additional requirements imposed by the Regional Water Board shall be consistent with the overall monitoring effort in the receiving waters.

M. MONITORING AND REPORTING REQUIREMENTS

Table 3. LUP Summary of Monitoring Requirements

LUP Type	Visual Inspections				Sample Collection		
	Daily Site BMP	Pre-storm Event / Baseline	Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water	Non-Visible (when applicable)
1	X						X
2	X	X	X	X	X		X
3	X	X	X	X	X	X	X

1. Objectives

LUP dischargers shall prepare a monitoring and reporting program (M&RP) prior to the start of construction and immediately implement the program at the start of construction for LUPs. The monitoring program must be implemented at the appropriate level to protect water quality at all times throughout the life of the project. The M&RP must be a part of the SWPPP, included as an appendix or separate SWPPP chapter.

2. M&RP Implementation Schedule

a. LUP dischargers shall implement the requirements of this Section at the time of commencement of construction activity. LUP dischargers are responsible for implementing these requirements until construction activity is complete and the site is stabilized.

b. LUP dischargers shall revise the M&RP when:

i Site conditions or construction activities change such that a change in monitoring is required to comply with the requirements and intent of this General Permit.

ii The Regional Water Board requires the discharger to revise its M&RP based on its review of the document. Revisions may include, but not be limited to, conducting additional site inspections, submitting reports, and certifications. Revisions shall be submitted via postal mail or electronic e-mail.

iii The Regional Water Board may require additional monitoring and reporting program requirements including sampling and analysis of discharges to CWA § 303(d)-listed water bodies. Additional requirements imposed by the Regional Water Board shall be consistent with the overall monitoring effort in the receiving waters.

3. LUP Type 1 Monitoring and Reporting Requirements

a. LUP Type 1 Inspection Requirements

i LUP Type 1 dischargers shall ensure that all inspections are conducted by trained personnel. The name(s) and contact number(s) of the assigned inspection personnel should be listed in the SWPPP.

ii LUP Type 1 dischargers shall ensure that all visual inspections are conducted daily during working hours and in conjunction with other daily activities in areas where active construction is occurring.

iii LUP Type 1 dischargers shall ensure that photographs of the site taken before, during, and after storm events are taken during inspections, and submitted through the State Water Board's SMARTS website once every three rain events.

iv LUP Type 1 dischargers shall conduct daily visual inspections to verify that:

(1) Appropriate BMPs for storm water and non-storm water are being implemented in areas where active construction is occurring (including staging areas);

(2) Project excavations are closed, with properly protected spoils, and that road surfaces are cleaned of excavated material and construction materials such as chemicals by either removing or storing the material in protective storage containers at the end of every construction day;

(3) Land areas disturbed during construction are returned to pre-construction conditions or an equivalent protection is used at the end of each workday to eliminate or minimize erosion and the possible discharge of sediment or other pollutants during a rain event.

v Inspections may be discontinued in non-active construction areas where soil-disturbing activities are completed and final soil stabilization is achieved (e.g., paving is completed, substructures

are installed, vegetation meets minimum cover requirements for final stabilization, or other stabilization requirements are met).

vi Inspection programs are required for LUP Type 1 projects where temporary and permanent stabilization BMPs are installed and are to be monitored after active construction is completed. Inspection activities shall continue until adequate permanent stabilization is established and, in areas where re-vegetation is chosen, until minimum vegetative coverage is established in accordance with Section C.1 of this Attachment.

b. LUP Type 1 Monitoring Requirements for Non-Visible Pollutants

LUP Type 1 dischargers shall implement sampling and analysis requirements to monitor non-visible pollutants associated with (1) construction sites; (2) activities producing pollutants that are not visually detectable in storm water discharges; and (3) activities which could cause or contribute to an exceedance of water quality objectives in the receiving waters.

i Sampling and analysis for non-visible pollutants is only required where the LUP Type 1 discharger believes pollutants associated with construction activities have the potential to be discharged with storm water runoff due to a spill or in the event there was a breach, malfunction, failure and/or leak of any BMP. Also, failure to implement BMPs may require sample collection.

(1) Visual observations made during the monitoring program described above will help the LUP Type 1 discharger determine when to collect samples.

(2) The LUP Type 1 discharger is not required to sample if one of the conditions described above (e.g., breach or spill) occurs and the site is cleaned of material and pollutants and/or BMPs are implemented prior to the next storm event.

ii LUP Type 1 dischargers shall collect samples down-gradient from all discharge locations where the visual observations were made triggering the monitoring, and which can be safely accessed. For sites where sampling and analysis is required, personnel trained in water quality sampling procedures shall collect storm water samples.

iii If sampling for non-visible pollutant parameters is required, LUP Type 1 dischargers shall ensure that samples be analyzed for parameters indicating the presence of pollutants identified in the pollutant source assessment required in Section J.2.a.i.

iv LUP Type 1 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

v LUP Type 1 dischargers shall ensure that a sufficiently large sample of storm water that has not come into contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample[12]) will be collected for comparison with the discharge sample. Samples shall be collected during the first two hours of discharge from rain events that occur during daylight hours and which generate runoff.

vi LUP Type 1 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis. Analyses may include, but are not limited to, indicator parameters such as: pH, specific conductance, dissolved oxygen, conductivity, salinity, and Total Dissolved Solids (TDS).

vii For laboratory analyses, all sampling, sample preservation, and other analyses must be conducted according to test procedures pursuant to 40 C.F.R. Part 136. LUP Type 1 dischargers shall ensure that field samples are collected and analyzed according to manufacturer specifications of the sampling devices employed. Portable meters shall be calibrated according to manufacturer's specification.

viii LUP Type 1 dischargers shall ensure that all field and/or analytical data are kept in the SWPPP document.

c. LUP Type 1 Visual Observation Exceptions

i LUP Type 1 dischargers shall be prepared to collect samples and conduct visual observation (inspections) to meet the minimum visual observation requirements of this Attachment. The Type 1 LUP discharger is not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

(1) During dangerous weather conditions such as flooding and electrical storms;

(2) Outside of scheduled site business hours.

(3) When access to the site is unsafe due to storm events.

[12] Sample collected at a location unaffected by contruction activities.

ii If the LUP Type 1 discharger does not collect the required samples or visual observation (inspections) due to these exceptions, an explanation why the sampling or visual observation (inspections) were not conducted shall be included in both the SWPPP and the Annual Report.

d. Particle Size Analysis for Risk Justification

LUP Type 1 dischargers utilizing justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

4. LUP Type 2 & 3 Monitoring and Reporting Requirements

a. LUP Type 2 & 3 Inspection Requirements

i LUP Type 2 & 3 dischargers shall ensure that all inspections are conducted by trained personnel. The name(s) and contact number(s) of the assigned inspection personnel should be listed in the SWPPP.

ii LUP Type 2 & 3 dischargers shall ensure that all visual inspections are conducted daily during working hours and in conjunction with other daily activities in areas where active construction is occurring.

iii LUP Type 2 & 3 dischargers shall ensure that photographs of the site taken before, during, and after storm events are taken during inspections, and submitted through the State Water Board's SMARTS website once every three rain events.

iv LUP Type 2 & 3 dischargers shall conduct daily visual inspections to verify that appropriate BMPs for storm water and non-storm water are being implemented and in place in areas where active construction is occurring (including staging areas).

v LUP Type 2 & 3 dischargers shall conduct inspections of the construction site prior to anticipated storm events, during extended storm events, and after actual storm events to identify areas contributing to a discharge of storm water associated with construction activity. Pre-storm inspections are to ensure that BMPs are properly installed and maintained; post-storm inspections are to assure that BMPs have functioned adequately. During

extended storm events, inspections shall be required during normal working hours for each 24-hour period.

vi Inspections may be discontinued in non-active construction areas where soil-disturbing activities are completed and final soil stabilization is achieved (e.g., paving is completed, substructures are installed, vegetation meets minimum cover requirements for final stabilization, or other stabilization requirements are met).

vii LUP Type 2 & 3 dischargers shall implement a monitoring program for inspecting projects that require temporary and permanent stabilization BMPs after active construction is complete. Inspections shall ensure that the BMPs are adequate and maintained. Inspection activities shall continue until adequate permanent stabilization is established and, in vegetated areas, until minimum vegetative coverage is established in accordance with Section C.1 of this Attachment.

viii If possible, LUP Type 2 & 3 dischargers shall install a rain gauge on-site at an accessible and secure location with readings made during all storm event inspections. When readings are unavailable, data from the closest rain gauge with publically available data may be used.

ix LUP Type 2 & 3 dischargers shall Include and maintain a log of the inspections conducted in the SWPPP. The log will provide the date and time of the inspection and who conducted the inspection.

b. LUP Type 2 & 3 Storm Water Effluent Monitoring Requirements

Table 4. LUP Type 2 & 3 Effluent Monitoring Requirements

LUP Type	Frequency	Effluent Monitoring
2	Minimum of 3 samples per day characterizing discharges associated with construction activity from the project active areas of construction.	Turbidity, pH, and non-visible pollutant parameters (if applicable)
3	Minimum of 3 samples per day characterizing discharges associated with construction activity from the project active areas of construction.	turbidity, pH, suspended sediment concentrations (SSC)[13] (only if turbidity NEL exceeded), plus non-visible pollutant parameters (if applicable)

i LUP Type 2 & 3 dischargers shall collect storm water grab samples from sampling locations characterizing discharges associated with

[13] Suspended Sediment Concentration monitoring is required for any Type 3 area that exceeds its turbidity NEL.

activity from the LUP active areas of construction. At a minimum, 3 samples shall be collected per day of discharge.

ii LUP Type 2 & 3 dischargers shall collect samples of stored or contained storm water that is discharged subsequent to a storm event producing precipitation of ½ inch or more at the time of discharge.

iii LUP Type 2 & 3 dischargers shall ensure that storm water grab sample(s) obtained be representative of the flow and characteristics of the discharge.

iv LUP Type 2 & 3 dischargers shall analyze their effluent samples for:

(1) pH and turbidity
(2) Any additional parameter for which monitoring is required by the Regional Water Board.

v LUP Type 3 dischargers that have violated the turbidity daily average NEL shall analyze subsequent effluent samples for turbidity and SSC.

c. LUP Type 2 & 3 Storm Water Effluent Sampling Locations

i LUP Type 2 & 3 dischargers shall perform sampling and analysis of storm water discharges to characterize discharges associated with construction activity from the entire disturbed project or area.

ii LUP Type 2 & 3 dischargers may monitor and report run-on from surrounding areas if there is reason to believe run-on may contribute to exceedance of NALs or NELs (applicable to Type 3).

iii LUP Type 2 & 3 dischargers shall select analytical test methods from the list provided in Table 5 below.

iv LUP Type 2 & 3 dischargers shall ensure that all storm water sample collection preservation and handling shall be conducted in accordance with the "Storm Water Sample Collection and Handling Instructions" below.

d. LUP Type 3 Receiving Water Monitoring Requirements

i In the event that an LUP Type 3 discharger violates an applicable NEL contained in this General Permit and has a direct discharge to receiving waters, the LUP discharger shall subsequently sample Receiving Waters (RWs) for turbidity, pH (if applicable) and SSC.

ii LUP Type 3 dischargers that meet the project criteria in Appendix 3 of this General Permit and have more than 30 acres of soil disturbance in the project area or project section area designated as Type 3, shall comply with the Bioassessment requirements prior to commencement of construction activity.

iii LUP Type 3 dischargers shall obtain RW samples in accordance with the requirements of the Receiving Water Sampling Locations section (Section M.4.d of this Attachment).

e. LUP Type 3 Receiving Water Sampling Locations

i **Upstream/up-gradient RW samples**: LUP Type 3 dischargers shall obtain any required upstream/up-gradient receiving water samples from a representative and accessible location as close as possible to and upstream from the effluent discharge point.

ii **Downstream/down-gradient RW samples**: LUP Type 3 dischargers shall obtain any required downstream/down-gradient receiving water samples from a representative and accessible location as close as possible to and downstream from the effluent discharge point.

iii If two or more discharge locations discharge to the same receiving water, LUP Type 3 dischargers may sample the receiving water at a single upstream and downstream location.

f. LUP Type 2 & 3 Monitoring Requirements for Non-Visible Pollutants

LUP Type 2 & 3 dischargers shall implement sampling and analysis requirements to monitor non-visible pollutants associated with (1) construction sites; (2) activities producing pollutants that are not visually detectable in storm water discharges; and (3) activities which could cause or contribute to an exceedance of water quality objectives in the receiving waters.

i Sampling and analysis for non-visible pollutants is only required where LUP Type 2 & 3 dischargers believe pollutants associated with construction activities have the potential to be discharged with storm water runoff due to a spill or in the event there was a breach, malfunction, failure and/or leak of any BMP. Also, failure to implement BMPs may require sample collection.

(1) Visual observations made during the monitoring program described above will help LUP Type 2 & 3 dischargers determine when to collect samples.

(2) LUP Type 2 & 3 dischargers are not required to sample if one of the conditions described above (e.g., breach or spill) occurs and the site is cleaned of material and pollutants and/or BMPs are implemented prior to the next storm event.

ii LUP Type 2 & 3 dischargers shall collect samples down-gradient from the discharge locations where the visual observations were made triggering the monitoring and which can be safely accessed. For sites where sampling and analysis is required, personnel trained in water quality sampling procedures shall collect storm water samples.

iii If sampling for non-visible pollutant parameters is required, LUP Type 2 & 3 dischargers shall ensure that samples be analyzed for parameters indicating the presence of pollutants identified in the pollutant source assessment required in Section J.2.a.i.

iv LUP Type 2 & 3 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

v LUP Type 2 & 3 dischargers shall ensure that a sufficiently large sample of storm water that has not come into contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample[14]) will be collected for comparison with the discharge sample. Samples shall be collected during the first two hours of discharge from rain events that occur during daylight hours and which generate runoff.

vi LUP Type 2 & 3 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis. Analyses may include, but are not limited to, indicator parameters such as: pH, specific conductance, dissolved oxygen, conductivity, salinity, and Total Dissolved Solids (TDS).

vii For laboratory analyses, all sampling, sample preservation, and other analyses must be conducted according to test procedures pursuant to 40 C.F.R. Part 136. LUP Type 2 & 3 dischargers shall ensure that field samples are collected and analyzed according to manufacturer specifications of the sampling devices employed. Portable meters shall be calibrated according to manufacturer's specification.

viii LUP Type 2 & 3 dischargers shall ensure that all field and/or analytical data are kept in the SWPPP document.

[14] Sample collected at a location unaffected by construction activities

g. LUP Type 2 & 3 Visual Observation and Sample Collection Exceptions

i LUP Type 2 & 3 dischargers shall be prepared to collect samples and conduct visual observation (inspections) to meet the minimum visual observation requirements of this Attachment. Type 2 & 3 LUP dischargers are not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

(1) During dangerous weather conditions such as flooding and electrical storms;

(2) Outside of scheduled site business hours.

(3) When access to the site is unsafe due to storm events.

ii If the LUP Type 2 or 3 discharger does not collect the required samples or visual observation (inspections) due to these exceptions, an explanation why the sampling or visual observation (inspections) were not conducted shall be included in both the SWPPP and the Annual Report.

h. LUP Type 2 & 3 Storm Water Sample Collection and Handling Instructions

LUP Type 2 & 3 dischargers shall refer to Table 5 below for test Methods, detection Limits, and reporting Units. During storm water sample collection and handling, the LUP Type 2 & 3 discharger shall:

i Identify the parameters required for testing and the number of storm water discharge points that will be sampled. Request the laboratory to provide the appropriate number of sample containers, types of containers, sample container labels, blank chain of custody forms, and sample preservation instructions.

ii Determine how to ship the samples to the laboratory. The testing laboratory should receive samples within 48 hours of the physical sampling (unless otherwise required by the laboratory). The options are to either deliver the samples to the laboratory, arrange to have the laboratory pick them up, or ship them overnight to the laboratory.

iii Use only the sample containers provided by the laboratory to collect and store samples. Use of any other type of containers could contaminate your samples.

iv Prevent sample contamination, by not touching, or putting anything into the sample containers before collecting storm water samples.

v Not overfilling sample containers. Overfilling can change the analytical results.

vi Tightly screw the cap of each sample container without stripping the threads of the cap.

vii Complete and attach a label to each sample container. The label shall identify the date and time of sample collection, the person taking the sample, and the sample collection location or discharge point. The label should also identify any sample containers that have been preserved.

viii Carefully pack sample containers into an ice chest or refrigerator to prevent breakage and maintain temperature during shipment. Remember to place frozen ice packs into the shipping container. Samples should be kept as close to 4° C (39° F) as possible until arriving at the laboratory. Do not freeze samples.

ix Complete a Chain of Custody form for each set of samples. The Chain of Custody form shall include the discharger's name, address, and phone number, identification of each sample container and sample collection point, person collecting the samples, the date and time each sample container was filled, and the analysis that is required for each sample container.

x Upon shipping/delivering the sample containers, obtain both the signatures of the persons relinquishing and receiving the sample containers.

xi Designate and train personnel to collect, maintain, and ship samples in accordance with the above sample protocols and good laboratory practices.

xii Refer to the Surface Water Ambient Monitoring Program's (SWAMP) Quality Assurance Management Plan (QAMP) for more information on sampling collection and analysis. See http://www.waterboards.ca.gov/water_issues/programs/swamp/[15] QAMP Link: http://www.waterboards.ca.gov/water_issues/programs/swamp/qamp.shtml

[15] Additional information regarding QAMP can be found at http://mpsl.mlml.calstate.edu/swqacompare.htm.

Table 5. Test Methods, Detection Limits, Reporting Units and Applicable NALs/NELs

Parameter	Test Method	Discharge Type	Min. Detection Limit	Reporting Units	Numeric Action Levels	Numeric Effluent Limitation (LUP Type 3)
pH	Field test with calibrated portable instrument	Type 2 & 3	0.2	pH units	Lower = 6.5 upper = 8.5	Lower = 6.0 upper = 9.0
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	Type 2 & 3	1	NTU	250 NTU	500 NTU
SSC	ASTM Method D 3977-97[16]	Type 3 if NEL is exceeded	5 Mg/L		N/A	N/A
Bioassessment	(STE) Level I of (SAFIT),[17] fixed-count of 600 org/sample	Type 3 LUPs > 30 acres	N/A N/A		N/A	N/A

i. LUP Type 2 & 3 Monitoring Methods

i The LUP Type 2 or 3 discharger's project M&RP shall include a description of the following items:

(1) Visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures.

(2) Sampling locations, and sample collection and handling procedures. This shall include detailed procedures for sample collection, storage, preservation, and shipping to the testing lab to assure that consistent quality control and quality assurance is maintained. Dischargers shall attach to the monitoring program a copy of the Chain of Custody form used when handling and shipping samples.

[16] ASTM, 1999, Standard Test Method for Determining Sediment Concentration in Water Samples: American Society of Testing and Materials, D 3977-97, Vol. 11.02, pp. 389-394

[17] The current SAFIT STEs (28 November 2006) list requirements for both the Level I and Level II taxonomic effort, and are located at: http://www.swrcb.ca.gov/swamp/docs/safit/ste_list.pdf. When new editions are published by SAFIT, they will supersede all previous editions. All editions will be posted at the State Water Board's SWAMP website.

(3) Identification of the analytical methods and related method detection limits (if applicable) for each parameter required in Section M.4.f above.

ii LUP Type 2 & 3 dischargers shall ensure that all sampling and sample preservation be in accordance with the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association). All monitoring instruments and equipment (including a discharger's own field instruments for measuring pH and turbidity) shall be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. All laboratory analyses shall be conducted according to test procedures under 40 CFR Part 136, unless other test procedures have been specified in this General Permit or by the Regional Water Board. With the exception of field analysis conducted by the discharger for turbidity and pH, all analyses shall be sent to and conducted at a laboratory certified for such analyses by the State Department of Health Services (SSC exception). The LUP discharger shall conduct its own field analysis of pH and may conduct its own field analysis of turbidity if the discharger has sufficient capability (qualified and trained employees, properly calibrated and maintained field instruments, etc.) to adequately perform the field analysis.

j. LUP Type 2 & 3 Analytical Methods

LUP Type 2 & 3 dischargers shall refer to Table 5 above for test Methods, detection Limits, and reporting Units.

i **pH**: LUP Type 2 & 3 dischargers shall perform pH analysis on-site with a calibrated pH meter or pH test kit. The LUP discharger shall record pH monitoring results on paper and retain these records in accordance with Section M.4.o, below.

ii **Turbidity**: LUP Type 2 & 3 dischargers shall perform turbidity analysis using a calibrated turbidity meter (turbidimeter), either on-site or at an accredited lab. Acceptable test methods include Standard Method 2130 or USEPA Method 180.1. The results shall be recorded in the site log book in Nephelometric Turbidity Units (NTU).

iii **Suspended sediment concentration (SSC)**: LUP Type 3 dischargers exceeding their NEL, shall perform SSC analysis using ASTM Method D3977-97.

iv **Bioassessment**: LUP Type 3 dischargers shall perform bioassessment sampling and analysis according to Appendix 3 of this General Permit.

k. Watershed Monitoring Option

If an LUP Type 2 or 3 discharger is part of a qualified regional watershed-based monitoring program the LUP Type 2 or 3 discharger may be eligible for relief from the monitoring requirements in this Attachment. The Regional Water Board may approve proposals to substitute an acceptable watershed-based monitoring program if it determines that the watershed-based monitoring program will provide information to determine each discharger's compliance with the requirements of this General Permit.

l. Particle Size Analysis for Risk Justification

LUP Type 2 & 3 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

m. NAL Exceedance Report

i In the event that any effluent sample exceeds an applicable NAL, the Regional Water Boards may require LUP Type 2 & 3 dischargers to submit NAL Exceedance Reports.

ii LUP Type 2 & 3 dischargers shall certify each NAL Exceedance Report in accordance with the Special Provisions for Construction Activity.

iii LUP Type 2 & 3 dischargers shall retain an electronic or paper copy of each NAL Exceedance Report for a minimum of three years after the date the exceedance report is filed.

iv LUP Type 2 & 3 dischargers shall include in the NAL Exceedance Report:

(1) the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit"); and
(2) the date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation.

(3) Description of the current BMPs associated with the effluent sample that exceeded the NAL and the proposed corrective actions taken.

n. NEL Violation Report

i All LUP Type 3 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 5 days after the conclusion of the storm event.

ii In the event that a LUP Type 3 discharger has violated an applicable NEL, the discharger shall submit an NEL Violation Report to the State Water Board no later than 24 hours after the NEL exceedance has been identified.

iii The LUP Type 3 discharger shall certify each NEL Violation Report in accordance with the Special Provisions for Construction Activity.

iv The LUP Type 3 discharger shall retain an electronic or paper copy of each NEL Violation Report for a minimum of three years after the date the violation report is filed.

v The LUP Type 3 discharger shall include in the NEL Violation Report:

(1) the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit"); and
(2) the date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation.
(3) Description of the current on-site BMPs, and the proposed corrective actions taken to manage the NEL exceedance.

vi Compliance Storm Exemption:
In the event that an applicable NEL has been exceeded during a storm event equal to or larger than the Compliance Storm Event (see Section F.2.c of this Attachment), the LUP Type 3 discharger shall report the on-site rain gauge and nearby governmental rain gauge readings for verification.

o. Monitoring Records

LUP Type 2 & 3 dischargers shall ensure that records of all storm water monitoring information and copies of all reports (including Annual Reports) required by this General Permit be retained for a period of at least three years. LUP Type 2 & 3 dischargers may retain records off-

site and make them available upon request. These records shall include:

i The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge);

ii The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements;

iii The date and approximate time of analyses;

iv The individual(s) who performed the analyses;

v A summary of all analytical results from the last three years, the method detection limits and reporting units, the analytical techniques or methods used, and all chain of custody forms;

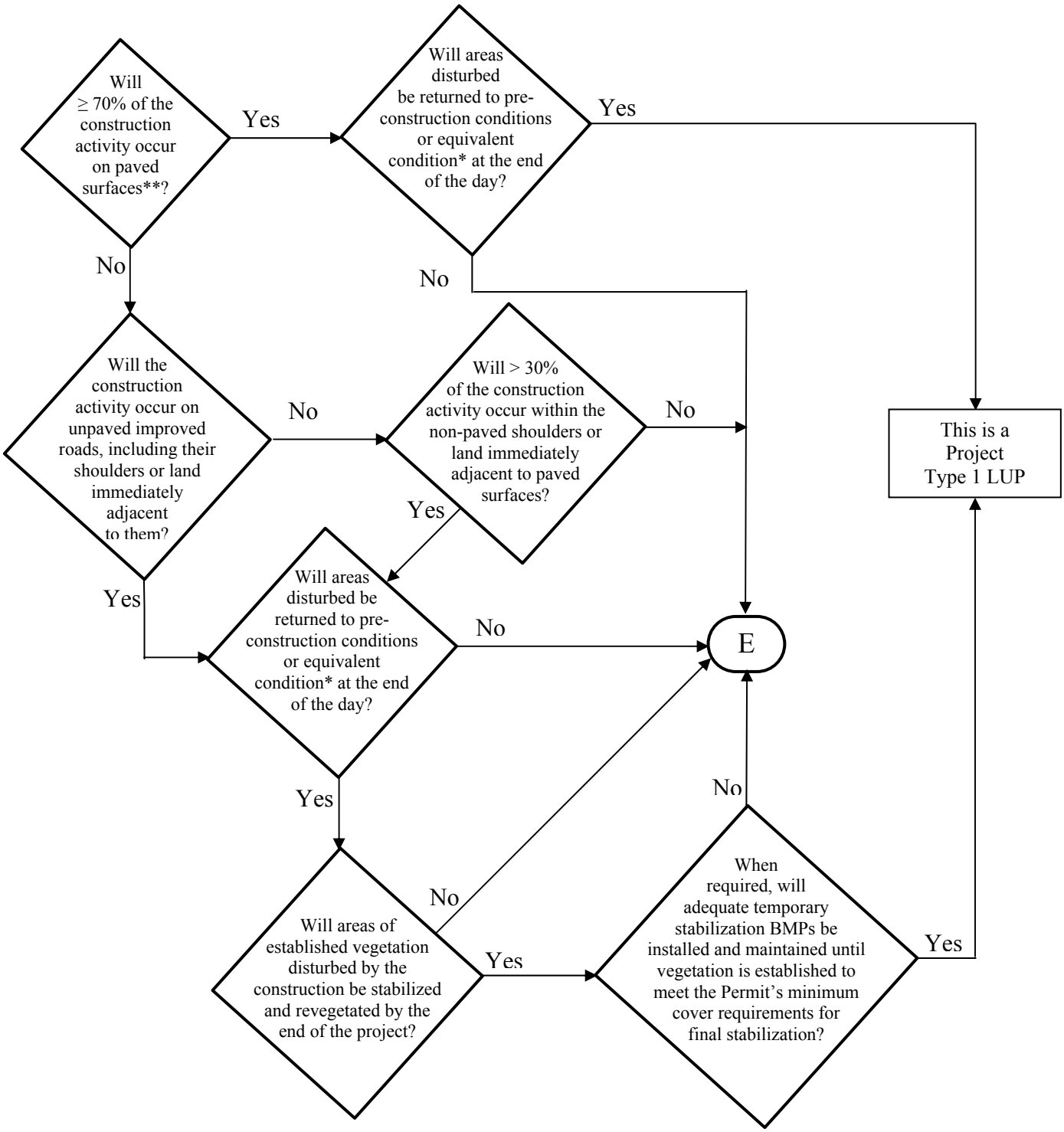
vi Quality assurance/quality control records and results;

vii Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Section M.4.a above);

viii Visual observation and sample collection exception records (see Section M.4.g above); and

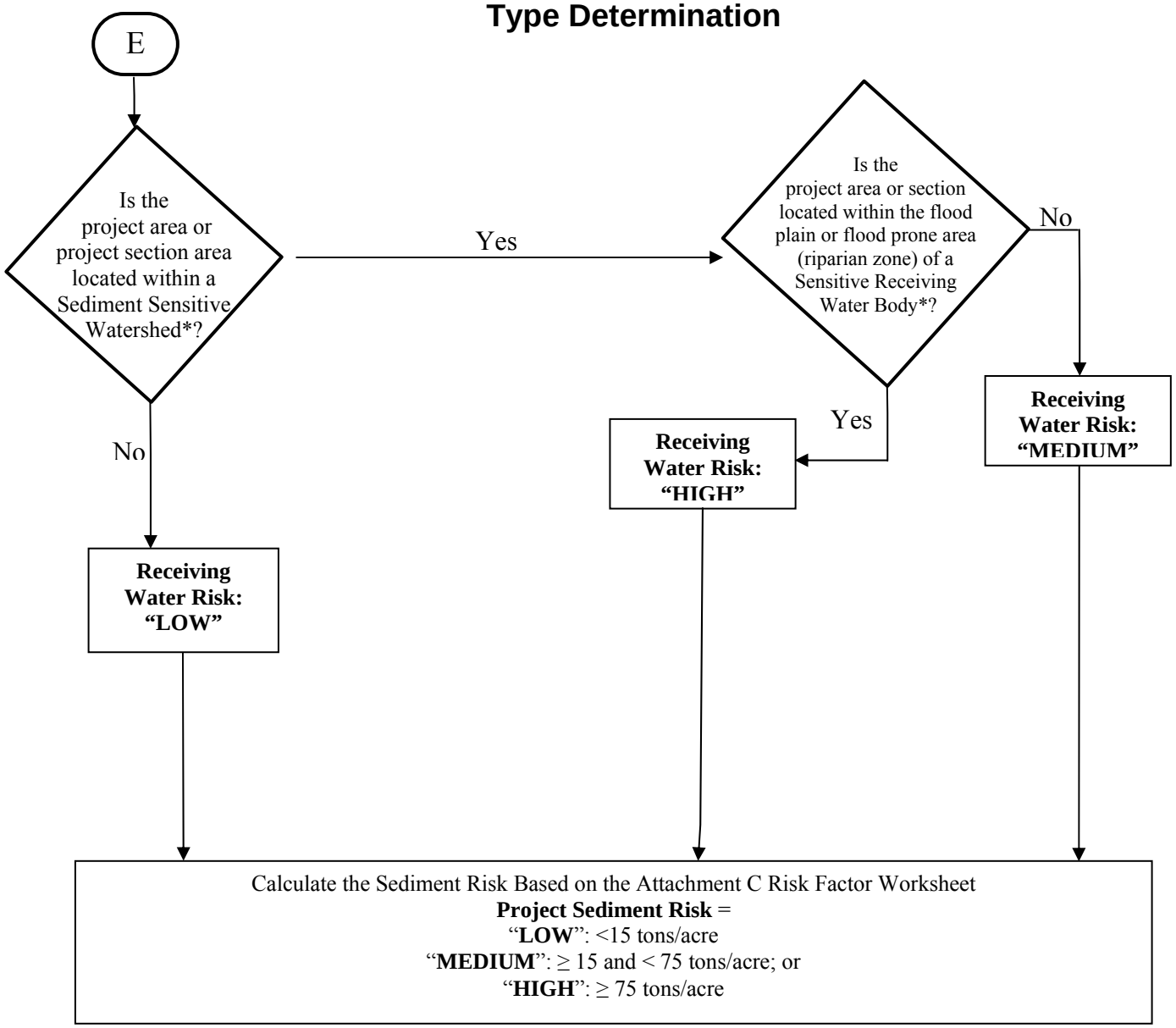
ix The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

ATTACHMENT A.1
LUP Project Area or Project Section Area Type Determination



*See Definition of Terms
** Or: "Will < 30% of the soil disturbance occur on unpaved surfaces?

ATTACHMENT A.1
LUP Project Area or Project Section Area Type Determination



* See Definition of Terms

PROJECT SEDIMENT RISK

RECEIVING WATER RISK	**LOW**	**MEDIUM**	**HIGH**
LOW	Type 1	Type 1	Type 2
MEDIUM	Type 1	Type 2	Type 3
HIGH	Type 2	Type 3	Type 3

ATTACHMENT A.1
Definition of Terms

1. **Equivalent Condition** – Means disturbed soils such as those from trench excavation are required to be hauled away, backfilled into the trench, and/or covered (e.g., metal plates, pavement, plastic covers over spoil piles) at the end of the construction day.
2. **Linear Construction Activity** – Linear construction activity consists of underground/ overhead facilities that typically include, but are not limited to, any conveyance, pipe or pipeline for the transportation of any gaseous, liquid (including water, wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g., telephone, telegraph, radio or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/ tower pad and cable/ wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/ borrow locations.
3. **Sediment Sensitive Receiving Water Body –** Defined as a water body segment that is listed on EPA's approved CWA 303(d) list for sedimentation/siltation, turbidity, or is designated with beneficial uses of SPAWN, MIGRATORY, and COLD.
4. **Sediment Sensitive Watershed –** Defined as a watershed draining into a receiving water body listed on EPA's approved CWA 303(d) list for sedimentation/siltation, turbidity, or a water body designated with beneficial uses of SPAWN, MIGRATORY, and COLD.

ATTACHMENT A.2
PERMIT REGISTRATION DOCUMENTS (PRDs)
GENERAL INSTRUCTIONS FOR LINEAR UNDERGROUND/OVERHEAD PROJECTS TO COMPLY WITH THE CONSTRUCTION GENERAL PERMIT

GENERAL INSTRUCTIONS

Who Must Submit

This permit is effective on July 1, 2010.

The Legally Responsible Person (LRP) for construction activities associated with linear underground/overhead project (LUP) must electronically apply for coverage under this General Permit on or after July 1, 2010. If it is determined that the LUP construction activities require an NPDES permit, the Legally Responsible Person[1] (LRP) shall submit PRDs for this General Permit in accordance with the following:

LUPs associated with Private or Municipal Development Projects

1. For LUPs associated with pre-development and pre-redevelopment construction activities:

   The LRP must obtain coverage[2] under this General Permit for its pre-development and pre-redevelopment construction activities where the total disturbed land area of these construction activities is greater than 1 acre.

2. For LUPs associated with new development and redevelopment construction projects:

   The LRP must obtain coverage under this General Permit for LUP construction activities associated with new development and redevelopment projects where the total disturbed land area of the LUP is greater than 1 acre. Coverage under this permit is not required where the same LUP construction activities are covered by another NPDES permit.

LUPs not associated with private or municipal new development or redevelopment projects:

The LRP must obtain coverage under this General Permit on or after July 1, 2010 for its LUP construction activities where the total disturbed land area is greater than 1 acre.

PRD Submittal Requirements

Prior to the start of construction activities a LRP must submit PRDs and fees to the State Water Board for each LUP.

New and Ongoing LUPs

Dischargers of new LUPs that commence construction activities after the adoption date of this General Permit shall file PRDs prior to the commencement of construction and implement the SWPPP upon the start of construction.

[1] person possessing the title of the land on which the construction activities will occur for the regulated site

[2] obtain coverage means filing PRDs for the project.

PERMIT REGISTRATION DOCUMENTS (PRDs)
GENERAL INSTRUCTIONS (CONTINUED)

Dischargers of ongoing LUPs that are currently covered under State Water Board Order No. 2003-0007 (Small LUP General Permit) shall electronically file Permit Registration Documents no later than July 1, 2010. After July 1, 2010, all NOIs subject to State Water Board Order No. 2003-0007-DWQ will be terminated. All existing dischargers shall be exempt from the risk determination requirements in Attachment A. All existing dischargers are therefore subject to LUP Type 1 requirements regardless of their project's sediment and receiving water risks. However, a Regional Board retains the authority to require an existing discharger to comply with the risk determination requirements in Attachment A.

Where to Apply

The Permit Registration Documents (PRDs) can be found at www.waterboards.ca.gov/water_issues/programs/stormwater/

Fees

The annual fee for storm water permits are established through the State of California Code of Regulations.

When Permit Coverage Commences

To obtain coverage under the General Permit, the LRP must include the complete PRDs and the annual fee. All PRDs deemed incomplete will be rejected with an explanation as to what is required to complete submittal. Upon receipt of complete PRDs and associated fee, each discharger will be sent a waste discharger's identification (WDID) number.

Projects and Activities Not Defined As Construction Activity

1. LUP construction activity does not include routine maintenance projects to maintain original line and grade, hydraulic capacity, or original purpose of the facility. Routine maintenance projects are projects associated with operations and maintenance activities that are conducted on existing lines and facilities and within existing right-of-way, easements, franchise agreements or other legally binding agreements of the discharger. Routine maintenance projects include, but are not limited to projects that are conducted to:

- Maintain the original purpose of the facility, or hydraulic capacity.
- Update existing lines[3] and facilities to comply with applicable codes, standards and regulations regardless if such projects result in increased capacity.
- Repairing leaks.

Routine maintenance does not include construction of new[4] lines or facilities resulting from compliance with applicable codes, standards and regulations.

[3] Update existing lines includes replacing existing lines with new materials or pipes.
[4] New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines.

PERMIT REGISTRATION DOCUMENTS (PRDs)
GENERAL INSTRUCTIONS (CONTINUED)

Routine maintenance projects do not include those areas of maintenance projects that are outside of an existing right-of-way, franchise, easements, or agreements. When a project must acquire new areas, those areas may be subject to this General Permit based on the area of disturbed land outside the original right-of-way, easement or agreement.

2. LUP construction activity does not include field activities associated with the planning and design of a project (e.g., activities associated with route selection).

3. Tie-ins conducted immediately adjacent to "energized" or "pressurized" facilities by the discharger are not considered small construction activities where all other LUP construction activities associated with the tie-in are covered by a NOI and SWPPP of a third party or municipal agency.

Calculating Land Disturbance Areas of LUPs

The total land area disturbed for LUPs is the sum of the:

- Surface areas of trenches, laterals and ancillary facilities, plus
- Area of the base of stockpiles on unpaved surfaces, plus
- Surface area of the borrow area, plus
- Areas of paved surfaces constructed for the project, plus
- Areas of new roads constructed or areas of major reconstruction to existing roads (e.g. improvements to two-track surfaces or road widening) for the sole purpose of accessing construction activities or as part of the final project, plus
- Equipment and material storage, staging, and preparation areas (laydown areas) not on paved surfaces, plus
- Soil areas outside the surface area of trenches, laterals and ancillary facilities that will be graded, and/or disturbed by the use of construction equipment, vehicles and machinery during construction activities.

Stockpiling Areas

Stockpiling areas, borrow areas and the removal of soils from a construction site may or may not be included when calculating the area of disturbed soil for a site depending on the following conditions:

- For stockpiling of soils onsite or immediately adjacent to a LUP site and the stockpile is not on a paved surface, the area of the base of the stockpile is to be included in the disturbed area calculation.

- The surface area of borrow areas that are onsite or immediately adjacent to a project site are to be included in the disturbed area calculation.

- For soil that is hauled offsite to a location owned or operated by the discharger that is not a paved surface, the area of the base of the stockpile is to be included in the disturbed area calculation except when the offsite location is already subject to a separate storm water permit.

PERMIT REGISTRATION DOCUMENTS (PRDs)
GENERAL INSTRUCTIONS (CONTINUED)

- For soil that is brought to the project from an off-site location owned or operated by the discharger the surface area of the borrow pit is to be included in the disturbed area calculation except when the offsite location is already subject to a separate storm water permit.

- Trench spoils on a paved surface that are either returned to the trench or excavation or hauled away from the project daily for disposal or reuse will not be included in the disturbed area calculation.

If you have any questions concerning submittal of PRDs, please call the State Water Board at (866) 563-3107.

ATTACHMENT B
PERMIT REGISTRATION DOCUMENTS (PRDs) TO COMPLY WITH THE TERMS OF THE GENERAL PERMIT TO DISCHARGE STORM WATER ASSOCIATED WITH CONSTRUCTION ACTIVITY

GENERAL INSTRUCTIONS

A. All Linear Construction Projects shall comply with the PRD requirements in Attachment A.2 of this Order.

B. Who Must Submit

Discharges of storm water associated with construction that results in the disturbance of one acre or more of land must apply for coverage under the General Construction Storm Water Permit (General Permit). Any construction activity that is a part of a larger common plan of development or sale must also be permitted, regardless of size. (For example, if 0.5 acre of a 20-acre subdivision is disturbed by the construction activities of discharger A and the remaining 19.5 acres is to be developed by discharger B, discharger A must obtain a General Storm Water Permit for the 0.5 acre project).

Other discharges from construction activities that are covered under this General Permit can be found in the General Permit Section II.B.

It is the LRP's responsibility to obtain coverage under this General Permit by electronically submitting complete PRDs (Permit Registration Documents).

In all cases, the proper procedures for submitting the PRDs must be completed before construction can commence.

C. Construction Activity Not Covered By This General Permit

Discharges from construction that are not covered under this General Permit can be found in the General Permit Sections II.A &B..

D. Annual Fees and Fee Calculation

Annual fees are calculated based upon the total area of land to be disturbed not the total size of the acreage owned. However, the calculation includes all acres to be disturbed during the duration of the project. For example, if 10 acres are scheduled to be disturbed the first year and 10 in each subsequent year for 5 years, the annual fees would be based upon 50 acres of disturbance. The State Water Board will evaluate adding acreage to an existing Permit Waste Discharge Identification (WDID) number on a case-by-case basis. In general, any acreage to be considered must be contiguous to the permitted land area and the existing

SWPPP must be appropriate for the construction activity and topography of the acreage under consideration. As acreage is built out and stabilized or sold, the Change of Information (COI) form enables the applicant to remove those acres from inclusion in the annual fee calculation. Checks should be made payable to: State Water Board.

The Annual fees are established through regulations adopted by the State Water Board. The total annual fee is the current base fee plus applicable surcharges for all construction sites submitting an NOI, based on the total acreage to be disturbed during the life of the project. Annual fees are subject to change by regulation.

Dischargers that apply for and satisfy the Small Construction Erosivity Wavier requirements shall pay a fee of $200.00 plus an applicable surcharge, see the General Permit Section II.B.7.

E. When to Apply

LRP's proposing to conduct construction activities subject to this General Permit must submit their PRDs prior to the commencement of construction activity.

F. Requirements for Completing Permit Registration Documents (PRDs)

All dischargers required to comply with this General Permit shall electronically submit the required PRDs for their type of construction as defined below.

G. Standard PRD Requirements (All Dischargers)

1. Notice of Intent
2. Risk Assessment (Standard or Site-Specific)
3. Site Map
4. SWPPP
5. Annual Fee
6. Certification

H. Additional PRD Requirements Related to Construction Type

1. Discharger in unincorporated areas of the State (not covered under an adopted Phase I or II SUSMP requirements) and that are not a linear project shall also submit a completed:
   a. Post-Construction Water Balance Calculator (Appendix 2).

2. Dischargers who are proposing to implement ATS shall submit:
   a. Complete ATS Plan in accordance with Attachment F at least 14 days prior to the planned operation of the ATS and a paper copy shall be available onsite during ATS operation.

b. Certification proof that design done by a professional in accordance with Attachment F.

3. Dischargers who are proposing an alternate Risk Justification:
   a. Particle Size Analysis.

I. Exceptions to Standard PRD Requirements

Construction sites with an R value less than 5 as determined in the Risk Assessment are not required to submit a SWPPP.

J. Description of PRDs

1. Notice of Intent (NOI)

2. Site Map(s) Includes:
   a. The project's surrounding area (vicinity)
   b. Site layout
   c. Construction site boundaries
   d. Drainage areas
   e. Discharge locations
   f. Sampling locations
   g. Areas of soil disturbance (temporary or permanent)
   h. Active areas of soil disturbance (cut or fill)
   i. Locations of all runoff BMPs
   j. Locations of all erosion control BMPs
   k. Locations of all sediment control BMPs
   l. ATS location (if applicable)
   m. Locations of sensitive habitats, watercourses, or other features which are not to be disturbed
   n. Locations of all post-construction BMPs
   o. Locations of storage areas for waste, vehicles, service, loading/unloading of materials, access (entrance/exits) points to construction site, fueling, and water storage, water transfer for dust control and compaction practices

3. **SWPPPs**
   A site-specific SWPPP shall be developed by each discharger and shall be submitted with the PRDs.

4. **Risk Assessment**
   All dischargers shall use the Risk Assessment procedure as describe in the General Permit Appendix 1.

   a. The Standard Risk Assessment includes utilization of the following:
      i. Receiving water Risk Assessment interactive map

ii. EPA Rainfall Erosivity Factor Calculator Website
iii. Sediment Risk interactive map
iv. Sediment sensitive water bodies list

b. The Site-Specific Risk Assessment includes the completion of the hand calculated R value Risk Calculator

5. **Post-Construction Water Balance Calculator**
All dischargers subject to this requirement shall complete the Water Balance Calculator (in Appendix 2) in accordance with the instructions.

6. **ATS Design Document and Certification**
All dischargers using ATS must submit electronically their system design (as well as any supporting documentation) and proof that the system was designed by a qualified ATS design professional (See Attachment F).

To obtain coverage under the General Permit PRDs must be included and completed. If any of the required items are missing, the PRD submittal is considered incomplete and will be rejected. Upon receipt of a complete PRD submittal, the State Water Board will process the application package in the order received and assign a (WDID) number.

Questions?

If you have any questions on completing the PRDs please email stormwater@waterboards.ca.gov or call (866) 563-3107.

ATTACHMENT C
RISK LEVEL 1 REQUIREMENTS

A. Effluent Standards

[These requirements are the same as those in the General Permit order.]

1. Narrative – Risk Level 1 dischargers shall comply with the narrative effluent standards listed below:

   a. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

   b. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

2. Numeric – Risk Level 1 dischargers are not subject to a numeric effluent standard.

B. Good Site Management "Housekeeping"

1. Risk Level 1 dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, Risk Level 1 dischargers shall implement the following good housekeeping measures:

   a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

   b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

c. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

e. Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.

2. Risk Level 1 dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

b. Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

d. Cover waste disposal containers at the end of every business day and during a rain event.

e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

f. Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.

g. Implement procedures that effectively address hazardous and non-hazardous spills.

h. Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that:

i. Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and

ii. Appropriate spill response personnel are assigned and trained.

i. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

3. Risk Level 1 dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

   a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.

   b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.

   c. Clean leaks immediately and disposing of leaked materials properly.

4. Risk Level 1 dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

   a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

   b. Contain fertilizers and other landscape materials when they are not actively being used.

   c. Discontinue the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.

   d. Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

   e. Stack erodible landscape material on pallets and covering or storing such materials when not being used or applied.

5. Risk Level 1 dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify

all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, Risk Level 1 dischargers shall do the following:

a. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

b. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

c. Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

d. Ensure retention of sampling, visual observation, and inspection records.

e. Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

6. Risk Level 1 dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.

C. Non-Storm Water Management

1. Risk Level 1 dischargers shall implement measures to control all non-storm water discharges during construction.

2. Risk Level 1 dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

3. Risk Level 1 dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

D. Erosion Control

1. Risk Level 1 dischargers shall implement effective wind erosion control.

2. Risk Level 1 dischargers shall provide effective soil cover for inactive[1] areas and all finished slopes, open space, utility backfill, and completed lots.

3. Risk Level 1 dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

E. Sediment Controls

1. Risk Level 1 dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

2. On sites where sediment basins are to be used, Risk Level 1 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.

F. Run-on and Runoff Controls

Risk Level 1 dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.

G. Inspection, Maintenance and Repair

1. Risk Level 1 dischargers shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee trained to do the task(s) appropriately, but shall ensure adequate deployment.

2. Risk Level 1 dischargers shall perform weekly inspections and observations, and at least once each 24-hour period during extended

[1] Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.

storm events, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

3. Upon identifying failures or other shortcomings, as directed by the QSP, Risk Level 1 dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

4. For each inspection required, Risk Level 1 dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format.

5. Risk Level 1 dischargers shall ensure that checklists shall remain onsite with the SWPPP and at a minimum, shall include:

   a. Inspection date and date the inspection report was written.

   b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

   c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.

   d. A description of any BMPs evaluated and any deficiencies noted.

   e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

   f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

   g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

   h. Photographs taken during the inspection, if any.

   i. Inspector's name, title, and signature.

H. Rain Event Action Plan

Not required for Risk Level 1 dischargers.

I. Risk Level 1 Monitoring and Reporting Requirements

Table 1- Summary of Monitoring Requirements

Risk Level	Visual Inspections					Sample Collection	
	Quarterly Non-storm Water Discharge	Pre-storm Event		Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water
		Baseline	REAP				
1	X	X		X	X		

1. **Construction Site Monitoring Program Requirements**

   a. Pursuant to Water Code Sections 13383 and 13267, all dischargers subject to this General Permit shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of this Section. The CSMP shall include all monitoring procedures and instructions, location maps, forms, and checklists as required in this section. The CSMP shall be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions. The CSMP shall be a part of the Storm Water Pollution Prevention Plan (SWPPP), included as an appendix or separate SWPPP chapter.

   b. Existing dischargers registered under the State Water Board Order No. 99-08-DWQ shall make and implement necessary revisions to their Monitoring Programs to reflect the changes in this General Permit in a timely manner, but no later than July 1, 2010. Existing dischargers shall continue to implement their existing Monitoring Programs in compliance with State Water Board Order No. 99-08-DWQ until the necessary revisions are completed according to the schedule above.

   c. When a change of ownership occurs for all or any portion of the construction site prior to completion or final stabilization, the new discharger shall comply with these requirements as of the date the ownership change occurs.

2. **Objectives**

   The CSMP shall be developed and implemented to address the following objectives:

   a. To demonstrate that the site is in compliance with the Discharge Prohibitions;

b. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives;

c. To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges; and

d. To determine whether BMPs included in the SWPPP are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

3. **Risk Level 1 - Visual Monitoring (Inspection) Requirements for Qualifying Rain Events**

a. Risk Level 1 dischargers shall visually observe (inspect) storm water discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.

b. Risk Level 1 dischargers shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.

c. Risk Level 1 dischargers shall conduct visual observations (inspections) during business hours only.

d. Risk Level 1 dischargers shall record the time, date and rain gauge reading of all qualifying rain events.

e. Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 1 dischargers shall visually observe (inspect):

i. All storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.

ii. All BMPs to identify whether they have been properly implemented in accordance with the SWPPP. If needed, the discharger shall implement appropriate corrective actions.

iii. Any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

f. For the visual observations (inspections) described in e.i and e.iii above, Risk Level 1 dischargers shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

g. Within two business days (48 hours) after each qualifying rain event, Risk Level 1 dischargers shall conduct post rain event visual observations (inspections) to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.

h. Risk Level 1 dischargers shall maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

4. **Risk Level 1 – Visual Observation Exemptions**

a. Risk Level 1 dischargers shall be prepared to conduct visual observation (inspections) until the minimum requirements of Section I.3 above are completed. Risk Level 1 dischargers are not required to conduct visual observation (inspections) under the following conditions:

i. During dangerous weather conditions such as flooding and electrical storms.

ii. Outside of scheduled site business hours.

b. If no required visual observations (inspections) are collected due to these exceptions, Risk Level 1 dischargers shall include an explanation in their SWPPP and in the Annual Report documenting why the visual observations (inspections) were not conducted.

5. **Risk Level 1 – Monitoring Methods**

Risk Level 1 dischargers shall include a description of the visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures in the CSMP.

6. **Risk Level 1 – Non-Storm Water Discharge Monitoring Requirements**

a. Visual Monitoring Requirements:

   i. Risk Level 1 dischargers shall visually observe (inspect) each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.

   ii. Risk Level 1 dischargers shall conduct one visual observation (inspection) quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) are only required during daylight hours (sunrise to sunset).

   iii. Risk Level 1 dischargers shall ensure that visual observations (inspections) document the presence or evidence of any non-storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. Risk Level 1 dischargers shall maintain on-site records indicating the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate unauthorized non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges.

7. **Risk Level 1 – Non-Visible Pollutant Monitoring Requirements**

   a. Risk Level 1 dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.

   b. Risk Level 1 dischargers shall ensure that water samples are large enough to characterize the site conditions.

   c. Risk Level 1 dischargers shall collect samples at all discharge locations that can be safely accessed.

   d. Risk Level 1 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

   e. Risk Level 1 dischargers shall analyze samples for all non-visible pollutant parameters (if applicable) - parameters indicating the

presence of pollutants identified in the pollutant source assessment required (Risk Level 1 dischargers shall modify their CSMPs to address these additional parameters in accordance with any updated SWPPP pollutant source assessment).

f. Risk Level 1 dischargers shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.

g. Risk Level 1 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.[2]

h. Risk Level 1 dischargers shall keep all field /or analytical data in the SWPPP document.

8. **Risk Level 1 – Particle Size Analysis for Project Risk Justification**

Risk Level 1 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

9. **Risk Level 1 – Records**

Risk Level 1 dischargers shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Risk Level 1 dischargers shall retain all records on-site while construction is ongoing. These records include:

a. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.

b. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.

c. The date and approximate time of analyses.

d. The individual(s) who performed the analyses.

[2] For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed.

e. A summary of all analytical results from the last three years, the method detection limits and reporting units, and the analytical techniques or methods used.

f. Rain gauge readings from site inspections.

g. Quality assurance/quality control records and results.

h. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Sections I.3 and I.6 above).

i. Visual observation and sample collection exception records (see Section I.4 above).

j. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

ATTACHMENT D
RISK LEVEL 2 REQUIREMENTS

A. Effluent Standards

[These requirements are the same as those in the General Permit order.]

1. Narrative – Risk Level 2 dischargers shall comply with the narrative effluent standards listed below:

   a. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

   b. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

2. Numeric – Risk level 2 dischargers are subject to a pH NAL of 6.5-8.5, and a turbidity NAL of 250 NTU.

B. Good Site Management "Housekeeping"

1. Risk Level 2 dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, Risk Level 2 dischargers shall implement the following good housekeeping measures:

   a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

   b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

c. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

e. Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.

2. Risk Level 2 dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

b. Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

d. Cover waste disposal containers at the end of every business day and during a rain event.

e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

f. Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.

g. Implement procedures that effectively address hazardous and non-hazardous spills.

h. Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require:

i. Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly.

ii. Appropriate spill response personnel are assigned and trained.

i. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

3. Risk Level 2 dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

   a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.

   b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.

   c. Clean leaks immediately and disposing of leaked materials properly.

4. Risk Level 2 dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

   a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

   b. Contain all fertilizers and other landscape materials when they are not actively being used.

   c. Discontinue the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.

   d. Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

   e. Stack erodible landscape material on pallets and covering or storing such materials when not being used or applied.

5. Risk Level 2 dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify

all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, Risk Level 2 dischargers shall do the following:

a. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

b. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

c. Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

d. Ensure retention of sampling, visual observation, and inspection records.

e. Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

6. Risk Level 2 dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.

7. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall document all housekeeping BMPs in the SWPPP and REAP(s) in accordance with the nature and phase of the construction project. Construction phases at traditional land development projects include Grading and Land Development Phase, Streets and Utilities, or Vertical Construction for traditional land development projects.

C. Non-Storm Water Management

1. Risk Level 2 dischargers shall implement measures to control all non-storm water discharges during construction.

2. Risk Level 2 dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

3. Risk Level 2 dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

D. Erosion Control

1. Risk Level 2 dischargers shall implement effective wind erosion control.

2. Risk Level 2 dischargers shall provide effective soil cover for inactive[1] areas and all finished slopes, open space, utility backfill, and completed lots.

3. Risk Level 2 dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

E. Sediment Controls

1. Risk Level 2 dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

2. On sites where sediment basins are to be used, Risk Level 2 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.

3. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall implement appropriate erosion control BMPs (runoff control and soil stabilization) in conjunction with sediment control BMPs for areas under active[2] construction.

4. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths[3] in accordance with Table 1.

Table 1 - Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Sheet flow length not

[1] Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.
[2] Active areas of construction are areas undergoing land surface disturbance. This includes construction activity during the preliminary stage, mass grading stage, streets and utilities stage and the vertical construction stage.
[3] Sheet flow length is the length that shallow, low velocity flow travels across a site.

	to exceed
0-25% 20	feet
25-50% 15	feet
Over 50%	10 feet

5. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment.

6. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire washoff locations) are maintained and protected from activities that reduce their effectiveness.

7. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall inspect on a daily basis all immediate access roads daily. At a minimum daily (when necessary) and prior to any rain event, the discharger shall remove any sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).

F. Run-on and Run-off Controls

Risk Level 2 dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.

G. Inspection, Maintenance and Repair

1. Risk Level 2 dischargers shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee appropriately trained to do the task(s).

2. Risk Level 2 dischargers shall perform weekly inspections and observations, and at least once each 24-hour period during extended storm events, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

3. Upon identifying failures or other shortcomings, as directed by the QSP, Risk Level 2 dischargers shall begin implementing repairs or

design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

4. For each inspection required, Risk Level 2 dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format.

5. Risk Level 2 dischargers shall ensure that checklists shall remain onsite with the SWPPP and at a minimum, shall include:

   a. Inspection date and date the inspection report was written.

   b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

   c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.

   d. A description of any BMPs evaluated and any deficiencies noted.

   e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

   f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

   g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

   h. Photographs taken during the inspection, if any.

   i. Inspector's name, title, and signature.

H. Rain Event Action Plan

1. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP develop a Rain Event Action Plan (REAP) 48 hours prior to any likely precipitation event. A likely precipitation event is any weather pattern that is forecast to have a 50% or greater probability of producing precipitation in the project area. The discharger shall

ensure a QSP obtain a printed copy of precipitation forecast information from the National Weather Service Forecast Office (e.g., by entering the zip code of the project's location at http://www.srh.noaa.gov/forecast).

2. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP develop the REAPs for all phases of construction (i.e., Grading and Land Development, Streets and Utilities, Vertical Construction, Final Landscaping and Site Stabilization).

3. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP ensure that the REAP include, at a minimum, the following site information:

   a. Site Address
   b. Calculated Risk Level (2 or 3)
   c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number
   d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number
   e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number

4. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP include in the REAP, at a minimum, the following project phase information:

   a. Activities associated with each construction phase
   b. Trades active on the construction site during each construction phase
   c. Trade contractor information
   d. Suggested actions for each project phase

5. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP develop additional REAPs for project sites where construction activities are indefinitely halted or postponed (Inactive Construction). At a minimum, Inactive Construction REAPs must include:

   a. Site Address
   b. Calculated Risk Level (2 or 3)
   c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number
   d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number
   e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number

f. Trades active on site during Inactive Construction
g. Trade contractor information
h. Suggested actions for inactive construction sites

6. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP begin implementation and make the REAP available onsite no later than 24 hours prior to the likely precipitation event.

7. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP maintain onsite a paper copy of each REAP onsite in compliance with the record retention requirements of the Special Provisions in this General Permit.

I. Risk Level 2 Monitoring and Reporting Requirements

Table 2- Summary of Monitoring Requirements

Risk Level	Visual Inspections					Sample Collection	
	Quarterly Non-storm Water Discharge	Pre-storm Event		Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water
		Baseline	REAP				
2	X	X	X	X	X	X	

1. Construction Site Monitoring Program Requirements

   a. Pursuant to Water Code Sections 13383 and 13267, all dischargers subject to this General Permit shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of this Section. The CSMP shall include all monitoring procedures and instructions, location maps, forms, and checklists as required in this section. The CSMP shall be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions. The CSMP shall be a part of the Storm Water Pollution Prevention Plan (SWPPP), included as an appendix or separate SWPPP chapter.

   b. Existing dischargers registered under the State Water Board Order No. 99-08-DWQ shall make and implement necessary revisions to their Monitoring Program to reflect the changes in this General Permit in a timely manner, but no later than July 1, 2010. Existing dischargers shall continue to implement their existing Monitoring Programs in compliance with State Water Board Order No. 99-08-DWQ until the necessary revisions are completed according to the schedule above.

   c. When a change of ownership occurs for all or any portion of the construction site prior to completion or final stabilization, the new discharger shall comply with these requirements as of the date the ownership change occurs.

2. **Objectives**

   The CSMP shall be developed and implemented to address the following objectives:

a. To demonstrate that the site is in compliance with the Discharge Prohibitions and applicable Numeric Action Levels (NALs)/Numeric Effluent Limitations (NELs) of this General Permit.

b. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives.

c. To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges.

d. To determine whether BMPs included in the SWPPP/Rain Event Action Plan (REAP) are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

3. **Risk Level 2 – Visual Monitoring (Inspection) Requirements for Qualifying Rain Events**

a. Risk Level 2 dischargers shall visually observe (inspect) storm water discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.

b. Risk Level 2 dischargers shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.

c. Risk Level 2 dischargers shall conduct visual observations (inspections) during business hours only.

d. Risk Level 2 dischargers shall record the time, date and rain gauge reading of all qualifying rain events.

e. Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 2 dischargers shall visually observe (inspect):

i. all storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.

ii. all BMPs to identify whether they have been properly implemented in accordance with the SWPPP/REAP. If needed, the discharger shall implement appropriate corrective actions.

iii. any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

f. For the visual observations (inspections) described in c.i and c.iii above, Risk Level 2 dischargers shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

g. Within two business days (48 hours) after each qualifying rain event, Risk Level 2 dischargers shall conduct post rain event visual observations (inspections) to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.

h. Risk Level 2 dischargers shall maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

4. **Risk Level 2 – Water Quality Sampling and Analysis**

a. Risk Level 2 dischargers shall collect storm water grab samples from sampling locations, as defined in Section I.5. The storm water grab sample(s) obtained shall be representative of the flow and characteristics of the discharge.

b. At minimum, Risk Level 2 dischargers shall collect 3 samples per day of the qualifying event.

c. Risk Level 2 dischargers shall ensure that the grab samples collected of stored or contained storm water are from discharges subsequent to a qualifying rain event (producing precipitation of ½ inch or more at the time of discharge).

<u>Storm Water Effluent Monitoring Requirements</u>

d. Risk Level 2 dischargers shall analyze their effluent samples for:

i. pH and turbidity.

ii. Any additional parameters for which monitoring is required by the Regional Water Board.

5. **Risk Level 2 – Storm Water Discharge Water Quality Sampling Locations**

Effluent Sampling Locations

a. Risk Level 2 dischargers shall perform sampling and analysis of storm water discharges to characterize discharges associated with construction activity from the entire project disturbed area.

b. Risk Level 2 dischargers shall collect effluent samples at all discharge points where storm water is discharged off-site.

c. Risk Level 2 dischargers shall ensure that storm water discharge collected and observed represent[4] the effluent in each drainage area based on visual observation of the water and upstream conditions.

d. Risk Level 2 dischargers shall monitor and report site run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs or NELs.

e. Risk Level 2 dischargers who deploy an ATS on their site, or a portion on their site, shall collect ATS effluent samples and measurements from the discharge pipe or another location representative of the nature of the discharge.

f. Risk Level 2 dischargers shall select analytical test methods from the list provided in Table 3 below.

g. All storm water sample collection preservation and handling shall be conducted in accordance with Section I.7 “Storm Water Sample Collection and Handling Instructions” below.

6. **Risk Level 2 – Visual Observation and Sample Collection Exemptions**

a. Risk Level 2 dischargers shall be prepared to collect samples and conduct visual observation (inspections) until the minimum requirements of Sections I.3 and I.4 above are completed. Risk

[4] For example, if there has been concrete work recently in an area, or drywall scrap is exposed to the rain, a pH sample shall be taken of drainage from the relevant work area. Similarly, if sediment laden water is flowing through some parts of a silt fence, samples shall be taken of the sediment-laden water even if most water flowing through the fence is clear.

Level 2 dischargers are not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

i. During dangerous weather conditions such as flooding and electrical storms.

ii. Outside of scheduled site business hours.

b. If no required samples or visual observation (inspections) are collected due to these exceptions, Risk Level 2 dischargers shall include an explanation in their SWPPP and in the Annual Report documenting why the sampling or visual observation (inspections) were not conducted.

7. **Risk Level 2 – Storm Water Sample Collection and Handling Instructions**

a. Risk Level 2 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

b. Risk Level 2 dischargers shall ensure that testing laboratories will receive samples within 48 hours of the physical sampling (unless otherwise required by the laboratory), and shall use only the sample containers provided by the laboratory to collect and store samples.

c. Risk Level 2 dischargers shall designate and train personnel to collect, maintain, and ship samples in accordance with the Surface Water Ambient Monitoring Program's (SWAMP) 2008 Quality Assurance Program Plan (QAPrP).[5]

8. **Risk Level 2 – Monitoring Methods**

a. Risk Level 2 dischargers shall include a description of the following items in the CSMP:

i. Visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures.

ii. Sampling locations, and sample collection and handling procedures. This shall include detailed procedures for sample

[5] Additional information regarding SWAMP's QAPrP and QAMP can be found at http://www.waterboards.ca.gov/water_issues/programs/swamp/.
QAPrP:http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/swamp_qapp_master090108a.pdf.
QAMP: http://www.waterboards.ca.gov/water_issues/programs/swamp/qamp.shtml.

collection, storage, preservation, and shipping to the testing lab to assure that consistent quality control and quality assurance is maintained. Dischargers shall attach to the monitoring program an example Chain of Custody form used when handling and shipping samples.

iii. Identification of the analytical methods and related method detection limits (if applicable) for each parameter required in Section I.4 above.

b. Risk Level 2 dischargers shall ensure that all sampling and sample preservation are in accordance with the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association). All monitoring instruments and equipment (including a discharger's own field instruments for measuring pH and turbidity) should be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. Risk Level 2 dischargers shall ensure that all laboratory analyses are conducted according to test procedures under 40 CFR Part 136, unless other test procedures have been specified in this General Permit or by the Regional Water Board. With the exception of field analysis conducted by the discharger for turbidity and pH, all analyses should be sent to and conducted at a laboratory certified for such analyses by the State Department of Health Services. Risk Level 2 dischargers shall conduct their own field analysis of pH and may conduct their own field analysis of turbidity if the discharger has sufficient capability (qualified and trained employees, properly calibrated and maintained field instruments, etc.) to adequately perform the field analysis.

9. **Risk Level 2 – Analytical Methods**

a. Risk Level 2 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

b. **pH**: Risk Level 2 dischargers shall perform pH analysis on-site with a calibrated pH meter or a pH test kit. Risk Level 2 dischargers shall record pH monitoring results on paper and retain these records in accordance with Section I.14, below.

c. **Turbidity**: Risk Level 2 dischargers shall perform turbidity analysis using a calibrated turbidity meter (turbidimeter), either on-site or at an accredited lab. Acceptable test methods include Standard Method 2130 or USEPA Method 180.1. The results will be recorded in the site log book in Nephelometric Turbidity Units (NTU).

10. **Risk Level 2 - Non-Storm Water Discharge Monitoring Requirements**

    a. Visual Monitoring Requirements:

        i. Risk Level 2 dischargers shall visually observe (inspect) each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.

        ii. Risk Level 2 dischargers shall conduct one visual observation (inspection) quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) are only required during daylight hours (sunrise to sunset).

        iii. Risk Level 2 dischargers shall ensure that visual observations (inspections) document the presence or evidence of any non-storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. Risk Level 2 dischargers shall maintain on-site records indicating the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate unauthorized non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges.

    b. Effluent Sampling Locations:

        i. Risk Level 2 dischargers shall sample effluent at all discharge points where non-storm water and/or authorized non-storm water is discharged off-site.

        ii. Risk Level 2 dischargers shall send all non-storm water sample analyses to a laboratory certified for such analyses by the State Department of Health Services.

        iii. Risk Level 2 dischargers shall monitor and report run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs.

11. **Risk Level 2 – Non-Visible Pollutant Monitoring Requirements**

a. Risk Level 2 dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.

b. Risk Level 2 dischargers shall ensure that water samples are large enough to characterize the site conditions.

c. Risk Level 2 dischargers shall collect samples at all discharge locations that can be safely accessed.

d. Risk Level 2 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

e. Risk Level 2 dischargers shall analyze samples for all non-visible pollutant parameters (if applicable) - parameters indicating the presence of pollutants identified in the pollutant source assessment required (Risk Level 2 dischargers shall modify their CSMPs to address these additional parameters in accordance with any updated SWPPP pollutant source assessment).

f. Risk Level 2 dischargers shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.

g. Risk Level 2 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.[6]

h. Risk Level 2 dischargers shall keep all field /or analytical data in the SWPPP document.

12. **Risk Level 2 – Watershed Monitoring Option**

Risk Level 2 dischargers who are part of a qualified regional watershed-based monitoring program may be eligible for relief from the requirements in Sections I.5. The Regional Water Board may approve proposals to substitute an acceptable watershed-based monitoring program by determining if the watershed-based monitoring program

[6] For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed.

will provide substantially similar monitoring information in evaluating discharger compliance with the requirements of this General Permit.

13. **Risk Level 2 – Particle Size Analysis for Project Risk Justification**

    Risk Level 2 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

14. **Risk Level 2 – Records**

    Risk Level 2 dischargers shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Risk Level 2 dischargers shall retain all records on-site while construction is ongoing. These records include:

    a. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.

    b. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.

    c. The date and approximate time of analyses.

    d. The individual(s) who performed the analyses.

    e. A summary of all analytical results from the last three years, the method detection limits and reporting units, the analytical techniques or methods used, and the chain of custody forms.

    f. Rain gauge readings from site inspections;

    g. Quality assurance/quality control records and results.

    h. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Sections I.3 and I.10 above).

    i. Visual observation and sample collection exception records (see Section I.6 above).

j. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

15. **Risk Level 2 – NAL Exceedance Report**

a. In the event that any effluent sample exceeds an applicable NAL, Risk Level 2 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 10 days after the conclusion of the storm event. The Regional Boards have the authority to require the submittal of an NAL Exceedance Report.

b. Risk Level 2 dischargers shall certify each NAL Exceedance Report in accordance with the Special Provisions for Construction Activity.

c. Risk Level 2 dischargers shall retain an electronic or paper copy of each NAL Exceedance Report for a minimum of three years after the date the annual report is filed.

d. Risk Level 2 dischargers shall include in the NAL Exceedance Report:

i. The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as “less than the method detection limit”).

ii. The date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation.

iii. A description of the current BMPs associated with the effluent sample that exceeded the NAL and the proposed corrective actions taken.

Table 3 – Risk Level 2 Test Methods, Detection Limits, Reporting Units and Applicable NALs/NELs

Parameter	Test Method / Protocol	Discharge Type	Min. Detection Limit	Reporting Units	Numeric Action Level
pH	Field test with calibrated portable instrument	Risk Level 2 Discharges	0.2 pH	units	lower NAL = 6.5 upper NAL = 8.5
Turbidity EPA	0180.1 and/or field test with calibrated portable instrument	Risk Level 2 Discharges other than ATS	1 NTU		250 NTU
		For ATS discharges	1 NTU		N/A

ATTACHMENT E
RISK LEVEL 3 REQUIREMENTS

A. Effluent Standards

[These requirements are the same as those in the General Permit order.]

1. Narrative – Risk Level 3 dischargers shall comply with the narrative effluent standards listed below:

   a. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

   b. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

2. Numeric –Risk Level 3 dischargers are subject to a pH NAL of 6.5-8.5, and a turbidity NAL of 250 NTU. In addition, Risk Level 3 dischargers are subject to a pH NEL of 6.0-9.0 and a turbidity NEL of 500 NTU.

B. Good Site Management "Housekeeping"

1. Risk Level 3 dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, Risk Level 3 dischargers shall implement the following good housekeeping measures:

   a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

   b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

c. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

e. Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.

2. Risk Level 3 dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

b. Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

d. Cover waste disposal containers at the end of every business day and during a rain event.

e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

f. Contain and securely protecting stockpiled waste material from wind and rain at all times unless actively being used.

g. Implement procedures that effectively address hazardous and non-hazardous spills.

h. Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that:

i. Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and

ii. Appropriate spill response personnel are assigned and trained.

i. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

3. Risk Level 3 dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

   a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.

   b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.

   c. Clean leaks immediately and disposing of leaked materials properly.

4. Risk Level 3 dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

   a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

   b. Contain fertilizers and other landscape materials when they are not actively being used.

   c. Discontinuing the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.

   d. Applying erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

   e. Stacking erodible landscape material on pallets and covering or storing such materials when not being used or applied.

5. Risk Level 3 dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify

all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, Risk Level 3 dischargers shall do the following:

a. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

b. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

c. Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

d. Ensure retention of sampling, visual observation, and inspection records.

e. Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

6. Risk Level 3 dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.

7. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall document all housekeeping BMPs in the SWPPP and REAP(s) in accordance with the nature and phase of the construction project. Construction phases at traditional land development projects include Grading and Land Development Phase, Streets and Utilities, or Vertical Construction for traditional land development projects.

C. Non-Storm Water Management

1. Risk Level 3 dischargers shall implement measures to control all non-storm water discharges during construction.

2. Risk Level 3 dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

3. Risk Level 3 dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

D. Erosion Control

1. Risk Level 3 dischargers shall implement effective wind erosion control.

2. Risk Level 3 dischargers shall provide effective soil cover for inactive[1] areas and all finished slopes, open space, utility backfill, and completed lots.

3. Dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

E. Sediment Controls

1. Risk Level 3 dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

2. On sites where sediment basins are to be used, Risk Level 3 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.

3. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall implement appropriate erosion control BMPs (runoff control and soil stabilization) in conjunction with sediment control BMPs for areas under active[2] construction.

4. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths[3] in accordance with Table 1.

[1] Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.
[2] Active areas of construction are areas undergoing land surface disturbance. This includes construction activity during the preliminary stage, mass grading stage, streets and utilities stage and the vertical construction stage
[3] Sheet flow length is the length that shallow, low velocity flow travels across a site.

Table 1 - Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Sheet flow length not to exceed
0-25% 20	feet
25-50% 15	feet
Over 50%	10 feet

5. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment.

6. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire washoff locations) are maintained and protected from activities that reduce their effectiveness.

7. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall inspect on a daily basis all immediate access roads daily. At a minimum daily (when necessary) and prior to any rain event, the discharger shall remove any sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).

8. **Additional Risk Level 3 Requirement:** The Regional Water Board may require Risk Level 3 dischargers to implement additional site-specific sediment control requirements if the implementation of the other requirements in this section are not adequately protecting the receiving waters.

F. Run-on and Run-off Controls

Risk Level 3 dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.

G. Inspection, Maintenance and Repair

1. Risk Level 3 dischargers shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee appropriately trained to do the task(s).

2. Risk Level 3 dischargers shall perform weekly inspections and observations, and at least once each 24-hour period during extended storm events, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

3. Upon identifying failures or other shortcomings, as directed by the QSP, Risk Level 3 dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

4. For each inspection required, Risk Level 3 dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format.

5. Risk Level 3 dischargers shall ensure that checklists shall remain onsite with the SWPPP and at a minimum, shall include:

    a. Inspection date and date the inspection report was written.

    b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

    c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.

    d. A description of any BMPs evaluated and any deficiencies noted.

    e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

    f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

    g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

    h. Photographs taken during the inspection, if any.

i. Inspector's name, title, and signature.

H. Rain Event Action Plan

1. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP develop a Rain Event Action Plan (REAP) 48 hours prior to any likely precipitation event. A likely precipitation event is any weather pattern that is forecast to have a 50% or greater probability of producing precipitation in the project area. The QSP shall obtain a printed copy of precipitation forecast information from the National Weather Service Forecast Office (e.g., by entering the zip code of the project's location at http://www.srh.noaa.gov/forecast).

2. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP develop the REAPs for all phases of construction (i.e., Grading and Land Development, Streets and Utilities, Vertical Construction, Final Landscaping and Site Stabilization).

3. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP ensure that the REAP include, at a minimum, the following site information:

   a. Site Address.
   b. Calculated Risk Level (2 or 3).
   c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number.
   d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number.
   e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number.

4. **Additional Risk Level 3 Requirement:** The QSP shall include in the REAP, at a minimum, the following project phase information:

   a. Activities associated with each construction phase.
   b. Trades active on the construction site during each construction phase.
   c. Trade contractor information.
   d. Suggested actions for each project phase.

5. **Additional Risk Level 3 Requirement:** The QSP shall develop additional REAPs for project sites where construction activities are indefinitely halted or postponed (Inactive Construction). At a minimum, Inactive Construction REAPs must include:

a. Site Address.
b. Calculated Risk Level (2 or 3).
c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number.
d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number.
e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number.
f. Trades active on site during Inactive Construction.
g. Trade contractor information.
h. Suggested actions for inactive construction sites.

6. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP begin implementation and make the REAP available onsite no later than 24 hours prior to the likely precipitation event.

7. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP maintain onsite a paper copy of each REAP onsite in compliance with the record retention requirements of the Special Provisions in this General Permit.

I. Risk Level 3 Monitoring and Reporting Requirements

Table 2- Summary of Monitoring Requirements

Risk Level	Visual Inspections					Sample Collection	
	Quarterly Non-storm Water Discharge	Pre-storm Event		Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water
		Baseline	REAP				
3	X	X	X	X	X	X	X[4]

1. Construction Site Monitoring Program Requirements

   a. Pursuant to Water Code Sections 13383 and 13267, all dischargers subject to this General Permit shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of this Section. The CSMP shall include all monitoring procedures and instructions, location maps, forms, and checklists as required in this section. The CSMP shall be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions. The CSMP shall be a part of the Storm Water Pollution Prevention Plan (SWPPP), included as an appendix or separate SWPPP chapter.

   b. Existing dischargers registered under the State Water Board Order No. 99-08-DWQ shall make and implement necessary revisions to their Monitoring Program to reflect the changes in this General Permit in a timely manner, but no later than July 1, 2010. Existing dischargers shall continue to implement their existing Monitoring Program in compliance with State Water Board Order No. 99-08-DWQ until the necessary revisions are completed according to the schedule above.

   c. When a change of ownership occurs for all or any portion of the construction site prior to completion or final stabilization, the new discharger shall comply with these requirements as of the date the ownership change occurs.

2. **Objectives**

   The CSMP shall be developed and implemented to address the following objectives:

[4] When NEL exceeded

a. To demonstrate that the site is in compliance with the Discharge Prohibitions and applicable Numeric Action Levels (NALs)/Numeric Effluent Limitations (NELs) of this General Permit.

b. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives.

c. To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges.

d. To determine whether BMPs included in the SWPPP/Rain Event Action Plan (REAP) are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

3. **Risk Level 3 – Visual Monitoring (Inspection) Requirements for Qualifying Rain Events**

a. Risk Level 3 dischargers shall visually observe (inspect) storm water discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.

b. Risk Level 3 dischargers shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.

c. Risk Level 3 dischargers shall conduct visual observations (inspections) during business hours only.

d. Risk Level 3 dischargers shall record the time, date and rain gauge reading of all qualifying rain events.

e. Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 3 dischargers shall visually observe (inspect):

i. all storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.

ii. all BMPs to identify whether they have been properly implemented in accordance with the SWPPP/REAP. If needed, the discharger shall implement appropriate corrective actions.

iii. any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

f. For the visual observations (inspections) described in c.i. and c.iii above, Risk Level 3 dischargers shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

g. Within two business days (48 hours) after each qualifying rain event, Risk Level 3 dischargers shall conduct post rain event visual observations (inspections) to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.

h. Risk Level 3 dischargers shall maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

4. **Risk Level 3 – Water Quality Sampling and Analysis**

a. Risk Level 3 dischargers shall collect storm water grab samples from sampling locations, as defined in Section I.5. The storm water grab sample(s) obtained shall be representative of the flow and characteristics of the discharge.

b. At minimum, Risk Level 3 dischargers shall collect 3 samples per day of the qualifying event.

c. Risk Level 3 dischargers shall ensure that the grab samples collected of stored or contained storm water are from discharges subsequent to a qualifying rain event (producing precipitation of ½ inch or more at the time of discharge).

<u>Storm Water Effluent Monitoring Requirements</u>

d. Risk Level 3 dischargers shall analyze their effluent samples for:

i. pH and turbidity.

ii. Any additional parameters for which monitoring is required by the Regional Water Board.

e. Risk 3 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 5 days after the conclusion of the storm event.

f. Risk Level 3 discharger sites that have violated the turbidity daily average NEL shall analyze subsequent effluent samples for all the parameters specified in Section I.4.e, above, and Suspended Sediment Concentration (SSC).

Receiving Water Monitoring Requirements

g. In the event that a Risk Level 3 discharger violates an NEL contained in this General Permit and has a direct discharge into receiving waters, the Risk Level 3 discharger shall subsequently sample receiving waters (RWs) for all parameter(s) required in Section I.4.e above for the duration of coverage under this General Permit.

h. Risk Level 3 dischargers disturbing 30 acres or more of the landscape and with direct discharges into receiving waters shall conduct or participate in benthic macroinvertebrate bioassessment of RWs prior to commencement of construction activity (See Appendix 3).

i. Risk Level 3 dischargers shall obtain RW samples in accordance with the Receiving Water sampling location section (Section I.5), below.

5. **Risk Level 3 – Storm Water Discharge Water Quality Sampling Locations**

Effluent Sampling Locations

a. Risk Level 3 dischargers shall perform sampling and analysis of storm water discharges to characterize discharges associated with construction activity from the entire project disturbed area.

b. Risk Level 3 dischargers shall collect effluent samples at all discharge points where storm water is discharged off-site.

c. Risk Level 3 dischargers shall ensure that storm water discharge collected and observed represent[5] the effluent in each drainage area based on visual observation of the water and upstream conditions.

d. Risk Level 3 dischargers shall monitor and report site run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs or NELs.

e. Risk Level 3 dischargers who deploy an ATS on their site, or a portion on their site, shall collect ATS effluent samples and measurements from the discharge pipe or another location representative of the nature of the discharge.

f. Risk Level 3 dischargers shall select analytical test methods from the list provided in Table 3 below.

g. All storm water sample collection preservation and handling shall be conducted in accordance with Section I.7 "Storm Water Sample Collection and Handling Instructions" below.

Receiving Water Sampling Locations

h. **Upstream/up-gradient RW samples**: Risk Level 3 dischargers shall obtain any required upstream/up-gradient receiving water samples from a representative and accessible location as close as possible and upstream from the effluent discharge point.

i. **Downstream/down-gradient RW samples**: Risk Level 3 dischargers shall obtain any required downstream/down-gradient receiving water samples from a representative and accessible location as close as possible and downstream from the effluent discharge point.

j. If two or more discharge locations discharge to the same receiving water, Risk Level 3 dischargers may sample the receiving water at a single upstream and downstream location.

[5] For example, if there has been concrete work recently in an area, or drywall scrap is exposed to the rain, a pH sample shall be taken of drainage from the relevant work area. Similarly, if sediment-laden water is flowing through some parts of a silt fence, samples shall be taken of the sediment laden water even if most water flowing through the fence is clear.

6. **Risk Level 3 – Visual Observation and Sample Collection Exemptions**

   a. Risk Level 3 dischargers shall be prepared to collect samples and conduct visual observation (inspections) until the minimum requirements of Sections I.3 and I.4 above are completed. Risk Level 3 dischargers are not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

      i. During dangerous weather conditions such as flooding and electrical storms.

      ii. Outside of scheduled site business hours.

   b. If no required samples or visual observation (inspections) are collected due to these exceptions, Risk Level 3 dischargers shall include an explanation in their SWPPP and in the Annual Report documenting why the sampling or visual observation (inspections) were not conducted.

7. **Risk Level 3 – Storm Water Sample Collection and Handling Instructions**

   a. Risk Level 3 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

   b. Risk Level 3 dischargers shall ensure that testing laboratories will receive samples within 48 hours of the physical sampling (unless otherwise required by the laboratory), and shall use only the sample containers provided by the laboratory to collect and store samples.

   c. Risk Level 3 dischargers shall designate and train personnel to collect, maintain, and ship samples in accordance with the Surface Water Ambient Monitoring Program's (SWAMP) 2008 Quality Assurance Program Plan (QAPrP).[6]

[6] Additional information regarding SWAMP's QAPrP and QAMP can be found at http://www.waterboards.ca.gov/water_issues/programs/swamp/.
QAPrP:http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/swamp_qapp_master090108a.pdf
QAMP: http://www.waterboards.ca.gov/water_issues/programs/swamp/qamp.shtml

8. **Risk Level 3 – Monitoring Methods**

   a. Risk Level 3 dischargers shall include a description of the following items in the CSMP:

      i. Visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures.

      ii. Sampling locations, and sample collection and handling procedures. This shall include detailed procedures for sample collection, storage, preservation, and shipping to the testing lab to assure that consistent quality control and quality assurance is maintained. Dischargers shall attach to the monitoring program an example Chain of Custody form used when handling and shipping samples.

      iii. Identification of the analytical methods and related method detection limits (if applicable) for each parameter required in Section I.4 above.

   b. Risk Level 3 dischargers shall ensure that all sampling and sample preservation are in accordance with the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association). All monitoring instruments and equipment (including a discharger's own field instruments for measuring pH and turbidity) should be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. Risk Level 3 dischargers shall ensure that all laboratory analyses are conducted according to test procedures under 40 CFR Part 136, unless other test procedures have been specified in this General Permit or by the Regional Water Board. With the exception of field analysis conducted by the discharger for turbidity and pH, all analyses should be sent to and conducted at a laboratory certified for such analyses by the State Department of Health Services (SSC exception). Risk Level 3 dischargers shall conduct their own field analysis of pH and may conduct their own field analysis of turbidity if the discharger has sufficient capability (qualified and trained employees, properly calibrated and maintained field instruments, etc.) to adequately perform the field analysis.

9. **Risk Level 3 – Analytical Methods**

   a. Risk Level 3 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

b. **pH**: Risk Level 3 dischargers shall perform pH analysis on-site with a calibrated pH meter or a pH test kit. Risk Level 3 dischargers shall record pH monitoring results on paper and retain these records in accordance with Section I.14, below.

c. **Turbidity**: Risk Level 3 dischargers shall perform turbidity analysis using a calibrated turbidity meter (turbidimeter), either on-site or at an accredited lab. Acceptable test methods include Standard Method 2130 or USEPA Method 180.1. The results will be recorded in the site log book in Nephelometric Turbidity Units (NTU).

d. **Suspended sediment concentration (SSC)**: Risk Level 3 dischargers shall perform SSC analysis using ASTM Method D3977-97.

e. **Bioassessment**: Risk Level 3 dischargers shall perform bioassessment sampling and analysis according to Appendix 3 of this General Permit.

10. **Risk Level 3 - Non-Storm Water Discharge Monitoring Requirements**

a. Visual Monitoring Requirements:

i. Risk Level 3 dischargers shall visually observe (inspect) each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.

ii. Risk Level 3 dischargers shall conduct one visual observation (inspection) quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) are only required during daylight hours (sunrise to sunset).

iii. Risk Level 3 dischargers shall ensure that visual observations (inspections) document the presence or evidence of any non-storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. Risk Level 3 dischargers shall maintain on-site records indicating the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate unauthorized non-storm water discharges and to

reduce or prevent pollutants from contacting non-storm water discharges.

b. Effluent Sampling Locations:

i. Risk Level 3 dischargers shall sample effluent at all discharge points where non-storm water and/or authorized non-storm water is discharged off-site.

ii. Risk Level 3 dischargers shall send all non-storm water sample analyses to a laboratory certified for such analyses by the State Department of Health Services.

iii. Risk Level 3 dischargers shall monitor and report run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs or NELs.

11. **Risk Level 3 – Non-Visible Pollutant Monitoring Requirements**

a. Risk Level 3 dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.

b. Risk Level 3 dischargers shall ensure that water samples are large enough to characterize the site conditions.

c. Risk Level 3 dischargers shall collect samples at all discharge locations that can be safely accessed.

d. Risk Level 3 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

e. Risk Level 3 dischargers shall analyze samples for all non-visible pollutant parameters (if applicable) - parameters indicating the presence of pollutants identified in the pollutant source assessment required (Risk Level 3 dischargers shall modify their CSMPs to address these additional parameters in accordance with any updated SWPPP pollutant source assessment).

f. Risk Level 3 dischargers shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.

g. Risk Level 3 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.[7]

h. Risk Level 3 dischargers shall keep all field /or analytical data in the SWPPP document.

12. **Risk Level 3 – Watershed Monitoring Option**

Risk Level 3 dischargers who are part of a qualified regional watershed-based monitoring program may be eligible for relief from the requirements in Sections I.5. The Regional Water Board may approve proposals to substitute an acceptable watershed-based monitoring program by determining if the watershed-based monitoring program will provide substantially similar monitoring information in evaluating discharger compliance with the requirements of this General Permit.

13. **Risk Level 3 – Particle Size Analysis for Project Risk Justification**

Risk Level 3 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

14. **Risk Level 3 – Records**

Risk Level 3 dischargers shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Risk Level 3 dischargers shall retain all records on-site while construction is ongoing. These records include:

a. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.

b. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.

c. The date and approximate time of analyses.

[7] For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed.

d. The individual(s) who performed the analyses.

e. A summary of all analytical results from the last three years, the method detection limits and reporting units, the analytical techniques or methods used, and the chain of custody forms.

f. Rain gauge readings from site inspections.

g. Quality assurance/quality control records and results.

h. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Sections I.3 and I.10 above).

i. Visual observation and sample collection exception records (see Section I.6 above).

j. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

15. **Risk Level 3 – NAL Exceedance Report**

a. In the event that any effluent sample exceeds an applicable NAL, Risk Level 3 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 10 days after the conclusion of the storm event. The Regional Boards have the authority to require the submittal of an NAL Exceedance Report.

b. Risk Level 3 dischargers shall certify each NAL Exceedance Report in accordance with the Special Provisions for Construction Activity In this General Permit.

c. Risk Level 3 dischargers shall retain an electronic or paper copy of each NAL Exceedance Report for a minimum of three years after the date the annual report is filed.

d. Risk Level 3 dischargers shall include in the NAL Exceedance Report:

i. The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as “less than the method detection limit”).

ii. The date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation.

iii. A description of the current BMPs associated with the effluent sample that exceeded the NAL and the proposed corrective actions taken.

16. **Risk Level 3 – NEL Violation Report**

a. Risk Level 3 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 5 days after the conclusion of the storm event.

b. In the event that a discharger has violated an applicable NEL, Risk Level 3 dischargers shall submit an NEL Violation Report to the State Water Board within 24 hours after the NEL exceedance has been identified.

c. Risk Level 3 dischargers shall certify each NEL Violation Report in accordance with the Special Provisions for Construction Activity in this General Permit.

d. Risk Level 3 dischargers shall retain an electronic or paper copy of each NEL Violation Report for a minimum of three years after the date the annual report is filed.

e. Risk Level 3 dischargers shall include in the NEL Violation Report:

i. The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as “less than the method detection limit”);

ii. The date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation; and

iii. A Description of the current onsite BMPs, and the proposed corrective actions taken to manage the NEL exceedance.

f. Compliance Storm Exemption - In the event that an applicable NEL has been exceeded during a storm event equal to or larger than the Compliance Storm Event, Risk level 3 discharger shall report the on-site rain gauge reading and nearby governmental rain gauge readings for verification.

17. **Risk Level 3 – Bioassessment**

a. Risk Level 3 dischargers with a total project-related ground disturbance exceeding 30 acres shall:

i. Conduct bioassessment monitoring, as described in Appendix 3.

ii. Include the collection and reporting of specified in stream biological data and physical habitat.

iii. Use the bioassessment sample collection and Quality Assurance & Quality Control (QA/QC) protocols developed by the State of California's Surface Water Ambient Monitoring Program (SWAMP).[8]

b. Risk Level 3 dischargers qualifying for bioassessment, where construction commences out of an index period for the site location shall:

i. Receive Regional Board approval for the sampling exception.

ii. Conduct bioassessment monitoring, as described in Appendix 3.

iii. Include the collection and reporting of specified instream biological data and physical habitat.

iv. Use the bioassessment sample collection and Quality Assurance & Quality Control (QA/QC) protocols developed by the State of California's Surface Water Ambient Monitoring Program (SWAMP).

OR

v. Make a check payable to: Cal State Chico Foundation (SWAMP Bank Account) or San Jose State Foundation (SWAMP Bank Account) and include the WDID# on the check for the amount calculated for the exempted project.

vi. Send a copy of the check to the Regional Water Board office for the site's region.

vii. Invest $**7,500.00 X The number of samples required** into the SWAMP program as compensation (upon regional board approval).

[8] http://www.waterboards.ca.gov/water_issues/programs/swamp/.

Table 3 – Risk Level 3 Test Methods, Detection Limits, Reporting Units and Applicable NALs/NELs

Parameter	Test Method / Protocol	Discharge Type	Min. Detection Limit	Reporting Units	Numeric Action Level	Numeric Effluent Limitation
pH	Field test with calibrated portable instrument	Risk Level 3 Discharges	0.2 pH	units	lower NAL = 6.5 upper NAL = 8.5	lower NEL = 6.0 upper NEL = 9.0
Turbidity EPA	0180.1 and/or field test with calibrated portable instrument	Risk Level 3 Discharges other than ATS	1	NTU	250 NTU	500 NTU
		For ATS discharges	1 NTU		N/A	10 NTU for Daily Weighted Average & 20 NTU for Any Single Sample
SSC ASTM	Method D 3977-97[9]	Risk Level 3 (if NEL exceeded)	5 mg/L		N/A	N/A
Bioassessment	(STE) Level I of (SAFIT),[10] fixed-count of 600 org/sample	Risk Level 3 projects> 30 acres	N/A N/A		N/A	N/A

[9] ASTM, 1999, Standard Test Method for Determining Sediment Concentration in Water Samples: American Society of Testing and Materials, D 3977-97, Vol. 11.02, pp. 389-394.

[10] The current SAFIT STEs (28 November 2006) list requirements for both the Level I and Level II taxonomic effort, and are located at: http://www.swrcb.ca.gov/swamp/docs/safit/ste_list.pdf. When new editions are published by SAFIT, they will supersede all previous editions. All editions will be posted at the State Water Board's SWAMP website.

ATTACHMENT F:
Active Treatment System (ATS) Requirements

Table 1 – Numeric Effluent Limitations, Numeric Action Levels, Test Methods, Detection Limits, and Reporting Units

Parameter	Test Method	Discharge Type	Min. Detection Limit	Units	Numeric Action Level	Numeric Effluent Limitation
Turbidity	EPA 0180.1 and/or field test with a calibrated portable instrument	For ATS discharges	1 NTU		N/A	10 NTU for Daily Flow-Weighted Average & 20 NTU for Any Single Sample

A. Dischargers choosing to implement an Active Treatment System (ATS) on their site shall comply with all of the requirements in this Attachment.

B. The discharger shall maintain a paper copy of each ATS specification onsite in compliance with the record retention requirements in the Special Provisions of this General Permit.

C. ATS Design, Operation and Submittals

1. The ATS shall be designed and approved by a Certified Professional in Erosion and Sediment Control (CPESC), a Certified Professional in Storm Water Quality (CPSWQ); a California registered civil engineer; or any other California registered engineer.

2. The discharger shall ensure that the ATS is designed in a manner to preclude the accidental discharge of settled floc[1] during floc pumping or related operations.

3. The discharger shall design outlets to dissipate energy from concentrated flows.

4. The discharger shall install and operate an ATS by assigning a lead person (or project manager) who has either a minimum of five years construction storm

[1] Floc is defined as a clump of solids formed by the chemical action in ATS systems.

water experience or who is a licensed contractors specifically holding a California Class A Contractors license.[2]

5. The discharger shall prepare an ATS Plan that combines the site-specific data and treatment system information required to safely and efficiently operate an ATS. The ATS Plan shall be electronically submitted to the State Water Board at least 14 days prior to the planned operation of the ATS and a paper copy shall be available onsite during ATS operation. At a minimum, the ATS Plan shall include:

   a. ATS Operation and Maintenance Manual for All Equipment.

   b. ATS Monitoring, Sampling & Reporting Plan, including Quality Assurance/Quality Control (QA/QC).

   c. ATS Health and Safety Plan.

   d. ATS Spill Prevention Plan.

6. The ATS shall be designed to capture and treat (within a 72-hour period) a volume equivalent to the runoff from a 10-year, 24-hour storm event using a watershed runoff coefficient of 1.0.

D. Treatment – Chemical Coagulation/Flocculation

1. Jar tests shall be conducted using water samples selected to represent typical site conditions and in accordance with ASTM D2035-08 (2003).

2. The discharger shall conduct, at minimum, six site-specific jar tests (per polymer with one test serving as a control) for each project to determine the proper polymer and dosage levels for their ATS.

3. Single field jar tests may also be conducted during a project if conditions warrant, for example if construction activities disturb changing types of soils, which consequently cause change in storm water and runoff characteristics.

E. Residual Chemical and Toxicity Requirements

1. The discharger shall utilize a residual chemical test method that has a method detection limit (MDL) of 10% or less than the maximum allowable threshold

[2] Business and Professions Code Division 3, Chapter 9, Article 4, Class A Contractor: A general engineering contractor is a contractor whose principal contracting business is in connection with fixed works requiring specialized engineering knowledge and skill. [http://www.cslb.ca.gov/General-Information/library/licensing-classifications.asp].

concentration[3] (MATC) for the specific coagulant in use and for the most sensitive species of the chemical used.

2. The discharger shall utilize a residual chemical test method that produces a result within one hour of sampling.

3. The discharger shall have a California State certified laboratory validate the selected residual chemical test. Specifically the lab will review the test protocol, test parameters, and the detection limit of the coagulant. The discharger shall electronically submit this documentation as part of the ATS Plan.

4. If the discharger cannot utilize a residual chemical test method that meets the requirements above, the discharger shall operate the ATS in Batch Treatment[4] mode.

5. A discharger planning to operate in Batch Treatment mode shall perform toxicity testing in accordance with the following:

   a. The discharger shall initiate acute toxicity testing on effluent samples representing effluent from each batch prior to discharge[5]. All bioassays shall be sent to a laboratory certified by the Department of Health Services (DHS) Environmental Laboratory Accreditation Program (ELAP). The required field of testing number for Whole Effluent Toxicity (WET) testing is E113.[6]

   b. Acute toxicity tests shall be conducted with the following species and protocols. The methods to be used in the acute toxicity testing shall be those outlined for a 96-hour acute test in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms, USEPA-841-R-02-012" for Fathead minnow, *Pimephales promelas* (fathead minnow). Acute toxicity for *Oncorhynchus mykiss* (Rainbow Trout) may be used as a substitute for testing fathead minnows.

   c. All toxicity tests shall meet quality assurance criteria and test acceptability criteria in the most recent versions of the EPA test method for WET testing.

   d. The discharger shall electronically report all acute toxicity testing.

[3] The Maximum Allowable Threshold Concentration (MATC) is the allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity testing conducted by an independent, third-party laboratory. A typical MATC would be:
The MATC is equal to the geometric mean of the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.
[4] Batch Treatment mode is defined as holding or recirculating the treated water in a holding basin or tank(s) until treatment is complete or the basin or storage tank(s) is full.
[5] This requirement only requires that the test be initiated prior to discharge.
[6] http://www.dhs.ca.gov/ps/ls/elap/pdf/FOT_Desc.pdf.

F. Filtration

1. The ATS shall include a filtration step between the coagulant treatment train and the effluent discharge. This is commonly provided by sand, bag, or cartridge filters, which are sized to capture suspended material that might pass through the clarifier tanks.

2. Differential pressure measurements shall be taken to monitor filter loading and confirm that the final filter stage is functioning properly.

G. Residuals Management

1. Sediment shall be removed from the storage or treatment cells as necessary to ensure that the cells maintain their required water storage (i.e., volume) capability.

2. Handling and disposal of all solids generated during ATS operations shall be done in accordance with all local, state, and federal laws and regulations.

H. ATS Instrumentation

1. The ATS shall be equipped with instrumentation that automatically measures and records effluent water quality data and flow rate.

2. The minimum data recorded shall be consistent with the Monitoring and Reporting requirements below, and shall include:

   a. Influent Turbidity

   b. Effluent Turbidity

   c. Influent pH

   d. Effluent pH

   e. Residual Chemical

   f. Effluent Flow rate

   g. Effluent Flow volume

3. Systems shall be equipped with a data recording system, such as data loggers or webserver-based systems, which records each measurement on a frequency no longer than once every 15 minutes.

4. Cumulative flow volume shall be recorded daily. The data recording system shall have the capacity to record a minimum of seven days continuous data.

5. Instrumentation systems shall be interfaced with system control to provide auto shutoff or recirculation in the event that effluent measurements exceed turbidity or pH.

6. The system shall also assure that upon system upset, power failure, or other catastrophic event, the ATS will default to a recirculation mode or safe shut down.

7. Instrumentation (flow meters, probes, valves, streaming current detectors, controlling computers, etc.) shall be installed and maintained per manufacturer's recommendations, which shall be included in the QA/QC plan.

8. The QA/QC plan shall also specify calibration procedures and frequencies, instrument method detection limit or sensitivity verification, laboratory duplicate procedures, and other pertinent procedures.

9. The instrumentation system shall include a method for controlling coagulant dose, to prevent potential overdosing. Available technologies include flow/turbidity proportional metering, periodic jar testing and metering pump adjustment, and ionic charge measurement controlling the metering pump.

I. ATS Effluent Discharge

1. ATS effluent shall comply with all provisions and prohibitions in this General Permit, specifically the NELs.

2. NELs for discharges from an ATS:

   a. Turbidity of all ATS discharges shall be less than 10 NTU for daily flow-weighted average of all samples and 20 NTU for any single sample.

   b. Residual Chemical shall be < 10% of MATC[7] for the most sensitive species of the chemical used.

3. If an analytical effluent sampling result is outside the range of pH NELs (i.e., is below the lower NEL for pH or exceeds the upper NEL for pH) or exceeds the turbidity NEL (as listed in Table 1), the discharger is in violation of this General

[7] The Maximum Allowable Threshold Concentration (MATC) is the allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity testing conducted by an independent, third-party laboratory. The MATC is equal to the geometric mean of the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.

Permit and shall electronically file the results in violation within 24-hours of obtaining the results.

4. If ATS effluent is authorized to discharge into a sanitary sewer system, the discharger shall comply with any pre-treatment requirements applicable for that system. The discharger shall include any specific criteria required by the municipality in the ATS Plan.

5. Compliance Storm Event:

   Discharges of storm water from ATS shall comply with applicable NELs (above) unless the storm event causing the discharges is determined after the fact to be equal to or larger than the Compliance Storm Event (expressed in inches of rainfall). The Compliance Storm Event for ATS discharges is the 10 year, 24 hour storm, as determined using these maps:

   http://www.wrcc.dri.edu/pcpnfreq/nca10y24.gif
   http://www.wrcc.dri.edu/pcpnfreq/sca10y24.gif

   This exemption is dependent on the submission of rain gauge data verifying the storm event is equal to or larger than the Compliance Storm.

J. Operation and Maintenance Plan

1. Each Project shall have a site-specific Operation and Maintenance (O&M) Manual covering the procedures required to install, operate and maintain the ATS.[8]

2. The O&M Manual shall only be used in conjunction with appropriate project-specific design specifications that describe the system configuration and operating parameters.

3. The O&M Manual shall have operating manuals for specific pumps, generators, control systems,and other equipment.

K. Sampling and Reporting Quality Assurance/ Quality Check (QA/QC) Plan

4. A project-specific QA/QC Plan shall be developed for each project. The QA/QC Plan shall include at a minimum:

   a. Calibration – Calibration methods and frequencies for all system and field instruments shall be specified.

   b. Method Detection Limits (MDLs) – The methods for determining MDLs shall be specified for each residual coagulant measurement method. Acceptable

[8] The manual is typically in a modular format covering generalized procedures for each component that is utilized in a particular system.

minimum MDLs for each method, specific to individual coagulants, shall be specified.

c. Laboratory Duplicates – Requirements for monthly laboratory duplicates for residual coagulant analysis shall be specified.

L. Personnel Training

1. Operators shall have training specific to using an ATS and liquid coagulants for storm water discharges in California.

2. The training shall be in the form of a formal class with a certificate and requirements for testing and certificate renewal.

3. Training shall include a minimum of eight hours classroom and 32 hours field training. The course shall cover the following topics:

   a. Coagulation Basics –Chemistry and physical processes

   b. ATS System Design and Operating Principles

   c. ATS Control Systems

   d. Coagulant Selection – Jar testing, dose determination, etc.

   e. Aquatic Safety/Toxicity of Coagulants, proper handling and safety

   f. Monitoring, Sampling, and Analysis

   g. Reporting and Recordkeeping

   h. Emergency Response

M. Active Treatment System (ATS) Monitoring Requirements

Any discharger who deploys an ATS on their site shall conduct the following:

1. Visual Monitoring

   a. A designated responsible person shall be on site daily at all times during treatment operations.

   b. Daily on-site visual monitoring of the system for proper performance shall be conducted and recorded in the project data log.

i. The log shall include the name and phone number of the person responsible for system operation and monitoring.

ii. The log shall include documentation of the responsible person's training.

2. Operational and Compliance Monitoring

a. Flow shall be continuously monitored and recorded at not greater than 15-minute intervals for total volume treated and discharged.

b. Influent and effluent pH must be continuously monitored and recorded at not greater than 15-minute intervals.

c. Influent and effluent turbidity (expressed in NTU) must be continuously monitored and recorded at not greater than 15-minute intervals.

d. The type and amount of chemical used for pH adjustment, if any, shall be monitored and recorded.

e. Dose rate of chemical used in the ATS system (expressed in mg/L) shall be monitored and reported 15-minutes after startup and every 8 hours of operation.

f. Laboratory duplicates – monthly laboratory duplicates for residual coagulant analysis must be performed and records shall be maintained onsite.

g. Effluent shall be monitored and recorded for residual chemical/additive levels.

h. If a residual chemical/additive test does not exist and the ATS is operating in a batch treatment mode of operation refer to the toxicity monitoring requirements below.

3. Toxicity Monitoring

A discharger operating in batch treatment mode shall perform toxicity testing in accordance with the following:

a. The discharger shall initiate acute toxicity testing on effluent samples representing effluent from each batch prior to discharge.[9] All bioassays shall be sent to a laboratory certified by the Department of Health Services (DHS) Environmental Laboratory Accreditation Program (ELAP). The required field of testing number for Whole Effluent Toxicity (WET) testing is E113.[10]

[9] This requirement only requires that the test be initiated prior to discharge.
[10] http://www.dhs.ca.gov/ps/ls/elap/pdf/FOT_Desc.pdf.

b. Acute toxicity tests shall be conducted with the following species and protocols. The methods to be used in the acute toxicity testing shall be those outlined for a 96-hour acute test in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms, USEPA-841-R-02-012" for Fathead minnow, *Pimephales promelas or* Rainbow trout *Oncorhynchus mykiss* may be used as a substitute for fathead minnow.

c. All toxicity tests shall meet quality assurance criteria and test acceptability criteria in the most recent versions of the EPA test method for WET testing.[11]

4. Reporting and Recordkeeping

At a minimum, every 30 days a LRP representing the discharger shall access the State Water Boards Storm Water Mulit-Application and Report Tracking system (SMARTS) and electronically upload field data from the ATS. Records must be kept for three years after the project is completed .

5. Non-compliance Reporting

a. Any indications of toxicity or other violations of water quality objectives shall be reported to the appropriate regulatory agency as required by this General Permit.

b. Upon any measurements that exceed water quality standards, the system operator shall immediately notify his supervisor or other responsible parties, who shall notify the Regional Water Board.

c. If any monitoring data exceeds any applicable NEL in this General Permit, the discharger shall electronically submit a NEL Violation Report to the State Water Board within 24 hours after the NEL exceedance has been identified.

i. ATS dischargers shall certify each NEL Violation Report in accordance with the Special Provisions for Construction Activity in this General Permit.

ii. ATS dischargers shall retain an electronic or paper copy of each NEL Violation Report for a minimum of three years after the date the annual report is filed.

iii. ATS dischargers shall include in the NEL Violation Report:

(1) The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit");

[11] http://www.epa.gov/waterscience/methods/wet/.

(2) The date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation; and

(3) A description of the current onsite BMPs, and the proposed corrective actions taken to manage the NEL exceedance.

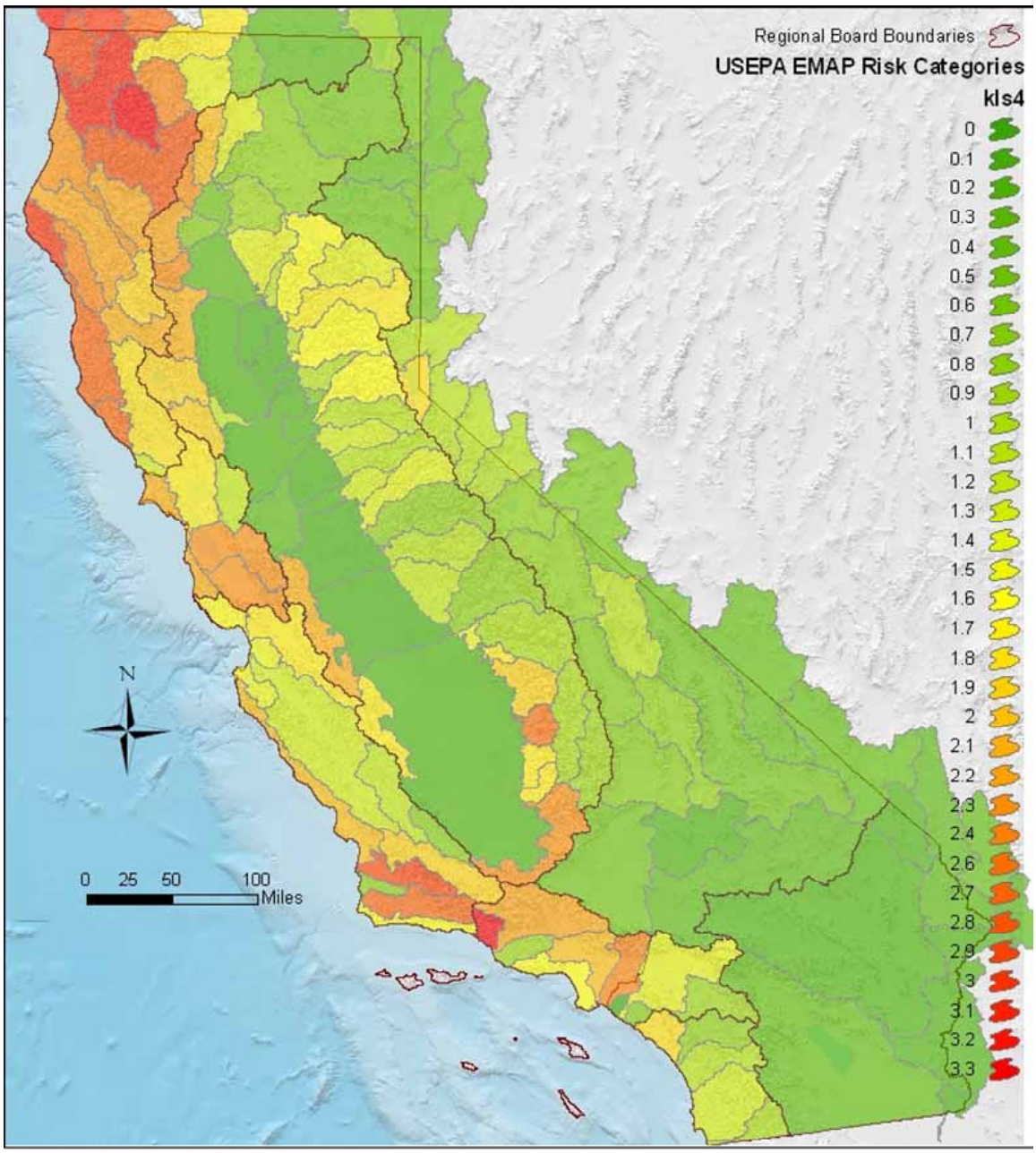
iv. Compliance Storm Exemption - In the event that an applicable NEL has been exceeded during a storm event equal to or larger than the Compliance Storm Event, ATS dischargers shall report the on-site rain gauge reading and nearby governmental rain gauge readings for verification.

Risk Determination Worksheet

Step 1	Determine Sediment Risk via one of the options listed: 1. GIS Map Method - EPA Rainfall Erosivity Calculator & GIS map 2. Individual Method - EPA Rainfall Erosivity Calculator & Individual Data
Step 2	Determine Receiving Water Risk via one of the options listed: 1. GIS map of Sediment Sensitive Watersheds provided (in development) 2. List of Sediment Sensitive Watersheds provided
Step 3	Determine Combined Risk Level

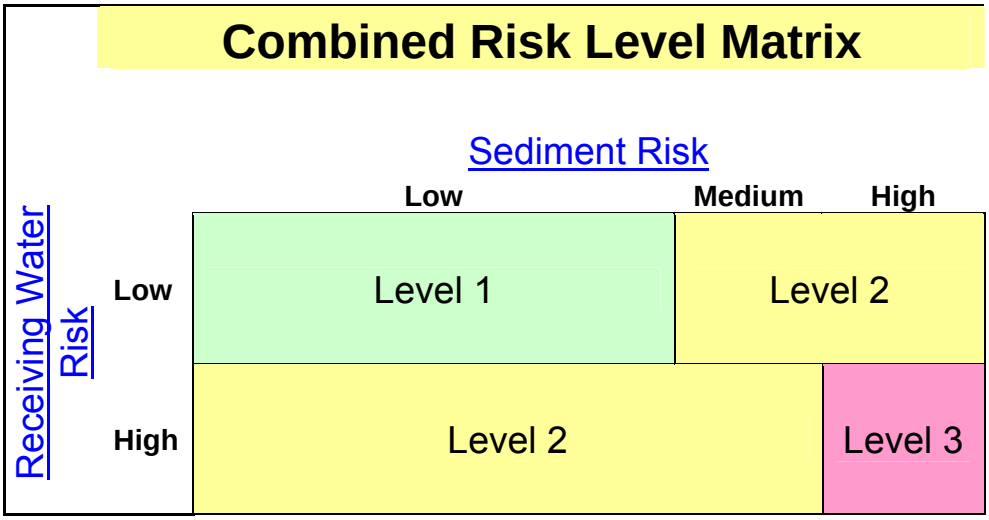
Sediment Risk Factor Worksheet	Entry
A) R Factor	
Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site. http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm	
R Factor Value	0
B) K Factor (weighted average, by area, for all site soils)	
The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted. Site-specific K factor guidance	
K Factor Value	0
C) LS Factor (weighted average, by area, for all slopes)	
The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction. LS Table	
LS Factor Value	0
Watershed Erosion Estimate (=RxKxLS) in tons/acre	0
Site Sediment Risk Factor Low Sediment Risk: < 15 tons/acre Medium Sediment Risk: >=15 and <75 tons/acre High Sediment Risk: >= 75 tons/acre	**Low**

For the GIS Map Method, the R factor for the project is calculated using the online calculator at (see cell to right). The product of K and LS are shown on the figure below. To determine soil loss in tons per acre, multiply the R factor times the value for K times LS from the map.
http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm



State Water Resources Control Board, January 15, 2008

Receiving Water (RW) Risk Factor Worksheet	Entry	Score
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment**? (For help with impaired waterbodies please check the attached worksheet or visit the link below) or has a **USEPA approved TMDL implementation plan for sediment**?: 2006 Approved Sediment-impared WBs Worksheet http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml **OR**	**Yes**	**High**
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? http://www.ice.ucdavis.edu/geowbs/asp/wbquse.asp		



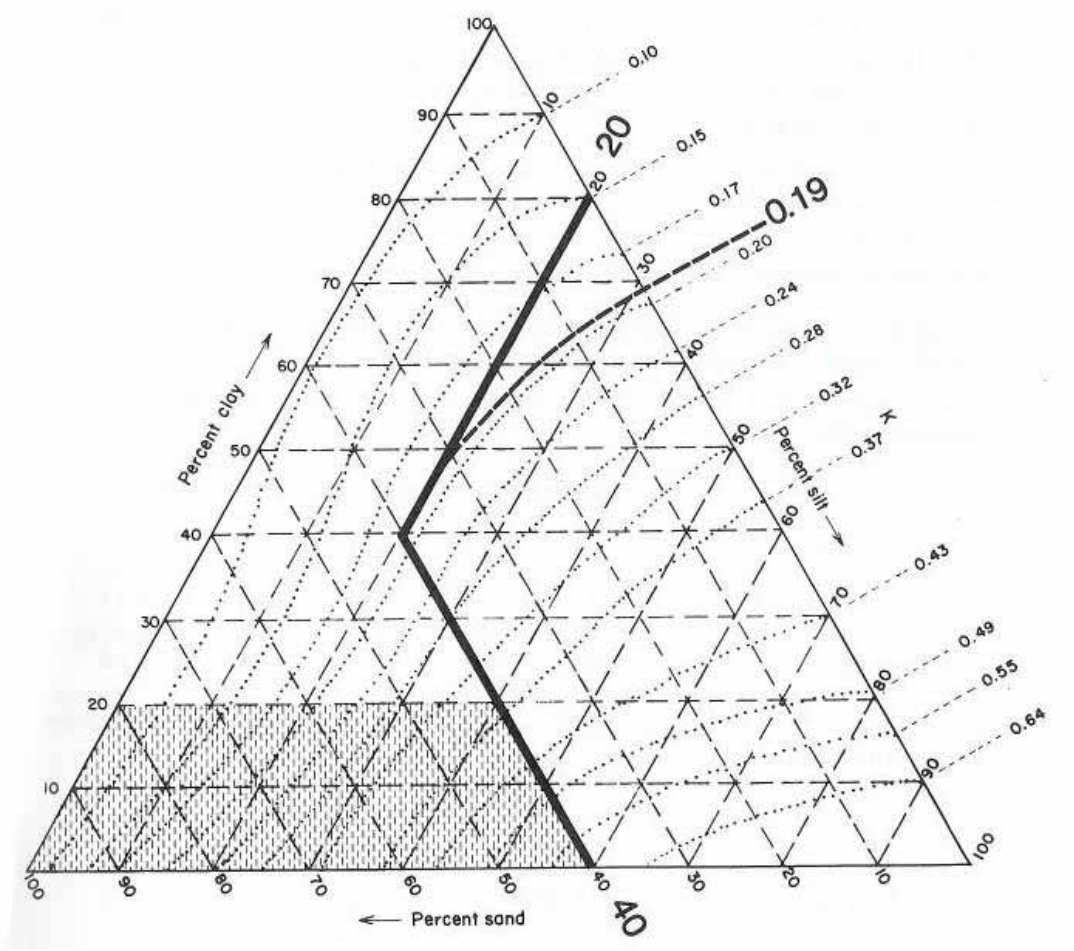
Project Sediment Risk: Low

Project RW Risk: High

Project Combined Risk: Level 2

Soil Erodibility Factor (K)

The K factor can be determined by using the nomograph method, which requires that a particle size analysis (ASTM D-422) be done to determine the percentages of sand, very fine sand, silt and clay. Use the figure below to determine appropriate K value.



Erickson triangular nomograph used to estimate soil erodibility (K) factor.
The figure above is the USDA nomograph used to determine the K factor for a soil, based on its texture (% silt plus very fine sand, % sand, % organic matter, soil structure, and permeability).
Nomograph from Erickson 1977 as referenced in Goldman et. al., 1986.

Sheet Flow Length (ft)	Average Watershed Slope (%)														
	0.2	**0.5**	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**	**8.0**	**10.0**	**12.0**	**14.0**	**16.0**	**20.0**	
<3	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.35	0.36	0.38	0.39	0.41	
6	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.37	0.41	0.45	0.49	0.56	
9	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.38	0.45	0.51	0.56	0.67	
12	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.39	0.47	0.55	0.62	0.76	
15	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.40	0.49	0.58	0.67	0.84	
25	0.05	0.07	0.10	0.16	0.21	0.26	0.31	0.36	0.45	0.57	0.71	0.85	0.98	1.24	
50	0.05	0.08	0.13	0.21	0.30	0.38	0.46	0.54	0.70	0.91	1.15	1.40	1.64	2.10	
75	0.05	0.08	0.14	0.25	0.36	0.47	0.58	0.69	0.91	1.20	1.54	1.87	2.21	2.86	
100	0.05	0.09	0.15	0.28	0.41	0.55	0.68	0.82	1.10	1.46	1.88	2.31	2.73	3.57	
150	0.05	0.09	0.17	0.33	0.50	0.68	0.86	1.05	1.43	1.92	2.51	3.09	3.68	4.85	
200	0.06	0.10	0.18	0.37	0.57	0.79	1.02	1.25	1.72	2.34	3.07	3.81	4.56	6.04	
250	0.06	0.10	0.19	0.40	0.64	0.89	1.16	1.43	1.99	2.72	3.60	4.48	5.37	7.16	
300	0.06	0.10	0.20	0.43	0.69	0.98	1.28	1.60	2.24	3.09	4.09	5.11	6.15	8.23	1
400	0.06	0.11	0.22	0.48	0.80	1.14	1.51	1.90	2.70	3.75	5.01	6.30	7.60	10.24	1
600	0.06	0.12	0.24	0.56	0.96	1.42	1.91	2.43	3.52	4.95	6.67	8.45	10.26	13.94	1
800	0.06	0.12	0.26	0.63	1.10	1.65	2.25	2.89	4.24	6.03	8.17	10.40	12.69	17.35	2
1000	0.06	0.13	0.27	0.69	1.23	1.86	2.55	3.30	4.91	7.02	9.57	12.23	14.96	20.57	2

LS Factors for Construction Sites. *Table from Renard et. al., 1997.*

WBID	REGION NUMBER	REGION NAME	WATER BODY TYPE ABBR	WATER BODY TYPE	WATER BODY NAME	CALWATER WATERSHED	ESTIMATED SIZE AFFECTED	UNIT ABBR	UNIT	POLLUTANT CODE	POLLUTANT	SOURCE CODE	POTENTIAL SOURCES	PROPOSED TMDL COMPLETION	COMMENTS
CAE115301	1	North Coast	E	Estuaries	Bodega HU, Estero Americano HA, estuary	11530012	199	A	Acres	1100	Sedimentation/Siltation	1510	Range Grazing-Riparian	2019	Water Quality Attainment strategy is attempting to increase voluntary measures for attainment of standards & objectives, as was done in the Estero de San Antonio/Stemple Creek T Water Quality Attainment Strategy, adopted by NCRWQCB in Dec, 97.
CAE115301	1	North Coast	E	Estuaries	Bodega HU, Estero Americano HA, estuary	11530012	199	A	Acres	1100	Sedimentation/Siltation	7000	Hydromodification	2019	Water Quality Attainment strategy is attempting to increase voluntary measures for attainment of standards & objectives, as was done in the Estero de San Antonio/Stemple Creek T Water Quality Attainment Strategy, adopted by NCRWQCB in Dec, 97.
CAE115301	1	North Coast	E	Estuaries	Bodega HU, Estero Americano HA, estuary	11530012	199	A	Acres	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Water Quality Attainment strategy is attempting to increase voluntary measures for attainment of standards & objectives, as was done in the Estero de San Antonio/Stemple Creek T Water Quality Attainment Strategy, adopted by NCRWQCB in Dec, 97.
CAE115301	1	North Coast	E	Estuaries	Bodega HU, Estero Americano HA, estuary	11530012	199	A	Acres	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Water Quality Attainment strategy is attempting to increase voluntary measures for attainment of standards & objectives, as was done in the Estero de San Antonio/Stemple Creek T Water Quality Attainment Strategy, adopted by NCRWQCB in Dec, 97.
CAE115301	1	North Coast	E	Estuaries	Bodega HU, Estero Americano HA, estuary	11530012	199	A	Acres	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Water Quality Attainment strategy is attempting to increase voluntary measures for attainment of standards & objectives, as was done in the Estero de San Antonio/Stemple Creek T Water Quality Attainment Strategy, adopted by NCRWQCB in Dec, 97.
CAE115301	1	North Coast	E	Estuaries	Bodega HU, Estero Americano HA, estuary	11530012	199	A	Acres	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Water Quality Attainment strategy is attempting to increase voluntary measures for attainment of standards & objectives, as was done in the Estero de San Antonio/Stemple Creek T Water Quality Attainment Strategy, adopted by NCRWQCB in Dec, 97.
CAR11111	1	North Coast	R	Rivers/Streams	Eel River HU, Lower Eel River HA, Eel River Delta	11110000	426	M	Miles	1100	Sedimentation/Siltation	1500	Range Grazing-Riparian and/or Upland	2019	
CAR11111	1	North Coast	R	Rivers/Streams	Eel River HU, Lower Eel River HA, Eel River Delta	11110000	426	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR11111	1	North Coast	R	Rivers/Streams	Eel River HU, Lower Eel River HA, Eel River Delta	11110000	426	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR11141	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	1510	Range Grazing-Riparian	2004	
CAR11141	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	1520	Range Grazing-Upland	2004	
CAR11141	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2004	
CAR11141	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	2100	Harvesting, Restoration, Residue Management	2004	
CAR11141	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	2300	Logging Road Construction/Maintenance	2004	
CAR11141	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2004	
CAR11141	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2004	
CAR11141	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2004	
CAR11141	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	7550	Habitat Modification	2004	
CAR11141	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2004	
CAR11141	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2004	
CAR11141	1	North Coast	R	Rivers/Streams	Eel River HU, Middle Main HA	11140000	674	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2004	
CAR11162	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	1935	Agriculture-grazing	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR11162	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR11162	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	2100	Harvesting, Restoration, Residue Management	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR11162	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	2300	Logging Road Construction/Maintenance	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR11162	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	2400	Silvicultural Point Sources	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR11162	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR11162	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	3100	Highway/Road/Bridge Construction	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR11162	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR11162	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR11162	1	North Coast	R	Rivers/Streams	Eel River HU, Upper Main HA (Includes Tomki Creek)	11160000	1141	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	USEPA will develop a TMDL for Eel River, Upper Main Fork.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Elk River	11000000	88	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	The Eureka Plain HU, Elk River, includes the following Calwater Planning Watersheds (PWS): 110.00021, 110.00030, 110.00032, and 110.00042. Sedimentation, threat sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Elk River	11000000	88	M	Miles	1100	Sedimentation/Siltation	2100	Harvesting, Restoration, Residue Management	2019	The Eureka Plain HU, Elk River, includes the following Calwater Planning Watersheds (PWS): 110.00021, 110.00030, 110.00032, and 110.00042. Sedimentation, threat sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Elk River	11000000	88	M	Miles	1100	Sedimentation/Siltation	2300	Logging Road Construction/Maintenance	2019	The Eureka Plain HU, Elk River, includes the following Calwater Planning Watersheds (PWS): 110.00021, 110.00030, 110.00032, and 110.00042. Sedimentation, threat sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Elk River	11000000	88	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	The Eureka Plain HU, Elk River, includes the following Calwater Planning Watersheds (PWS): 110.00021, 110.00030, 110.00032, and 110.00042. Sedimentation, threat sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Elk River	11000000	88	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	The Eureka Plain HU, Elk River, includes the following Calwater Planning Watersheds (PWS): 110.00021, 110.00030, 110.00032, and 110.00042. Sedimentation, threat sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Elk River	11000000	88	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	The Eureka Plain HU, Elk River, includes the following Calwater Planning Watersheds (PWS): 110.00021, 110.00030, 110.00032, and 110.00042. Sedimentation, threat sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Elk River	11000000	88	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2019	The Eureka Plain HU, Elk River, includes the following Calwater Planning Watersheds (PWS): 110.00021, 110.00030, 110.00032, and 110.00042. Sedimentation, threat sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Elk River	11000000	88	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	The Eureka Plain HU, Elk River, includes the following Calwater Planning Watersheds (PWS): 110.00021, 110.00030, 110.00032, and 110.00042. Sedimentation, threat sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Freshwater Creek	11000000	84	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	The Eureka Plain HU, Freshwater Creek, includes the following Calwater Planning Watersheds (PWS): 110.00011, 110.00012, 110.00014, 110.00040, and 110.00050. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Freshwater Creek	11000000	84	M	Miles	1100	Sedimentation/Siltation	2100	Harvesting, Restoration, Residue Management	2019	The Eureka Plain HU, Freshwater Creek, includes the following Calwater Planning Watersheds (PWS): 110.00011, 110.00012, 110.00014, 110.00040, and 110.00050. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Freshwater Creek	11000000	84	M	Miles	1100	Sedimentation/Siltation	2300	Logging Road Construction/Maintenance	2019	The Eureka Plain HU, Freshwater Creek, includes the following Calwater Planning Watersheds (PWS): 110.00011, 110.00012, 110.00014, 110.00040, and 110.00050. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.

WBID	REGION NUMBER	REGION NAME	WATER BODY TYPE ABBR	WATER BODY TYPE	WATER BODY NAME	CALWATER WATERSHED	ESTIMATED SIZE AFFECTED	UNIT ABBR	UNIT	POLLUTANT CODE	POLLUTANT	SOURCE CODE	POTENTIAL SOURCES	PROPOSED TMDL COMPLETION	COMMENTS
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Freshwater Creek	11000000	84	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	The Eureka Plain HU, Freshwater Creek, includes the following Calwater Planning Watersheds (PWS): 110.00011, 110.00012, 110.00014, 110.00040, and 110.00050. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Freshwater Creek	11000000	84	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	The Eureka Plain HU, Freshwater Creek, includes the following Calwater Planning Watersheds (PWS): 110.00011, 110.00012, 110.00014, 110.00040, and 110.00050. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Freshwater Creek	11000000	84	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	The Eureka Plain HU, Freshwater Creek, includes the following Calwater Planning Watersheds (PWS): 110.00011, 110.00012, 110.00014, 110.00040, and 110.00050. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Freshwater Creek	11000000	84	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2019	The Eureka Plain HU, Freshwater Creek, includes the following Calwater Planning Watersheds (PWS): 110.00011, 110.00012, 110.00014, 110.00040, and 110.00050. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR11000	1	North Coast	R	Rivers/Streams	Eureka Plain HU, Freshwater Creek	11000000	84	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	The Eureka Plain HU, Freshwater Creek, includes the following Calwater Planning Watersheds (PWS): 110.00011, 110.00012, 110.00014, 110.00040, and 110.00050. Sedimentation, threat of sedimentation, impaired irrigation water quality, impaired domestic supply water quality, impaired spawning habitat, increased rate and depth of flooding due to sediment, property damage. NCRWQCB and California Department of forestry staff are involved in ongoing efforts to attain adherance to Forest Practice Rules.
CAR10511	1	North Coast	R	Rivers/Streams	Klamath River HU, Lower HA, Klamath Glen HSA	10511000	609	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	If this listing is determined to be on tribal lands, USEPA should place this water body and pollutant on the section 303d list for the tribal lands. It is not the State Water Board's inten this listing affect other actions related to decommissioning and removal of dams on the Klamath River
CAR10910	1	North Coast	R	Rivers/Streams	Mad River HU, Mad River	10900000	654	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	USEPA will develop TMDL for the Mad River. Sediment TMDLS will be developed for the area tributary to and including: (1) the Mad River (North Fork), (2) the mad River (Upper), (3) the Mad River (Middle).
CAR10910	1	North Coast	R	Rivers/Streams	Mad River HU, Mad River	10900000	654	M	Miles	1100	Sedimentation/Siltation	5000	Resource Extraction	2019	USEPA will develop TMDL for the Mad River. Sediment TMDLS will be developed for the area tributary to and including: (1) the Mad River (North Fork), (2) the mad River (Upper), (3) the Mad River (Middle).
CAR10910	1	North Coast	R	Rivers/Streams	Mad River HU, Mad River	10900000	654	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	USEPA will develop TMDL for the Mad River. Sediment TMDLS will be developed for the area tributary to and including: (1) the Mad River (North Fork), (2) the mad River (Upper), (3) the Mad River (Middle).
CAR11412	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Austin Creek HSA	11412000	81	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment.
CAR11412	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Austin Creek HSA	11412000	81	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment.
CAR11412	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Austin Creek HSA	11412000	81	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment.
CAR11412	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Austin Creek HSA	11412000	81	M	Miles	1100	Sedimentation/Siltation	7300	Dam Construction	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment.
CAR11412	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Austin Creek HSA	11412000	81	M	Miles	1100	Sedimentation/Siltation	7400	Flow Regulation/Modification	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment.
CAR11412	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Austin Creek HSA	11412000	81	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment.
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	1200	Irrigated Crop Production	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	1300	Specialty Crop Production	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	1915	Agriculture-storm runoff	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	1935	Agriculture-grazing	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	3100	Highway/Road/Bridge Construction	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7100	Channelization	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7300	Dam Construction	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7350	Upstream Impoundment	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7400	Flow Regulation/Modification	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7550	Habitat Modification	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11411	1	North Coast	R	Rivers/Streams	Russian River HU, Lower Russian River HA, Guerneville HSA	11411000	195	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11426	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Big Sulphur Creek HSA	11426000	85	M	Miles	1100	Sedimentation/Siltation	3210	Geothermal Development	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11426	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Big Sulphur Creek HSA	11426000	85	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11426	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Big Sulphur Creek HSA	11426000	85	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .

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CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	1100	Nonirrigated Crop Production	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	1200	Irrigated Crop Production	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	1300	Specialty Crop Production	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	1510	Range Grazing-Riparian	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	1520	Range Grazing-Upland	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	1915	Agriculture-storm runoff	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	1935	Agriculture-grazing	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	3210	Geothermal Development	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	4501	Surface Runoff	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	5000	Resource Extraction	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	7100	Channelization	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	7500	Bridge Construction	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11425	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Geyserville HSA	11425000	242	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment TMDL.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	1200	Irrigated Crop Production	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	1300	Specialty Crop Production	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	1500	Range Grazing-Riparian and/or Upland	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	1510	Range Grazing-Riparian	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	1600	Intensive Animal Feeding Operations	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	1915	Agriculture-storm runoff	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	1935	Agriculture-grazing	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	2100	Harvesting, Restoration, Residue Management	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	3100	Highway/Road/Bridge Construction	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	4300	Other Urban Runoff	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	4501	Surface Runoff	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .

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CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	4300	Other Urban Runoff	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	4500	Highway/Road/Bridge Runoff	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	7100	Channelization	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	8050	Erosion From Derelict Land	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	8300	Highway Maintenance and Runoff	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR11421	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	11421000	96	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Entire Russian River watershed (including Laguna de Santa Rosa) is listed for sedimentation.
CAR30411	3	Central Coast	R	Rivers/Streams	San Vicente Creek	30411023	9.11953	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR31410	3	Central Coast	R	Rivers/Streams	Santa Ynez River (below city of Lompoc to Ocean)	31410040	3.8	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	
CAR31410	3	Central Coast	R	Rivers/Streams	Santa Ynez River (below city of Lompoc to Ocean)	31410040	3.8	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2019	
CAR31410	3	Central Coast	R	Rivers/Streams	Santa Ynez River (below city of Lompoc to Ocean)	31410040	3.8	M	Miles	1100	Sedimentation/Siltation	5000	Resource Extraction	2019	
CAR31410	3	Central Coast	R	Rivers/Streams	Santa Ynez River (Cachuma Lake to below city o Lompoc)	31440050	43	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	
CAR31410	3	Central Coast	R	Rivers/Streams	Santa Ynez River (Cachuma Lake to below city o Lompoc)	31440050	43	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2019	
CAR31410	3	Central Coast	R	Rivers/Streams	Santa Ynez River (Cachuma Lake to below city o Lompoc)	31440050	43	M	Miles	1100	Sedimentation/Siltation	5000	Resource Extraction	2019	
CAR31300	3	Central Coast	R	Rivers/Streams	Shuman Canyon Creek	31300041	8.5496	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	
CAR30413	3	Central Coast	R	Rivers/Streams	Valencia Creek	30413023	6.19	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2008	
CAR30413	3	Central Coast	R	Rivers/Streams	Valencia Creek	30413023	6.19	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2008	
CAR30412	3	Central Coast	R	Rivers/Streams	Zayante Creek	30412040	9.20875	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Zayante Creek	30412040	9.20875	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Zayante Creek	30412040	9.20875	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Zayante Creek	30412040	9.20875	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Zayante Creek	30412040	9.20875	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Zayante Creek	30412040	9.20875	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR11423	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Mark West Creek HSA	11423000	99	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	1100	Nonirrigated Crop Production	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	1200	Irrigated Crop Production	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	1300	Specialty Crop Production	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	1400	Pasture Grazing-Riparian and/or Upland	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	1510	Range Grazing-Riparian	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	1520	Range Grazing-Upland	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	1940	Dairies	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	3100	Highway/Road/Bridge Construction	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	4100	Urban Runoff--Non-industrial Permitted	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	4300	Other Urban Runoff	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	4501	Surface Runoff	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.

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CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7100	Channelization	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7500	Bridge Construction	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7550	Habitat Modification	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11422	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Santa Rosa Creek	11422000	87	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Entire Russian River watershed (including Santa Rosa Creek) is listed for sedimentation.
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	1915	Agriculture-storm runoff	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	2300	Logging Road Construction/Maintenance	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	3100	Highway/Road/Bridge Construction	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7100	Channelization	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7300	Dam Construction	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7350	Upstream Impoundment	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7400	Flow Regulation/Modification	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7550	Habitat Modification	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11424	1	North Coast	R	Rivers/Streams	Russian River HU, Middle Russian River HA, Warm Springs HSA	11424000	255	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Sediment impacts in Russian River tributaries prompted listing entire Russian River watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7100	Channelization	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7300	Dam Construction	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7400	Flow Regulation/Modification	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7500	Bridge Construction	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7550	Habitat Modification	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .

WBID	REGION NUMBER	REGION NAME	WATER BODY TYPE ABBR	WATER BODY TYPE	WATER BODY NAME	CALWATER WATERSHED	ESTIMATED SIZE AFFECTED	UNIT ABBR	UNIT	POLLUTANT CODE	POLLUTANT	SOURCE CODE	POTENTIAL SOURCES	PROPOSED TMDL COMPLETION	COMMENTS
CAR11432	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Coyote Valley HSA	11432000	171	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11433	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Forsythe Creek HSA	11433000	122	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11433	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Forsythe Creek HSA	11433000	122	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	5000	Resource Extraction	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	7550	Habitat Modification	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	8300	Highway Maintenance and Runoff	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAR11431	1	North Coast	R	Rivers/Streams	Russian River HU, Upper Russian River HA, Ukiah HSA	11431000	460	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2019	Russian River Watershed tributary sediment impairments led to listing of entire watershed for sediment .
CAB20114	2	San Francisco Bay	B	Bays and Harbors	Tomales Bay	20114033	8545.46	A	Acres	1100	Sedimentation/Siltation	1000	Agriculture	2008	TMDL will be developed as part of ongoing watershed management effort. Tributary streams, Lagunitas Creek and Walker Creek, must be managed first. Additional monitoring assessment needed.
CAB20114	2	San Francisco Bay	B	Bays and Harbors	Tomales Bay	20114033	8545.46	A	Acres	1100	Sedimentation/Siltation	7350	Upstream Impoundment	2008	TMDL will be developed as part of ongoing watershed management effort. Tributary streams, Lagunitas Creek and Walker Creek, must be managed first. Additional monitoring assessment needed.
CAR20240	2	San Francisco Bay	R	Rivers/Streams	Butano Creek	20240031	3.62774	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Impairment to steelhead habita
CAR20113	2	San Francisco Bay	R	Rivers/Streams	Lagunitas Creek	20113020	16.75	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2009	Tributary to Tomales Bay. TMDLs will be developed as part of evolving watershed management effort. Additional monitoring and assessment nee
CAR20113	2	San Francisco Bay	R	Rivers/Streams	Lagunitas Creek	20113020	16.75	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2009	Tributary to Tomales Bay. TMDLs will be developed as part of evolving watershed management effort. Additional monitoring and assessment nee
CAR20650	2	San Francisco Bay	R	Rivers/Streams	Napa River	20650010	65.33	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2006	TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment nee
CAR20650	2	San Francisco Bay	R	Rivers/Streams	Napa River	20650010	65.33	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2006	TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment nee
CAR20650	2	San Francisco Bay	R	Rivers/Streams	Napa River	20650010	65.33	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2006	TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment nee
CAR20650	2	San Francisco Bay	R	Rivers/Streams	Napa River	20650010	65.33	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2006	TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment nee
CAR20240	2	San Francisco Bay	R	Rivers/Streams	Pescadero Creek	20240013	26.03	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	If California Department of Fish and Game and the National Marine Fisheries Service find that for this water body fish populations are not impacted, the State Water Board supp removing this water body and pollutant from the list.
CAR20630	2	San Francisco Bay	R	Rivers/Streams	Petaluma River	20630020	21.566	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	
CAR20630	2	San Francisco Bay	R	Rivers/Streams	Petaluma River	20630020	21.566	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	
CAR20630	2	San Francisco Bay	R	Rivers/Streams	Petaluma River	20630020	21.566	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2019	
CAR20550	2	San Francisco Bay	R	Rivers/Streams	San Francisquito Creek	20550040	12.05	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2008	Impairment to steelhead habita
CAR20230	2	San Francisco Bay	R	Rivers/Streams	San Gregorio Creek	20230014	11.14	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	Impairment to steelhead habita
CAR20640	2	San Francisco Bay	R	Rivers/Streams	Sonoma Creek	20640050	30.23	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2008	TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment nee
CAR20640	2	San Francisco Bay	R	Rivers/Streams	Sonoma Creek	20640050	30.23	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2008	TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment nee
CAR20640	2	San Francisco Bay	R	Rivers/Streams	Sonoma Creek	20640050	30.23	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2008	TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment nee
CAR20640	2	San Francisco Bay	R	Rivers/Streams	Sonoma Creek	20640050	30.23	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2008	TMDL will be developed as part of ongoing watershed management effort. Additional monitoring and assessment nee
CAR20112	2	San Francisco Bay	R	Rivers/Streams	Walker Creek	20112013	15.8352	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2009	Tributary to Tomales Bay. TMDLs will be developed as part of evolving watershed management effort. Additional monitoring and assessment nee
CAB30600	3	Central Coast	B	Bays and Harbors	Moss Landing Harbor	30600014	79.2726	A	Acres	1100	Sedimentation/Siltation	1000	Agriculture	2019	
CAB30600	3	Central Coast	B	Bays and Harbors	Moss Landing Harbor	30600014	79.2726	A	Acres	1100	Sedimentation/Siltation	1200	Irrigated Crop Production	2019	
CAB30600	3	Central Coast	B	Bays and Harbors	Moss Landing Harbor	30600014	79.2726	A	Acres	1100	Sedimentation/Siltation	1915	Agriculture-storm runoff	2019	
CAB30600	3	Central Coast	B	Bays and Harbors	Moss Landing Harbor	30600014	79.2726	A	Acres	1100	Sedimentation/Siltation	7000	Hydromodification	2019	
CAB30600	3	Central Coast	B	Bays and Harbors	Moss Landing Harbor	30600014	79.2726	A	Acres	1100	Sedimentation/Siltation	7200	Dredging	2019	
CAB30600	3	Central Coast	B	Bays and Harbors	Moss Landing Harbor	30600014	79.2726	A	Acres	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	
CAB30600	3	Central Coast	B	Bays and Harbors	Moss Landing Harbor	30600014	79.2726	A	Acres	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAB30600	3	Central Coast	B	Bays and Harbors	Moss Landing Harbor	30600014	79.2726	A	Acres	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAE30600	3	Central Coast	E	Estuaries	Elkhorn Slough	30600014	2033.73	A	Acres	1100	Sedimentation/Siltation	1000	Agriculture	2015	
CAE30600	3	Central Coast	E	Estuaries	Elkhorn Slough	30600014	2033.73	A	Acres	1100	Sedimentation/Siltation	1200	Irrigated Crop Production	2015	
CAE30600	3	Central Coast	E	Estuaries	Elkhorn Slough	30600014	2033.73	A	Acres	1100	Sedimentation/Siltation	1915	Agriculture-storm runoff	2015	
CAE30600	3	Central Coast	E	Estuaries	Elkhorn Slough	30600014	2033.73	A	Acres	1100	Sedimentation/Siltation	7810	Channel Erosion	2015	
CAE30600	3	Central Coast	E	Estuaries	Elkhorn Slough	30600014	2033.73	A	Acres	1100	Sedimentation/Siltation	9100	Nonpoint Source	2015	
CAE30600	3	Central Coast	E	Estuaries	Moro Cojo Slough	30913011	62.4949	A	Acres	1100	Sedimentation/Siltation	1000	Agriculture	2019	
CAE30600	3	Central Coast	E	Estuaries	Moro Cojo Slough	30913011	62.4949	A	Acres	1100	Sedimentation/Siltation	1200	Irrigated Crop Production	2019	
CAE30600	3	Central Coast	E	Estuaries	Moro Cojo Slough	30913011	62.4949	A	Acres	1100	Sedimentation/Siltation	1915	Agriculture-storm runoff	2019	
CAE30600	3	Central Coast	E	Estuaries	Moro Cojo Slough	30913011	62.4949	A	Acres	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	
CAE30600	3	Central Coast	E	Estuaries	Moro Cojo Slough	30913011	62.4949	A	Acres	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAE30413	3	Central Coast	E	Estuaries	Soquel Lagoon	30413014	1.15873	A	Acres	1100	Sedimentation/Siltation	3000	Construction/Land Development	2011	
CAR30413	3	Central Coast	R	Rivers/Streams	Aptos Creek	30413023	8.40589	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2008	
CAR30413	3	Central Coast	R	Rivers/Streams	Aptos Creek	30413023	8.40589	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2008	
CAR30412	3	Central Coast	R	Rivers/Streams	Bean Creek	30412041	8.90707	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bean Creek	30412041	8.90707	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bean Creek	30412041	8.90707	M	Miles	1100	Sedimentation/Siltation	5000	Resource Extraction	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bean Creek	30412041	8.90707	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bean Creek	30412041	8.90707	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bear Creek(Santa Cruz County	30412030	6.31531	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bear Creek(Santa Cruz County	30412030	6.31531	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bear Creek(Santa Cruz County	30412030	6.31531	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bear Creek(Santa Cruz County	30412030	6.31531	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Bear Creek(Santa Cruz County	30412030	6.31531	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Boulder Creek	30412020	7.55958	M	Miles	1100	Sedimentation/Siltation	1300	Specialty Crop Production	2019	
CAR30412	3	Central Coast	R	Rivers/Streams	Boulder Creek	30412020	7.55958	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	

WBID	REGION NUMBER	REGION NAME	WATER BODY TYPE ABBR	WATER BODY TYPE	WATER BODY NAME	CALWATER WATERSHED	ESTIMATED SIZE AFFECTED	UNIT ABBR	UNIT	POLLUTANT CODE	POLLUTANT	SOURCE CODE	POTENTIAL SOURCES	PROPOSED TMDL COMPLETION	COMMENTS
CAR3041	2 3	Central Coast	R	Rivers/Streams	Boulder Creek	30412020	7.55958	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Boulder Creek	30412020	7.55958	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Boulder Creek	30412020	7.55958	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Boulder Creek	30412020	7.55958	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Branciforte Creek	30412051	5.78	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Branciforte Creek	30412051	5.78	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Branciforte Creek	30412051	5.78	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR3130	0 3	Central Coast	R	Rivers/Streams	Casmalia Canyon Creek	31300040	4.96262	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Fall Creek	30412022	5.07242	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Fall Creek	30412022	5.07242	M	Miles	1100	Sedimentation/Siltation	7550	Habitat Modification	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Fall Creek	30412022	5.07242	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Fall Creek	30412022	5.07242	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Kings Creek	30412011	4.36837	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Kings Creek	30412011	4.36837	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Kings Creek	30412011	4.36837	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Kings Creek	30412011	4.36837	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Kings Creek	30412011	4.36837	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Love Creek	30412021	3.78816	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Love Creek	30412021	3.78816	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Love Creek	30412021	3.78816	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Love Creek	30412021	3.78816	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Love Creek	30412021	3.78816	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Love Creek	30412021	3.78816	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Mountain Charlie Gulch	30412040	3.92844	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Mountain Charlie Gulch	30412040	3.92844	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Mountain Charlie Gulch	30412040	3.92844	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Mountain Charlie Gulch	30412040	3.92844	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Newell Creek (Upper	30412031	3.50199	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Newell Creek (Upper	30412031	3.50199	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Newell Creek (Upper	30412031	3.50199	M	Miles	1100	Sedimentation/Siltation	3110	Road Construction	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Newell Creek (Upper	30412031	3.50199	M	Miles	1100	Sedimentation/Siltation	3215	Disturbed Sites (Land Develop.)	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Newell Creek (Upper	30412031	3.50199	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Newell Creek (Upper	30412031	3.50199	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR3041	2 3	Central Coast	R	Rivers/Streams	Newell Creek (Upper	30412031	3.50199	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR4042	2 4	Los Angeles	R	Rivers/Streams	Las Virgenes Creek	40422010	11.62	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	
CAR4042	1 4	Los Angeles	R	Rivers/Streams	Malibu Creek	40421000	10.85	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	
CAR4042	4 4	Los Angeles	R	Rivers/Streams	Medea Creek Reach 1 (Lake to Confl. with Lindero)	40424000	2.57	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	
CAR4031	2 4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 2 (estuary to Potrero Rd was Calleguas Creek Reaches 1 and 2 on 1998 303d list)	40312000	4.31213	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR4031	2 4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 2 (estuary to Potrero Rd was Calleguas Creek Reaches 1 and 2 on 1998 303d list)	40312000	4.31213	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR4031	2 4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 3 (Potrero Road upstream to confluence with Conejo Creek on 1998 303d list)	40312000	3.46697	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR4031	2 4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 3 (Potrero Road upstream to confluence with Conejo Creek on 1998 303d list)	40312000	3.46697	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR4031	1 4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 4 (was Revolon Slough Main Branch: Mugu Lagoon to Central Avenue on 1998 303d list)	40311000	7.18751	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR4031	1 4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 4 (was Revolon Slough Main Branch: Mugu Lagoon to Central Avenue on 1998 303d list)	40311000	7.18751	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR4036	1 4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 5 (was Beardsley Channe on 1998 303d list)	40311000	4.34088	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR4036	1 4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 5 (was Beardsley Channe on 1998 303d list)	40311000	4.34088	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR4036	2 4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 6 (was Arroyo Las Posas Reaches 1 and 2 on 1998 303d list)	40362000	15.2966	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR4036	2 4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 6 (was Arroyo Las Posas Reaches 1 and 2 on 1998 303d list)	40362000	15.2966	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR4036	2 4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 7 (was Arroyo Simi Reaches 1 and 2 on 1998 303d list)	40367000	13.9129	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR4036	2 4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 7 (was Arroyo Simi Reaches 1 and 2 on 1998 303d list)	40367000	13.9129	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR4036	7 4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 8 (was Tapo Canyon Reach 1)	40366000	7.18869	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR4036	4 4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 11 (Arroyo Santa Rosa was part of Conejo Creek Reach 3 on 1998 303d list)	40365000	8.68888	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR4036	4 4	Los Angeles	R	Rivers/Streams	Calleguas Creek Reach 11 (Arroyo Santa Rosa was part of Conejo Creek Reach 3 on 1998 303d list)	40365000	8.68888	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2005	For 2006, sedimentation/siltation was moved by USEPA from the being addressed list back to the 303(d) list pending completion and USEPA approval of a TMDL.
CAR4042	3 4	Los Angeles	R	Rivers/Streams	Medea Creek Reach 2 (Abv Confl. with Linderc	40423000	5.41	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	
CAR4042	4 4	Los Angeles	R	Rivers/Streams	Triunfo Canyon Creek Reach 1	40424000	2.51	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	
CAR4042	4 4	Los Angeles	R	Rivers/Streams	Triunfo Canyon Creek Reach 2	40424000	3.32	M	Miles	1100	Sedimentation/Siltation	9000	Source Unknown	2019	
CAR5264	1 5	Central Valley	R	Rivers/Streams	Fall River (Pit)	52641031	8.61219	M	Miles	1100	Sedimentation/Siltation	2105	Historical Land Management Activities	2016	The sedimentation is accumulated sand size sediment in the upper Fall River. The historic land management activities include logging, grazing, channelization, roads, and railroads.
CAR5173	2 5	Central Valley	R	Rivers/Streams	Humbug Creek	51732030	2.20272	M	Miles	1100	Sedimentation/Siltation	5000	Resource Extraction	2012	All resource extraction sources are abandoned mine
CAR5591	1 5	Central Valley	R	Rivers/Streams	Panoche Creek (Silver Creek to Belmont Avenue)	55112000	17.6357	M	Miles	1100	Sedimentation/Siltation	1000	Agriculture	2007	
CAR5591	1 5	Central Valley	R	Rivers/Streams	Panoche Creek (Silver Creek to Belmont Avenue)	55112000	17.6357	M	Miles	1100	Sedimentation/Siltation	1935	Agriculture-grazing	2007	

WBID	REGION NUMBER	REGION NAME	WATER BODY TYPE ABBR	WATER BODY TYPE	WATER BODY NAME	CALWATER WATERSHED	ESTIMATED SIZE AFFECTED	UNIT ABBR	UNIT	POLLUTANT CODE	POLLUTANT	SOURCE CODE	POTENTIAL SOURCES	PROPOSED TMDL COMPLETION	COMMENTS
CAR55911 5		Central Valley	R	Rivers/Streams	Panoche Creek (Silver Creek to Belmont Avenue)	55112000	17.6357	M	Miles	1100	Sedimentation/Siltation	3100	Highway/Road/Bridge Construction	2007	
CAL63030(6		Lahontan	L	Lakes/Reservoirs	Bridgeport Reservoi	63030050	2614.34	A	Acres	1100	Sedimentation/Siltation	1350	Grazing-Related Sources	2006	
CAL63030(6		Lahontan	L	Lakes/Reservoirs	Bridgeport Reservoi	63030050	2614.34	A	Acres	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2006	
CAL63030(6		Lahontan	L	Lakes/Reservoirs	Bridgeport Reservoi	63030050	2614.34	A	Acres	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2006	
CAL63030(6		Lahontan	L	Lakes/Reservoirs	Bridgeport Reservoi	63030050	2614.34	A	Acres	1100	Sedimentation/Siltation	8540	Sediment Resuspension	2006	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	1350	Grazing-Related Sources	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	2000	Silviculture	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	3100	Highway/Road/Bridge Construction	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	3200	Land Development	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	4300	Other Urban Runoff	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	4500	Highway/Road/Bridge Runoff	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	4600	Urban Runoff--Erosion and Sedimentation	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	7000	Hydromodification	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	7100	Channelization	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	7600	Removal of Riparian Vegetation	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	7810	Channel Erosion	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	8100	Atmospheric Deposition	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	8540	Sediment Resuspension	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	8600	Natural Sources	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	8700	Recreational and Tourism Activities (non-boating)	2007	
CAL63430(6		Lahontan	L	Lakes/Reservoirs	Tahoe, Lake	63430010	85364.1	A	Acres	1100	Sedimentation/Siltation	9100	Nonpoint Source	2007	
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	1500	Range Grazing-Riparian and/or Upland	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	4501	Surface Runoff	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	5000	Resource Extraction	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	8100	Atmospheric Deposition	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	8700	Recreational and Tourism Activities (non-boating)	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63420 6		Lahontan	R	Rivers/Streams	Blackwood Creek	63420021	5.87001	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2008	Creek affected by past gravel quarry operations and other watershed disturbance including grazing and timber harv
CAR63520 6		Lahontan	R	Rivers/Streams	Bronco Creek	63520053	1.34403	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2006	Watershed disturbance in naturally highly erosive watershe
CAR63520 6		Lahontan	R	Rivers/Streams	Bronco Creek	63520053	1.34403	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2006	Watershed disturbance in naturally highly erosive watershe
CAR63520 6		Lahontan	R	Rivers/Streams	Bronco Creek	63520053	1.34403	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2006	Watershed disturbance in naturally highly erosive watershe
CAR63040 6		Lahontan	R	Rivers/Streams	Clearwater Creek	63040051	12.4874	M	Miles	1100	Sedimentation/Siltation	1500	Range Grazing-Riparian and/or Upland	2006	Listed on basis of limited information; additional monitoring may support delisti
CAR63040 6		Lahontan	R	Rivers/Streams	Clearwater Creek	63040051	12.4874	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2006	Listed on basis of limited information; additional monitoring may support delisti
CAR63040 6		Lahontan	R	Rivers/Streams	Clearwater Creek	63040051	12.4874	M	Miles	1100	Sedimentation/Siltation	8300	Highway Maintenance and Runoff	2006	Listed on basis of limited information; additional monitoring may support delisti
CAR63010 6		Lahontan	R	Rivers/Streams	East Walker River, below Bridgeport Reservo	63030050	8.00973	M	Miles	1100	Sedimentation/Siltation	1350	Grazing-Related Sources	2019	
CAR63010 6		Lahontan	R	Rivers/Streams	East Walker River, below Bridgeport Reservo	63030050	8.00973	M	Miles	1100	Sedimentation/Siltation	4500	Highway/Road/Bridge Runoff	2019	
CAR63010 6		Lahontan	R	Rivers/Streams	East Walker River, below Bridgeport Reservo	63030050	8.00973	M	Miles	1100	Sedimentation/Siltation	4600	Urban Runoff--Erosion and Sedimentation	2019	
CAR63010 6		Lahontan	R	Rivers/Streams	East Walker River, below Bridgeport Reservo	63030050	8.00973	M	Miles	1100	Sedimentation/Siltation	7350	Upstream Impoundment	2019	
CAR63010 6		Lahontan	R	Rivers/Streams	East Walker River, below Bridgeport Reservo	63030050	8.00973	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2019	
CAR63520 6		Lahontan	R	Rivers/Streams	Gray Creek (Nevada County	63520052	2.8033	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2006	Sediment from disturbance of naturally highly erosive watershe
CAR63520 6		Lahontan	R	Rivers/Streams	Gray Creek (Nevada County	63520052	2.8033	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2006	Sediment from disturbance of naturally highly erosive watershe
CAR63520 6		Lahontan	R	Rivers/Streams	Gray Creek (Nevada County	63520052	2.8033	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2006	Sediment from disturbance of naturally highly erosive watershe
CAR63410 6		Lahontan	R	Rivers/Streams	Heavenly Valley Creek (USFS boundary to Trout Creek)	63410031	1.44732	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2019	
CAR63410 6		Lahontan	R	Rivers/Streams	Heavenly Valley Creek (USFS boundary to Trout Creek)	63410031	1.44732	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2019	
CAR63410 6		Lahontan	R	Rivers/Streams	Heavenly Valley Creek (USFS boundary to Trout Creek)	63410031	1.44732	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2019	
CAR63410 6		Lahontan	R	Rivers/Streams	Heavenly Valley Creek (USFS boundary to Trout Creek)	63410031	1.44732	M	Miles	1100	Sedimentation/Siltation	7550	Habitat Modification	2019	
CAR63410 6		Lahontan	R	Rivers/Streams	Heavenly Valley Creek (USFS boundary to Trout Creek)	63410031	1.44732	M	Miles	1100	Sedimentation/Siltation	8700	Recreational and Tourism Activities (non-boating)	2019	
CAR63410 6		Lahontan	R	Rivers/Streams	Heavenly Valley Creek (USFS boundary to Trout Creek)	63410031	1.44732	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAR63030 6		Lahontan	R	Rivers/Streams	Hot Springs Canyon Creek	63030042	2.8612	M	Miles	1100	Sedimentation/Siltation	1500	Range Grazing-Riparian and/or Upland	2008	Listed on basis of limited data; further monitoring may support delistir
CAR63520 6		Lahontan	R	Rivers/Streams	Squaw Creek	63520011	5.8	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2006	
CAR63520 6		Lahontan	R	Rivers/Streams	Squaw Creek	63520011	5.8	M	Miles	1100	Sedimentation/Siltation	4300	Other Urban Runoff	2006	
CAR63520 6		Lahontan	R	Rivers/Streams	Squaw Creek	63520011	5.8	M	Miles	1100	Sedimentation/Siltation	7000	Hydromodification	2006	
CAR63520 6		Lahontan	R	Rivers/Streams	Squaw Creek	63520011	5.8	M	Miles	1100	Sedimentation/Siltation	7800	Drainage/Filling Of Wetlands	2006	
CAR63520 6		Lahontan	R	Rivers/Streams	Squaw Creek	63520011	5.8	M	Miles	1100	Sedimentation/Siltation	8300	Highway Maintenance and Runoff	2006	
CAR63520 6		Lahontan	R	Rivers/Streams	Squaw Creek	63520011	5.8	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2006	
CAR63520 6		Lahontan	R	Rivers/Streams	Squaw Creek	63520011	5.8	M	Miles	1100	Sedimentation/Siltation	8700	Recreational and Tourism Activities (non-boating)	2006	
CAR63520 6		Lahontan	R	Rivers/Streams	Squaw Creek	63520011	5.8	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2006	
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	1500	Range Grazing-Riparian and/or Upland	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	3000	Construction/Land Development	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	3100	Highway/Road/Bridge Construction	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	7700	Streambank Modification/Destabilization	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	7820	Erosion/Siltation	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	8600	Natural Sources	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	8700	Recreational and Tourism Activities (non-boating)	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	8710	Snow skiing activities	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63510 6		Lahontan	R	Rivers/Streams	Truckee River	63510010	39.1307	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2006	Watershed disturbance including ski resorts, silvicultural activities, urban development, reservoir construction and management; highly erosive subwatersh
CAR63420 6		Lahontan	R	Rivers/Streams	Ward Creek	63420020	5.675	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2008	
CAR63420 6		Lahontan	R	Rivers/Streams	Ward Creek	63420020	5.675	M	Miles	1100	Sedimentation/Siltation	3200	Land Development	2008	
CAR63420 6		Lahontan	R	Rivers/Streams	Ward Creek	63420020	5.675	M	Miles	1100	Sedimentation/Siltation	4000	Urban Runoff/Storm Sewers	2008	

WBID	REGION NUMBER	REGION NAME	WATER BODY TYPE ABBR	WATER BODY TYPE	WATER BODY NAME	CALWATER WATERSHED	ESTIMATED SIZE AFFECTED	UNIT ABBR	UNIT	POLLUTANT CODE	POLLUTANT	SOURCE CODE	POTENTIAL SOURCES	PROPOSED TMDL COMPLETION	COMMENTS
CAR6342006		Lahontan	R	Rivers/Streams	Ward Creek	63420020	5.675	M	Miles	1100	Sedimentation/Siltation	4500	Highway/Road/Bridge Runoff	2008	
CAR6342006		Lahontan	R	Rivers/Streams	Ward Creek	63420020	5.675	M	Miles	1100	Sedimentation/Siltation	7810	Channel Erosion	2008	
CAR6342006		Lahontan	R	Rivers/Streams	Ward Creek	63420020	5.675	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2008	
CAR6321006		Lahontan	R	Rivers/Streams	Wolf Creek (Alpine County)	63210031	11.8207	M	Miles	1100	Sedimentation/Siltation	1500	Range Grazing-Riparian and/or Upland	2019	
CAR6321006		Lahontan	R	Rivers/Streams	Wolf Creek (Alpine County)	63210031	11.8207	M	Miles	1100	Sedimentation/Siltation	2000	Silviculture	2019	
CAR6321006		Lahontan	R	Rivers/Streams	Wolf Creek (Alpine County)	63210031	11.8207	M	Miles	1100	Sedimentation/Siltation	9100	Nonpoint Source	2019	
CAL8017108		Santa Ana	L	Lakes/Reservoirs	Big Bear Lake	80171000	2865.01	A	Acres	1100	Sedimentation/Siltation	3000	Construction/Land Development	2006	
CAL8017108		Santa Ana	L	Lakes/Reservoirs	Big Bear Lake	80171000	2865.01	A	Acres	1100	Sedimentation/Siltation	8710	Snow skiing activities	2006	
CAL8017108		Santa Ana	L	Lakes/Reservoirs	Big Bear Lake	80171000	2865.01	A	Acres	1100	Sedimentation/Siltation	9105	Unknown Nonpoint Source	2006	
CAR801718		Santa Ana	R	Rivers/Streams	Rathbone (Rathbun) Creek	80171000	4.68	M	Miles	1100	Sedimentation/Siltation	8710	Snow skiing activities	2006	
CAR801718		Santa Ana	R	Rivers/Streams	Rathbone (Rathbun) Creek	80171000	4.68	M	Miles	1100	Sedimentation/Siltation	9105	Unknown Nonpoint Source	2006	
CAE9043109		San Diego	E	Estuaries	Agua Hedionda Lagoon	90431000	6.83187	A	Acres	1100	Sedimentation/Siltation	9201	Nonpoint/Point Source	2019	
CAE9042109		San Diego	E	Estuaries	Buena Vista Lagoon	90421000	202.298	A	Acres	1100	Sedimentation/Siltation	9201	Nonpoint/Point Source	2019	
CAE9061009		San Diego	E	Estuaries	Los Penasquitos Lagoon	90610000	468.918	A	Acres	1100	Sedimentation/Siltation	9201	Nonpoint/Point Source	2019	
CAE9046109		San Diego	E	Estuaries	San Elijo Lagoon	90461000	565.804	A	Acres	1100	Sedimentation/Siltation	9201	Nonpoint/Point Source	2019	Estimated size of impairment is 150 acres

Post-Construction Water Balance Calculator

3	User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.		(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below		(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.				***SACRAMENTO***			
4					(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recgonize any of these locations, leave this drop-down menu at location. The average value for the County will be used.				**SACRAMENTO FAA ARPT**			
5	***Project Information***				***Runoff Calculations***							
6	***Project Name:***	***Optional***			(Step 2) Indicate the Soil Type (dropdown menu to right):				***Group C Soils***	**Low infiltration. Sandy clay loam. Infiltration rate 0.05 to 0.15 inch/hr when wet.**		
7	***Waste Discharge Identification (WDID):***	***Optional***			(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right):				***Wood & Grass: <50% ground cover***			
8	***Date:***	***Optional***			(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right):				***Lawn, Grass, or Pasture covering more than 75% of the open space***			
9	***Sub Drainage Area Name (from map):***	***Optional***							**Complete Either**			
10	***Runoff Curve Numbers***								**Sq Ft**	**Acres**	**Acres**	
11	**Existing Pervious Runoff Curve Number**		**82**		*(Step 5) Total Project Site Area:*					**5.00**	**5.00**	
12	**Proposed Development Pervious Runoff Curve Number**		**74**		*(Step 6) Sub-watershed Area:*					**5.00**	**5.00**	
13	***Design Storm***				*Percent of total project :*				**100%**			
14	Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	**0.62**	**in**									
15	The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	**0.44**	**In**		***(Step 7) Sub-watershed Conditions***				**Complete Either**		**Calculated Acres**	
16	P used for calculations (in) (the greater of the above two criteria)	**0.62**	**In**		Sub-watershed Area (acres)				**Sq Ft**	**Acres**	**5.00**	
17	^Available at www.cabmphandbooks.com				Existing Rooftop Impervious Coverage					**0**	**0.00**	
18					Existing Non-Rooftop Impervious Coverage					**0**	**0.00**	
19					Proposed Rooftop Impervious Coverage					**0**	**0.00**	
20					Proposed Non-Rooftop Impervious Coverage					**0**	**0.00**	
21												
22					***Credits***				**Acres**		**Square Feet**	
23					Porous Pavement				**0.00**		**0**	
24					Tree Planting				**0.00**		**0**	
25	**Pre-Project Runoff Volume (cu ft)**	**247**	**Cu.Ft.**		Downspout Disconnection				**0.00**		**0**	
26	**Project-Related Runoff Volume Increase w/o credits (cu ft)**	**0**	**Cu.Ft.**		Impervious Area Disconnection				**0.00**		**0**	
27					Green Roof				**0.00**		**0**	
28					Stream Buffer				**0.00**		**0**	
29					Vegetated Swales				**0.00**		**0**	
30	**Project-Related Volume Increase with Credits (cu ft)**	**0**	**Cu.Ft.**		**Subtotal**				**0.00**		**0**	
31					**Subtotal Runoff Volume Reduction Credit**				**0 Cu. Ft.**			
32												
33	You have achieved your minimum requirements				***(Step 9) Impervious Volume Reduction Credits***				**Volume (cubic feet)**			
34					Rain Barrels/Cisterns				**0 Cu. Ft.**			
35					Soil Quality				**0 Cu. Ft.**			
36					**Subtotal Runoff Volume Reduction**				**0 Cu. Ft.**			
37					**Total Runoff Volume Reduction Credit**				**0 Cu. Ft.**			
38												

Porous Pavement Credit Worksheet

Please fill out a porous pavement credit worksheet for each project sub-watershed.

For the PROPOSED Development:

Proposed Porous Pavement	Runoff Reduction*	Fill in either Acres or SqFt		Equivalent Acres
		In SqFt.	In Acres	
Area of **Brick without Grout** on less than 12 inches of base with at least 20% void space over soil	0.45			0.00
Area of **Brick without Grout** on more than 12 inches of base with at least 20% void space over soil	0.90			0.00
Area of **Cobbles** less than 12 inches deep and over soil	0.30			0.00
Area of **Cobbles** less than 12 inches deep and over soil	0.60			0.00
Area of **Reinforced Grass Pavement** on less than 12 inches of base with at least 20% void space over soil	0.45			0.00
Area of **Reinforced Grass Pavement** on at least 12 inches of base with at least 20% void space over soil	0.90			0.00
Area of **Porous Gravel Pavement** on less than 12 inches of base with at least 20% void space over soil	0.38			0.00
Area of **Porous Gravel Pavement** on at least 12 inches of base with at least 20% void space over soil	0.75			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with less than 4 inches of gravel base (washed stone)	0.40			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with 4 to 8 inches of gravel base (washed stone)	0.60			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with 8 to 12 inches of gravel base (washed stone)	0.80			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with 12 or more inches of gravel base (washed stone)	1.00			0.00

*=1-Rv**

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**Using Site Design Techniques to meet Development Standards for Stormwater Quality (BASMAA 2003)

**NCDENR Stormwater BMP Manual (2007)

Tree Planting Credit Worksheet

Please fill out a tree canopy credit worksheet for each project sub-watershed.

Tree Canopy Credit Criteria	Number of Trees Planted	Credit (acres)
Number of proposed evergreen trees to be planted (credit = number of trees x 0.005)*	0	0.00
Number of proposed deciduous trees to be planted (credit = number of trees x 0.0025)*		0.00
	Square feet Under Canopy	
Square feet under an existing tree canopy, that will remain on the property, with an average diameter at 4.5 ft above grade (i.e., diameter at breast height or DBH) is LESS than 12 in diameter.		0.00
Square feet under an existing tree canopy that will remain on the property, with an average diameter at 4.5 ft above grade (i.e., diameter at breast height or DBH) is 12 in diameter or GREATER.		0.00
Please describe below how the project will ensure that these trees will be maintained.		

0

Return to Calculator

* credit amount based on credits from Stormwater Quality Design Manual for the Sacramento and South Placer Regions

Downspout Disconnection Credit Worksheet

Please fill out a downspout disconnection credit worksheet for each project subwatershed. If you answer yes to all questions, all rooftop area draining to each downspout will be subtracted from your proposed rooftop impervious coverage.

Downspout Disconnection Credit Criteria		
Do downspouts and any extensions extend at least six feet from a basement and two feet from a crawl space or concrete slab?	○ Yes	◉ No
Is the area of rooftop connecting to each disconnected downspout 600 square feet or less?	○ Yes	◉ No
Is the roof runoff from the design storm event fully contained in a raised bed or planter box or does it drain as sheet flow to a landscaped area large enough to contain the roof runoff from the design storm event?	○ Yes	◉ No
The Stream Buffer and/or Vegetated Swale credits **will not** be taken in this sub-watershed area?	○ Yes	◉ No

Percentage of existing	0.00	Acres	of rooftop surface has disconnected downspouts	
Percentage of the proposed	0.00	Acres	of rooftop surface has disconnected downspouts	50

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Impervious Area Disconnection Credit Worksheet

Please fill out an impervious area disconnection credit worksheet for each project sub-watershed. If you answer yes to all questions, all non-rooftop impervious surface area will be subtracted from your proposed non-rooftop impervious coverage.

Non-Rooftop Disconnection Credit Criteria	Response
Is the maximum contributing impervious flow path length less than 75 feet or, if equal or greater than 75 feet, is a storage device (e.g. French drain, bioretention area, gravel trench) implemented to achieve the required disconnection length?	◉ Yes ○ No
Is the impervious area to any one discharge location less than 5,000 square feet?	◉ Yes ○ No
The Stream Buffer credit **will not** be taken in this sub-watershed area?	◉ Yes ○ No

Percentage of existing	0.00	Acres non-rooftop surface area disconnected	
Percentage of the proposed	0.00	Acres non-rooftop surface area disconnected	70

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Green Roof Credit Worksheet

Please fill out a greenroof credit worksheet for each project sub-watershed. If you answer yes to all questions, 70% of the greenroof area will be subtracted from your proposed rooftop impervious coverage.

Green Roof Credit Criteria				Response
Is the roof slope less than 15% or does it have a grid to hold the substrate in place until it forms a thick vegetation mat?				◉ Yes ○ No
Has a professional engineer assessed the necessary load reserves and designed a roof structure to meet state and local codes?				◉ Yes ○ No
Is the irrigation needed for plant establishment and/or to sustain the green roof during extended dry periods, is the source from stored, recycled, reclaimed, or reused water?				◉ Yes ○ No
Percentage of existing	0.00	Acres	rooftop surface area in greenroof	
Percentage of the proposed	0.00	Acres	rooftop surface area in greenroof	

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Stream Buffer Credit Worksheet

Please fill out a stream buffer credit worksheet for each project sub-watershed. If you answer yes to all questions, you may subtract all impervious surface draining to each stream buffer that has not been addressed using the Downspout and/or Impervious Area Disconnection credits.

Stream Buffer Credit Criteria				Response
Does runoff enter the floodprone width* or within 500 feet (whichever is larger) of a stream channel as sheet flow**?				○ Yes ◉ No
Is the contributing overland slope 5% or less, or if greater than 5%, is a level spreader used?				○ Yes ◉ No
Is the buffer area protected from vehicle or other traffic barriers to reduce compaction?				○ Yes ◉ No
Will the stream buffer be maintained in an ungraded and uncompacted condition and will the vegetation be maintained in a natural condition?				○ Yes ◉ No
Percentage of existing	0.00	Acres	impervious surface area draining into a stream buffer:	
Percentage of the proposed	0.00	Acres	impervious surface area that will drain into a stream buffer:	
Please describe below how the project will ensure that the buffer areas will remain in ungraded and uncompacted condition and that the vegetation will be maintained in a natural condition.				

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* floodprone width is the width at twice the bankfull depth.
** the maximum contributing length shall be 75 feet for impervious area

Vegetated Swale Credit Worksheet

Please fill out a vegetated swale worksheet for each project subwatershed. If you answer yes to all questions, you may subtract all impervious surface draining to each stream buffer that has not been addressed using the Downspout Disconnection credit.

Vegetated Swale Credit Criteria

Have all vegetated swales been designed in accordance with Treatment Control BMP 30 (TC-30 - Vegetated Swale) from the California Stormwater BMP Handbook, New Development and Redevelopment (available at www.cabmphandbooks.com)?	○ Yes ◉ No
Is the maximum flow velocity for runoff from the design storm event less than or equal to 1.0 foot per second?	○ Yes ◉ No

Percentage of existing	0.00	Acres of impervious area draining to a vegetated swale	
Percentage of the proposed	0.00	Acres of impervious area draining to a vegetated swale	

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Rain Barrel/Cistern Credit Worksheet

Please fill out a rain barrel/cistern worksheet for each project sub-watershed.

Rain Barrel/Cistern Credit Criteria	Response
Total number of rain barrel(s)/cisterns	
Average capacity of rain barrel(s)/cistern(s) (in gallons)	
Total capacity rain barrel(s)/cistern(s) (in cu ft) [1]	0

[1] accounts for 10% loss

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Please fill out a soil quality worksheet for each project sub-watershed.

	Response
Will the landscaped area be lined with an impervious membrane?	
Will the soils used for landscaping meet the ideal bulk densities listed in Table 1 below? [1]	○ Yes ◉ No
If you answered yes to the question above, and you know the area-weighted bulk density within the top 12 inches for soils used for landscaping (in g/cm^3)* , fill in the cell to the right and skip to cell G11. If not select from the drop-down menu in G10.	1.3
If you answered yes to the question above, but you do not know the exact bulk density, which of the soil types in the drop down menu to the right best describes the top 12 inches for soils used for landscaping (in g/cm^3).	Sandy loams, loams
What is the average depth of your landscaped soil media meeting the above criteria (inches)?	12
What is the total area of the landscaped areas meeting the above criteria (in acres)?	2.97

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Table 1

Sands, loamy sands	<1.6
Sandy loams, loams	<1.4
Sandy clay loams, loams, clay loams	<1.4
Silts, silt loams	<1.3
Silt loams, silty clay loams	<1.1
Sandy clays, silty clays, some clay loams (35-45% clay)	<1.1
Clays (>45% clay)	<1.1

Porosity (%) 50.94%

Mineral grains in many soils are mainly quartz and feldspar, so 2.65 a good average for particle density. To determine percent porosity, use the formula: Porosity (%) = (1-Bulk Density/2.65) X 100

[1] USDA NRCS. "Soil Quality Urban Technical Note No.2-Urban Soil Compaction". March 2000. http://soils.usda.gov/sqi/management/files/sq_utn_2.pdf

* To determine how to calculate density see: http://www.globe.gov/tctg/bulkden.pdf?sectionID=94

APPENDIX 2:
Post-Construction Water Balance Performance Standard Spreadsheet

The discharger shall submit with their Notice of Intent (NOI) the following information to demonstrate compliance with the New and Re-Development Water Balance Performance Standard.

Map Instructions

The discharger must submit a small-scale topographic map of the site to show the existing contour elevations, pre- and post-construction drainage divides, and the total length of stream in each watershed area. Recommended scales include 1 in. = 20 ft., 1 in. = 30 ft., 1 in. = 40 ft., or 1 in = 50 ft. The suggested contour interval is usually 1 to 5 feet, depending upon the slope of the terrain. The contour interval may be increased on steep slopes. Other contour intervals and scales may be appropriate given the magnitude of land disturbance.

Spreadsheet Instructions

The intent of the spreadsheet is to help dischargers calculate the project-related increase in runoff volume and select impervious area and runoff reduction credits to reduce the project-related increase in runoff volume to pre-project levels.

The discharger has the option of using the spreadsheet (**Appendix 2.1)** or a more sophisticated, watershed process-based model (e.g. Storm Water Management Model, Hydrological Simulation Program Fortran) to determine the project-related increase in runoff volume.

In* Appendix 4.1**, ***you must complete the worksheet for each land use/soil type combination for each project sub-watershed.

Steps 1 through 9 pertain specifically to the Runoff Volume Calculator:

Step 1: Enter the county where the project is located in cell H3.

Step 2: Enter the soil type in cell H6.

Step 3: Enter the existing pervious (dominant) land use type in cell H7.

Step 4: Enter the proposed pervious (dominant) land use type in cell H8.

Step 5: Enter the total project site area in cell H11 or J11.

Step 6: Enter the sub-watershed area in cell H12 or J12.

Step 7: Enter the existing rooftop area in cell H17 or J17, the existing non-rooftop impervious area in cell H18 or J18, the proposed rooftop area in cell H19 or J19, and the proposed non-rooftop impervious area in cell H20 or J20

Step 8: Work through each of the impervious area reduction credits and claim credits where applicable. Volume that cannot be addressed using non-structural practices must be captured in structural practices and approved by the Regional Water Board.

Step 9: Work through each of the impervious volume reduction credits and claim credits where applicable. Volume that cannot be addressed using non-structural practices must be captured in structural practices and approved by the Regional Water Board.

Non-structural Practices Available for Crediting

- ***Porous Pavement***
- ***Tree Planting***
- ***Downspout Disconnection***
- ***Impervious Area Disconnection***
- ***Green Roof***
- ***Stream Buffer***
- ***Vegetated Swales***
- ***Rain Barrels and Cisterns***
- ***Landscaping Soil Quality***

APPENDIX 3
Bioassessment Monitoring Guidelines

Bioassessment monitoring is required for projects that meet all of the following criteria:

1. The project is rated Risk Level 3 or LUP Type 3
2. The project directly discharges runoff to a freshwater wadeable stream (or streams) that is either: (a) listed by the State Water Board or USEPA as impaired due to sediment, and/or (b) tributary to any downstream water body that is listed for sediment; and/or have the beneficial use SPAWN & COLD & MIGRATORY
3. Total project-related ground disturbance exceeds 30 acres.

For all such projects, the discharger shall conduct bioassessment monitoring, as described in this section, to assess the effect of the project on the biological integrity of receiving waters.
Bioassessment shall include:

1. The collection and reporting of specified instream biological data
2. The collection and reporting of specified instream physical habitat data

<u>Bioassessment Exception</u>
If a site qualifies for bioassessment, but construction commences out of an index period for the site location, the discharger shall:

1. Receive Regional Water Board approval for the sampling exception
2. Make a check payable to: Cal State Chico Foundation (SWAMP Bank Account) or San Jose State Foundation (SWAMP Bank Account) and include the WDID# on the check for the amount calculated for the exempted project.
3. Send a copy of the check to the Regional Water Board office for the site's region
4. Invest **7,500.00 X The number of samples required** into the SWAMP program as compensation (upon Regional Water Board approval).
5. Conduct bioassessment monitoring, as described in Appendix 4
6. Include the collection and reporting of specified instream biological data and physical habitat
7. Use the bioassessment sample collection and Quality Assurance & Quality Control (QA/QC) protocols developed by the State of California's Surface Water Ambient Monitoring Program (SWAMP)

<u>Site Locations and Frequency</u>
Macroinvertebrate samples shall be collected both before ground disturbance is initiated and after the project is completed. The "after" sample(s) shall be collected after at least one winter season resulting in surface runoff has transpired after project-related ground disturbance has ceased. "Before" and "after" samples shall be collected both upstream and downstream of the project's

discharge. Upstream samples should be taken immediately before the sites outfall and downstream samples should be taken immediately after the outfall (when safe to collect the samples). Samples should be collected for each freshwater wadeable stream that is listed as impaired due to sediment, or tributary to a water body that is listed for sediment. Habitat assessment data shall be collected concurrently with all required macroinvertebrate samples.

Index Period (Timing of Sample Collection)
Macroinvertebrate sampling shall be conducted during the time of year (i.e., the "index period") most appropriate for bioassessment sampling, depending on ecoregion. This map is posted on the State Water Board's Website: http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml

Field Methods for Macroinvertebrate Collections
In collecting macroinvertebrate samples, the discharger shall use the "Reachwide Benthos (Multi-habitat) Procedure" specified in *Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California* (Ode 2007).[1]

Physical - Habitat Assessment Methods
The discharger shall conduct, concurrently with all required macroinvertebrate collections, the "Full" suite of physical habitat characterization measurements as specified in *Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California* (Ode 2007), and as summarized in the Surface Water Ambient Monitoring Program's *Stream Habitat Characterization Form — Full Version*.

Laboratory Methods
Macroinvertebrates shall be identified and classified according to the Standard Taxonomic Effort (STE) Level I of the Southwestern Association of Freshwater Invertebrate Taxonomists (SAFIT),[2] and using a fixed-count of 600 organisms per sample.

Quality Assurance
The discharger or its consultant(s) shall have and follow a quality assurance (QA) plan that covers the required bioassessment monitoring. The QA plan shall include, or be supplemented to include, a specific requirement for external QA checks (i.e., verification of taxonomic identifications and correction of data where errors are identified). External QA checks shall be performed on one of the

[1] This document is available on the Internet at: http://www.swrcb.ca.gov/swamp/docs/phab_sopr6.pdf.
[2] The current SAFIT STEs (28 November 2006) list requirements for both the Level I and Level II taxonomic effort, and are located at: http://www.swrcb.ca.gov/swamp/docs/safit/ste_list.pdf. When new editions are published by SAFIT, they will supersede all previous editions. All editions will be posted at the State Water Board's SWAMP website.

discharger's macroinvertebrate samples collected per calendar year, or ten percent of the samples per year (whichever is greater). QA samples shall be randomly selected. The external QA checks shall be paid for by the discharger, and performed by the California Department of Fish and Game's Aquatic Bioassessment Laboratory. An alternate laboratory with equivalent or better expertise and performance may be used if approved in writing by State Water Board staff.

Sample Preservation and Archiving

The original sample material shall be stored in 70 percent ethanol and retained by the discharger until: 1) all QA analyses specified herein and in the relevant QA plan are completed; and 2) any data corrections and/or re-analyses recommended by the external QA laboratory have been implemented. The remaining subsampled material shall be stored in 70 percent ethanol and retained until completeness checks have been performed according to the relevant QA plan. The identified organisms shall be stored in 70 percent ethanol, in separate glass vials for each final ID taxon. (For example, a sample with 45 identified taxa would be archived in a minimum of 45 vials, each containing all individuals of the identified taxon.) Each of the vials containing identified organisms shall be labeled with taxonomic information (i.e., taxon name, organism count) and collection information (i.e., site name/site code, waterbody name, date collected, method of collection). The identified organisms shall be archived (i.e., retained) by the discharger for a period of not less than three years from the date that all QA steps are completed, and shall be checked at least once per year and "topped off" with ethanol to prevent desiccation. The identified organisms shall be relinquished to the State Water Board upon request by any State Water Board staff.

Data Submittal

The macroinvertebrate results (i.e., taxonomic identifications consistent with the specified SAFIT STEs, and number of organisms within each taxa) shall be submitted to the State Water Board in electronic format. The State Water Board's Surface Water Ambient Monitoring Program (SWAMP) is currently developing standardized formats for reporting bioassessment data. All bioassessment data collected after those formats become available shall be submitted using the SWAMP formats. Until those formats are available, the biological data shall be submitted in MS-Excel (or equivalent) format.[3]

The physical/habitat data shall be reported using the standard format titled *SWAMP Stream Habitat Characterization Form — Full Version*.[4]

[3] Any version of Excel, 2000 or later, may be used.
[4] Available at: http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/fieldforms_fullversion052908.pdf

Invasive Species Prevention

In conducting the required bioassessment monitoring, the discharger and its consultants shall take precautions to prevent the introduction or spread of aquatic invasive species. At minimum, the discharger and its consultants shall follow the recommendations of the California Department of Fish and Game to minimize the introduction or spread of the New Zealand mudsnail.[5]

[5] Instructions for controlling the spread of NZ mudsnails, including decontamination methods, can be found at: http://www.dfg.ca.gov/invasives/mudsnail/
More information on AIS More information on AIS
http://www.waterboards.ca.gov/water_issues/programs/swamp/ais/

Appendix 4 Sediment TMDLs

Implemented Sediment TMDLs in California. Construction was listed as a source in all fo these TMDLs in relation to road construction. Although construction was mentioned as a source, it was not given a specific allocation amount. The closest allocation amount would be for the road activity management WLA. **Implementation Phase** – Adoption process by the Regional Board, the State Water Resources Control Board, the Office of Administrative Law, and the US Environmental Protection Agency completed and TMDL being implemented.

A. Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.albionfinaltmdl	R	Albion River	Sedimentation	Road Construction	2001	43 acres	See A (table 6)

B Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.EelR-middle.mainSed.temp	R	Middle Main Eel River and Tributaries (from Dos Rios to the South Fork)	Sedimentation Road	Construction	2005-2006 521	mi^2	100

C Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.EelRsouth.sed.temp	R	South Fork Eel River	Sedimentation	Road Construction	12 1999	See chart	473

D Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.bigfinaltmdl	R Big	River	Sedimentation	Road Construction	12 2001	181 mi^2 watershed drainage	TMDL = loading capacity = nonpoint sources + background =

							393 t mi2 yr

E Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres**	**WLA** tons mi^2 yr
1 R1.epa.EelR-lower.Sed.temp-121807-signed	R	Lower Eel River	Sedimentation	Road Construction	12 2007	300 square-mile watershed	898

F Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres**	**WLA** tons mi^2 yr
1 R1.epa.EelR-middle.Sed.temp-	R	Middle Fork Eel River	Sedimentation	Road Construction	12 2003	753 mi^2 (approx. 482,000 acres)	82

G Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** Mi^2	**WLA** tons mi^2 yr
1 R1.epa.EelRnorth-Sed.temp.final-121807-signed	R	North Fork Eel River	Sedimentation	Road Construction	12 30 2002	289 (180,020 acres)	20

H Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** Mi^2	**WLA** tons mi^2 yr
1 R1.epa.EelR-upper.mainSed.temp-	R	Upper Main Eel River and Tributaries (including Tomki Creek, Outlet Creek and Lake Pillsbury)	Sedimentation	Road Construction	12 29 2004	688 (approx. 440,384 acres)	14

I Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.gualalafinaltmdl	R	Gualala River	Sedimentation	Road Construction	Not sure	300 (191,145 acres)	7

J Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.Mad-sed.turbidity	R	Mad River	Sedimentation	Road Construction	12 21 2007	480	174

K Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.mattole.sediment	R	Mattole River	Sedimentation	Road Construction	12 30 2003	296	27 or 520+27 = 547

L Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.navarro.sed.temp	R	Navarro River	Sedimentation	Road Construction	Not sure	315 (201,600 acres).	50

M Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.noyo.sediment	R	Noyo River	Sedimentation	Road Construction	12 16 1999	113 (72,323 acres)	68 (three areas measured) Table 16 in the TMDL

N Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA** tons mi^2 yr
1 R1.epa.RedwoodCk.sed	Cr	Redwood Creek	Sedimentation	Road Construction	12 30 1998	278	1900 Total allocation

O Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA – Roads** tons mi^2 yr
1 R1.epa.tenmile.sed	R	Ten Mile River	Sedimentation	Road Construction	2000	120	9

P Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA management** tons mi^2 yr
1 R1.epa.trinity.sed	R	Trinity River	Sedimentation	Road Construction	12 20 2001	2000 of 3000 covered in this TMDL	See rows below
1	Cr	Horse Linto Creek	Sedimentation	Road Construction	12 20 2001	64	528
1	Cr	Mill creek and Tish Tang	Sedimentation	Road Construction	12 20 2001	39	210
1	Cr	Willow Creek	Sedimentation	Road Construction	12 20 2001	43	94
1	Cr	Campbell Creek and Supply Creek	Sedimentation	Road Construction	12 20 2001	11	1961
1	Cr	Lower Mainstem and Coon Creek	Sedimentation	Road Construction	12 20 2001	32	63
1 R		Reference Subwatershed [1]	Sedimentation	Road Construction	12 20 2001	434	24
1	Cr	Canyon Creek	Sedimentation	Road	12 20 2001	64	326

				Construction			
1 R		Upper Tributaries[2]	Sedimentation	Road Construction	12 20 2001	72	67
1 R		Middle Tributaries[3]	Sedimentation	Road Construction	12 20 2001	54	53
1 R		Lower Tributaries[4]	Sedimentation	Road Construction	12 20 2001	96	55
1	Cr	Weaver and Rush Creeks	Sedimentation	Road Construction	12 20 2001	72	169
1 Cr		Deadwood Creek Hoadley Gulch Poker Bar	Sedimentation	Road Construction	12 20 2001	47	68
1	L	Lewiston Lake	Sedimentation	Road Construction	12 20 2001	25	49
1 Cr		Grassvalley Creek	Sedimentation	Road Construction	12 20 2001	37	44
1	Cr	Indian Creek	Sedimentation	Road Construction	12 20 2001	34	81
1	Cr	Reading and Browns Creek	Sedimentation	Road Construction	12 20 2001	104	66
1 Cr		Reference Subwatersheds[5]	Sedimentation	Road Construction	12 20 2001	235	281
1	L, Cr	Westside tributaries[6]	Sedimentation	Road Construction	12 20 2001	93	105
1 R,	Cr, G	Upper trinity[7]	Sedimentation	Road Construction	12 20 2001	161	690
1 R,	Cr, G	East Fork Tributaries[8]	Sedimentation	Road Construction	12 20 2001	115	65
1	R, L	Eastside Tributaries[9]	Sedimentation	Road Construction	12 20 2001	89	60

1 New River, Big French, Manzanita, North Fork, East Fork, North Fork
2 Dutch, Soldier, Oregon gulch, Conner Creek
3 Big Bar, Prairie Creek, Little French Creek
4 Swede, Italian, Canadian, Cedar Flat, Mill, McDonald, Hennessy, Quimby, Hawkins, Sharber
5 Stuarts Fork, Swift Creek, Coffee Creek
6 Stuart Arm, Stoney Creek, Mule Creek, East Fork, Stuart Fork, West Side Trinity Lake, Hatchet Creek, Buckeye Creek,
7 Upper Trinity River, Tangle Blue, Sunflower, Graves, Bear Upper Trinity Mainstream, Ramshorn Creek, Ripple Creek, Minnehaha Creek, Snowslide Gulch, Scorpion Creek
8 East Fork Trinity, Cedar Creek, Squirrel Gulch

9 East Side Tributaries, Trinity Lake

Q Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA** tons mi^2 yr
1 R1.epa.trinity.so.sed	R, Cr	South Fork Trinity River and Hayfork Creek	Sedimentation	Road Construction	12 1998	Not given, 19 miles long	33 (road total)

R Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA** tons mi^2 yr
1 R1.epa.vanduzen.sed	R, Cr	Van Duzen River and Yager Creek	Sedimentation	Various	12 16 1999	429	1353 total allocation
1		Upper Basin	Sedimentation	Road Construction			7
1		Middle Basin	Sedimentation	Road Construction			22
1		Lower Basin	Sedimentation	Road Construction			20

S Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA** tons mi^2 yr
6 R6.blackwood.sed Cr		Blackwood Creek (Placer County)	Bedded Sediment	Various	9 2007	11	17272 total

T Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA** tons mi^2 yr
6 R6.SquawCk.sed R		Squaw Creek (Placer County)	Sedimentation /controllable sources	Various – basin plan amendment	4 13 2006	8.2	10,900

Adopted TMDLs for Construction Sediment Sources

Region	Type	Name	Pollutant Stressor	Potential Sources	**TMDL Completion Date**	**Watershed Area** mi^2	Waste load Allocation tons mi^2 yr
8 R		Newport Bay San Diego Creek Watershed	Sedimentation	Construction Land Development	1999 2.24	(1432 acres)	125,000 tons per Year (no more than 13,000 tons per year from construction sites)

Appendix 4 Non Sediment TMDLs

Region 1 Lost River-DIN and CBOD

Region 1 Source: Cal Trans Construction TMDL Completion Date: 12 30 2008 TMDL Type: River, Lake Watershed Area= 2996 mi^2	**Pollutant Stressors/WLA**	
	Dissolved inorganic nitrogen (DIN) (metric tons/yr)	**Carbonaceous biochemical oxygen demand (CBOD) (metric tons/yr)**
Lost River from the Oregon border to Tule Lake	.1 .2	
Tule Lake Refuge	.1	.2
Lower Klamath Refuge	.1	.2

Region 2 San Francisco Bay-Mercury

Region 2 Source:Non-Urban Stormwater Runoff TMDL Type: Bay	**Name**	**Pollutant Stressor/WLA**	**TMDL Completion Date**
	San Francisco Bay	Mercury 25 kg/year	08 09 2006

Region 4 Machado Lake Nutrients - Resolution No. 2008-006 (Effective Date - March 11, 2009)

General Construction Stormwater Permit WLAs	Years After Effective Date	Total Phosphorus (mg/L)	Total Nitrogen (TKN + NO3-N + NO2-N) (mg/L)
Interim WLAs[1]	At Effective Date	1.25	3.50
Interim WLAs[2] 5	years	1.25	2.45
Final WLAs[2]	9.5 years	0.10	1.00

[1] The compliance points for effective date interim WLAs are measured in the lake.
[2] No compliance points are specified for general construction stormwater permits for the year 5 interim WLAs and final WLAs

Region 4 Ballona Creek-Metals and Selenium – Resolution No. 2007-015 (Effective Date October 29, 2008)

Wet Weather WLAs

Region 4 Source: NPDES General Construction TMDL Completion Date: 10 29 2008 TMDL Type: Creek	Copper (Cu)		Lead (Pb)		Selenium (Se)		Zinc (Zn)	
	g/day	g/day/acre	g/day	g/day/acre	g/day	g/day/acre	g/day	g/day/acre
Ballona Creek	4.94E-07 x Daily storm volume (L)	2.20E-10 x Daily storm volume (L)	1.62E-06 x Daily storm volume (L)	7.20E-10 x Daily storm volume (L)	1.37E-07 x Daily storm volume (L)	6.10E-11 x Daily storm volume (L)	3.27E-06 x Daily storm volume (L)	1.45E-09 x Daily storm volume (L)

Wet-weather WLA Implementation

- Within seven years of the effective date of the TMDL, the construction industry will submit the results of BMP effectiveness studies to determine BMPs that will achieve compliance with the final waste load allocations assigned to construction storm water permittees.
- Regional Board staff will bring the recommended BMPs before the Regional Board for consideration within eight years of the effective date of the TMDL.
- General construction storm water permittees will be considered in compliance with final waste load allocations if they implement these Regional Board approved BMPs. All permittees must implement the approved BMPs within nine years of the effective date of the TMDL. If no effectiveness studies are conducted and no BMPs are approved by the Regional Board within eight years of the effective date of the TMDL, each general construction storm water permit holder will be subject to site-specific BMPs and monitoring requirements to demonstrate compliance with final waste load allocations.

Dry-weather WLAs

A waste load allocation of zero is assigned to all general construction storm water permits during dry weather.

Dry-weather WLA Implementation

Non-storm water flows authorized by the General Permit for Storm Water Discharges Associated with Construction Activity (Water Quality Order No. 99-08 DWQ), or any successor order, are exempt from the dry-weather waste load allocation equal to zero as long as they comply with the provisions of sections C.3 and A.9 of the Order No. 99-08 DWQ, which state that these authorized non-storm discharges shall be:

(1) infeasible to eliminate
(2) comply with BMPs as described in the Storm Water Pollution Prevention Plan prepared by the permittee, and
(3) not cause or contribute to a violation of water quality standards, or comparable provisions in any successor order.
Unauthorized non-storm water flows are already prohibited by Order No. 99-08 DWQ.

Region 4 Los Angeles River and Tributaries-Metals– Resolution No. 2007-014
(Effective Date October 29, 2008)

Wet Weather WLAs

	Cadmium (Cd)		Copper (Cu)		Lead (Pb)		Zinc (Zn)	
	kg/day	g/day/acre	kg/day	g/day/acre	kg/day	g/day/acre	kg/day	g/day/acre
5.9x10	$^{-11}$ x Daily storm volume (L)	$7.6x10^{-12}$ x Daily storm volume (L)	$3.2x10^{-10}$ x Daily storm volume (L)	$4.2x10^{-11}$ x Daily storm volume (L)	$1.2x10^{-9}$ x Daily storm volume (L)	$1.5x10^{-10}$ x Daily storm volume (L)	$3.01x10^{-9}$ x Daily storm volume (L)	$3.9x10^{-10}$ x Daily storm volume (L)

Wet-weather WLA Implementation

- Within seven years of the effective date of the TMDL, the construction industry will submit the results of BMP effectiveness studies to determine BMPs that will achieve compliance with the final waste load allocations assigned to construction storm water permittees.
- Regional Board staff will bring the recommended BMPs before the Regional Board for consideration within eight years of the effective date of the TMDL.
- General construction storm water permittees will be considered in compliance with final waste load allocations if they implement these Regional Board approved BMPs. All permittees must implement the approved BMPs within nine years of the effective date of the TMDL. If no effectiveness studies are conducted and no BMPs are approved by the Regional Board within eight years of the effective date of the TMDL, each general construction storm water permit holder will be subject to site-specific BMPs and monitoring requirements to demonstrate compliance with final waste load allocations.

Dry-weather WLAs

A waste load allocation of zero is assigned to all general construction storm water permits during dry weather.

Dry-weather WLA Implementation

Non-storm water flows authorized by the General Permit for Storm Water Discharges Associated with Construction Activity (Water Quality Order No. 99-08 DWQ), or any successor order, are exempt from the dry-weather waste load allocation equal to zero as

long as they comply with the provisions of sections C.3 and A.9 of the Order No. 99-08 DWQ, which state that these authorized non-storm discharges shall be:

(1) infeasible to eliminate
(2) comply with BMPs as described in the Storm Water Pollution Prevention Plan prepared by the permittee, and
(3) not cause or contribute to a violation of water quality standards, or comparable provisions in any successor order.

Unauthorized non-storm water flows are already prohibited by Order No. 99-08 DWQ.

Region 4 Calleguas Creek Metals TMDL – Resolution No. 2006-012
(Effective Date - March 26, 2007)

Interim Limits and Final WLAs for Total Recoverable Copper, Nickel, and Selenium

Interim limits and waste load allocations are applied to receiving water.

A. Interim Limits

Constituents	Calleguas and Conejo Creek			Revolon Slough		
	Dry CMC (ug/L)	Dry CCC (ug/L)	Wet CMC (ug/L)	Dry CMC (ug/L)	Dry CCC (ug/L)	Wet CMC (ug/L)
Copper*	23	19	204	23	19	204
Nickel	15	13	(a)	15	13	(a)
Selenium	(b)	(b)	(b)	14	13	(a)

(a) The current loads do not exceed the TMDL under wet conditions; interim limits are not required.
(b) Selenium allocations have not been developed for this reach as it is not on the 303(d) list.
(c) Attainment of interim limits will be evaluated in consideration of background loading data, if available.

B. Final WLAs for Total Recoverable Copper, Nickel, and Selenium

Dry-Weather WLAs in Water Column

Flow Range	Calleguas and Conejo Creek			Revolon Slough		
	Low Flow	Average Flow	Elevated Flow	Low Flow	Average Flow	Elevated Flow
Copper1 (lbs/day)	0.04*WER - 0.02	0.12*WER - 0.02	0.18*WER - 0.03	0.03*WER - 0.01	0.06*WER - 0.03	0.13*WER - 0.02
Nickel (lbs/day)	0.100	0.120	0.440	0.050	0.069	0.116
Selenium (lbs/day)	(a)	(a)	(a)	0.004	0.003	0.004

[1] If site-specific WERs are approved by the Regional Board, TMDL waste load allocations shall be implemented in accordance with the approved WERs using the equations set forth above. Regardless of the final WERs, total copper loading shall not exceed current loading.

(a) Selenium allocations have not been developed for this reach as it is not on the 303(d) list.

Wet-Weather WLAs in Water Column

Constituent	Calleguas Creek	Revolon Slough
Copper[1] (lbs/day)	(0.00054*Q^2*0.032*Q - 0.17)*WER - 0.06	(0.0002*Q2+0.0005*Q)*WER
Nickel[2] (lbs/day)	0.014*Q^2+0.82*Q	0.027*Q^2+0.47*Q
Selenium[2] (lbs/day)	(a)	0.027*Q^2+0.47*Q

[1] If site-specific WERs are approved by the Regional Board, TMDL waste load allocations shall be implemented in accordance with the approved WERs using the equations set forth above. Regardless of the final WERs, total copper loading shall not exceed current loading.

[2] Current loads do not exceed loading capacity during wet weather. Sum of all loads cannot exceed loads presented in the table

(a) Selenium allocations have not been developed for this reach as it is not on the 303(d) list.

Q: Daily storm volume.

Interim Limits and Final WLAs for Mercury in Suspended Sediment

Flow Range	Calleguas Creek		Revolon Slough	
	Interim (lbs/yr)	Final (lbs/yr)	Interim (lbs/yr)	Final (lbs/yr)
0-15,000 MGY	3.3	0.4	1.7	0.1
15,000-25,000 MGY	10.5	1.6	4	0.7
Above 25,000 MGY	64.6	9.3	10.2	1.8

MGY: million gallons per year.

In accordance with current practice, a group concentration-based WLA has been developed for all permitted stormwater discharges, including municipal separate storm sewer systems (MS4s), Caltrans, general industrial and construction stormwater permits, and Naval Air Weapons Station Point Mugu. Dischargers will have a required 25%, 50% and 100% reduction in the difference between the current loadings and the load allocations at 5, 10 and 15 years after the effective date, respectively. Achievement of required reductions will be evaluated based on progress towards BMP implementation as outlined in the urban water quality management plans (UWQMPs). If the interim reductions are not met, the dischargers will submit a report to the Executive Officer detailing why the reductions were not met and the steps that will be taken to meet the required reductions.

Region 4 Calleguas Creek-OC Pesticides, PCBs, and Siltation (Resolution 2005-010)
Effective Date - March 24, 2006

Interim Requirements

Region 4 Calleguas Creek	**Pollutant Stressor**	**WLA Daily Max (µg/L)**	**WLA Monthly Ave (µg/L)**
Source: Minor NPDES point sources/WDRs			
TMDL Completion Date: 3 24 2006	Chlordane 1.2		0.59
TMDL Type:Creek	4,4-DDD 1.7		0.84
	4,4-DDE 1.2		0.59
	4,4-DDT 1.2		0.59
	Dieldrin 0.28		0.14
	PCB's 0.34		0.17
	Toxaphene 0.33		0.16

Region 4 Calleguas Creek-Calleguas Creek Toxicicity (Resolution 2005-009)
Effective Date - March 24, 2006

Minor sources include NPDES permittees other than POTWs and MS4s, discharging to the Calleguas Creek Watershed. A wasteload of 1.0 TUc is allocated to the minor point sources discharging to the Calleguas Creek Watershed. Additionally, the following wasteloads for chlorpyrifos and diazinon are established. Final WLAs apply as of March 24, 2006.

Chlorpyrifos WLAs, ug/L
Final WLA
(4 day)
0.014
Diazinon WLAs, ug/L
Final WLA
Acute and Chronic
0.10

Region 4 Calleguas Creek-Salts (Resolution 2007-016)
Effective Date – December 2, 2008

Final Dry Weather Pollutant WLA (mg/L)					
Region 4 Calleaguas Creek Source Permitted Stormwater Dischargers TMDL Completion Date: 12 2 2008 TMDL Type:Creek	**Critical Condition Flow Rate (mgd)**	**Chloride (lb/day)**	**TDS (lb/day)**	**Sulfate (lb/day)**	**Boron (lb/day)**
Simi	1.39	1738 9849 289	7 12		
Las Posas	0.13	157 887 261 N/A			
Conejo	1.26	1576 8931 262	7 N/A		
Camarillo	0.06	72	406 119 N/A		
Pleasant Valley (Calleguas)	0.12	150 850 250 N/A			
Pleasant Valley (Revolon)	0.25	314	1778	523	2
Dry Weather Interim Pollutant WLA (mg/L)					
	Chloride (mg/L)	**TDS (mg/L)**	**Sulfate (mg/L)**	**Boron (mg/L)**	

Simi 230.0		1720.0	1289.0	1.3
Las Posas	230	1720	1289	1.3
Conejo 230		1720	1289	1.3
Camarillo 230		1720	1289	1.3
Pleasant Valley (Calleguas)	230	1720	1289	1.3
Pleasant Valley (Revolon)	230	1720	1289	1.3

- Dry- weather waste load allocations apply in the receiving water at the base of each subwatershed. Dry weather allocations apply when instream flow rates are below the 86th percentile flow and there has been no measurable precipitation in the previous 24 hours.
- Because wet weather flows transport a large mass of salts at low concentrations, these dischargers meet water quality objectives during wet weather. No wet weather allocations are assigned.

Ballona Creek Toxic Pollutants (Resolution No. 2005-008)
Effective Date - January 11, 2006

Each storm water permittee enrolled under the general construction or industrial storm water permits will receive an individual waste load allocation on a per acre basis, based on the acreage of their facility.

Metals per Acre WLAs for Individual General Construction or Industrial Storm Water Permittees (g/yr/ac)

Cadmium	Copper	Lead	Silver	Zinc
0.1	3 4 0.1			13

Organics per Acre WLAs for Individual General Construction or Industrial Storm Water Permittees (mg/yr/ac)

Chlordane	DDTs	Total PCBs	Total PAHs
0.04	0.14	2	350

Waste load allocations will be incorporated into the State Board general permit upon renewal or into a watershed specific general construction storm water permit developed by the Regional Board.

Within seven years of the effective date of the TMDL, the construction industry will submit the results of BMP effectiveness studies to determine BMPs that will achieve compliance with the waste load allocations assigned to construction storm water permittees. Regional Board staff will bring the recommended BMPs before the Regional Board for consideration within eight years of the

effective date of the TMDL. General construction storm water permittees will be considered in compliance with waste load allocations if they implement these Regional Board approved BMPs.

All general construction permittees must implement the approved BMPs within nine years of the effective date of the TMDL. If no effectiveness studies are conducted and no BMPs are approved by the Regional Board within eight years of the effective date of the TMDL, each general construction storm water permit holder will be subject to site-specific BMPs and monitoring requirements to demonstrate compliance with waste load allocations.

Region 4 Marina Del Rey Harbor Toxic Pollutants TMDL (Resolution No. 2005-012)
Effective Date March 22, 2006

Each storm water permittee enrolled under the general construction or industrial storm water permits will receive an individual waste load allocation on a per acre basis, based on the acreage of their facility.

Metals per Acre WLAs for Individual General Construction or Industrial Storm Water Permittees (g/yr/ac)

Copper	Lead	Zinc
2.3	3.1	10

Organics per acre WLAs for Individual General Construction or Industrial Storm Water Permittees (mg/yr/ac)

Chlordane	Total PCBs
0.03	1.5

Waste load allocations will be incorporated into the State Board general permit upon renewal or into a watershed specific general construction storm water permit developed by the Regional Board.

Within seven years of the effective date of the TMDL, the construction industry will submit the results of BMP effectiveness studies to determine BMPs that will achieve compliance with the waste load allocations assigned to construction storm water permittees. Regional Board staff will bring the recommended BMPs before the Regional Board for consideration within eight years of the effective date of the TMDL. General construction storm water permittees will be considered in compliance with waste load allocations if they implement these Regional Board approved BMPs.

All general construction permittees must implement the approved BMPs within nine years of the effective date of the TMDL. If no effectiveness studies are conducted and no BMPs are approved by the Regional Board within eight years of the effective date of

the TMDL, each general construction storm water permit holder will be subject to site-specific BMPs and monitoring requirements to demonstrate compliance with waste load allocations.

Region 4 San Gabriel River and Tributaries-Metals and Selenium (EPA-established TMDL – Effective date: 3/26/07)

Wet-weather allocations

Waterbody	Copper	Lead	Zinc
San Gabriel River Reach 2*		0.8 kg/d	
Coyote Creek**	0.513 kg/d	2.07 kg/d	3.0 kg/d

*Mass-based allocations are based on a flow of 260 cfs (daily storm volume = 6.4×10^8 liters)

**Mass-based allocations are based on a flow of 156 cfs (daily storm volume = 3.8×10^8 liters)

Dry-weather allocations

The dry-weather copper waste load allocation for general construction storm water permittees that discharge to San Gabriel Reach 1, Coyote Creek, and the Estuary is zero.

The dry-weather selenium allocation for general construction storm water permittees that discharge to San Jose Creek Reach 1 and Reach 2 is 5 µg/L (total recoverable metals).

Region 4 Upper Santa Clara River Chloride TMDL Adopted by Resolution No 2006-016 Effective Date June 12, 2008

"Other NPDES dischargers" have a chloride WLA equal to 100 mg/L.

This TMDL was revised by Resolution No 2008-012, which, when it becomes effective, includes the following conditional WLAs for "Other minor NPDES discharges":

Reach	Concentration-based Conditional WLA for Chloride (mg/L)*
6	150 (12-month Average), 230 (Daily Maximum)
5	150 (12-month Average), 230 (Daily Maximum)
4B	117 (3-month Average), 230 (Daily Maximum)

*The conditional WLAs for chloride for all point sources shall apply only when chloride load reductions and/or chloride export projects are in operation by the Santa Clarita Valley Sanitation District according to the implementation plan for the TMDL. If these conditions are not met, WLAs shall be based on existing water quality objectives for chloride of 100 mg/L.

Region 4 The Harbor Beaches of Ventura County-Bacteria (Adopted by Resolution No. 2007-017)
Effective Date – December 18, 2008

Current and future enrollees in the Statewide Construction Activity Storm Water General Permit in the Channel Islands Harbor subwatershed are assigned WLAs of zero (0) days of allowable exceedances of the single sample limits and the rolling 30-day geometric mean limits.

Single Sample Limits are:
a. Total coliform density shall not exceed 10,000/100 ml.
b. Fecal coliform density shall not exceed 400/100 ml.
c. Enterococcus density shall not exceed 104/100 ml.
d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.

Rolling 30-day Geometric Mean Limits are:
a. Total coliform density shall not exceed 1,000/100 ml.
b. Fecal coliform density shall not exceed 200/100 ml.
c. Enterococcus density shall not exceed 35/100 ml.

Los Angeles Harbor Bacteria TMDL (Adopted by Resolution No. 2004-001)
Effective Date – March 10, 2005

Current and future enrollees in the Statewide Construction Activity Storm Water General Permit in the watershed are assigned WLAs of zero (0) days of allowable exceedances of the single sample limits and the rolling 30-day geometric mean.

Single Sample Limits are:
a. Total coliform density shall not exceed 10,000/100 ml.
b. Fecal coliform density shall not exceed 400/100 ml.
c. Enterococcus density shall not exceed 104/100 ml.
d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.

Rolling 30-day Geometric Mean Limits are:
a. Total coliform density shall not exceed 1,000/100 ml.
b. Fecal coliform density shall not exceed 200/100 ml.
c. Enterococcus density shall not exceed 35/100 ml.

Ballona Creek Bacteria TMDL (Adopted by Resolution No. 2006-011)
Effective Date – April 27, 2007

Current and future enrollees in the Statewide Construction Activity Storm Water General Permit in the watershed are assigned WLAs of zero (0) days of allowable exceedances of the single sample limits and the rolling 30-day geometric mean.

Single Sample Limits are:
a. Total coliform density shall not exceed 10,000/100 ml.
b. Fecal coliform density shall not exceed 400/100 ml.
c. Enterococcus density shall not exceed 104/100 ml.
d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.

Rolling 30-day Geometric Mean Limits are:
a. Total coliform density shall not exceed 1,000/100 ml.
b. Fecal coliform density shall not exceed 200/100 ml.
c. Enterococcus density shall not exceed 35/100 ml.

Region 4 Resolution No. 03-009 Los Angeles River and Tributaries-Nutrients

Minor Point Sources
Waste loads are allocated to minor point sources enrolled under NPDES or WDR permits including but not limited to Tapia WRP, Whittier Narrows WRP, Los Angeles Zoo WRP, industrial and construction stormwater, and municipal storm water and urban runoff from municipal separate storm sewer systems (MS4s)

Region 4 Minor Point Sources for NPDES/WDR Permits TMDL Effective Date: 3 23 2004 TMDL Type: River	Pollutant Stressor/WLA				
	Total Ammonia (NH_3)		**Nitrate-nitrogen (NO_3-N)**	**Nitrite-nitrogen (NO_2-N)**	**NO_3-N + NO_3-N**
	1 Hr Ave mg/l	30 Day Ave mg/l	30 Day Ave mg/l		30 Day Ave mg/l
LA River Above Los Angeles-Glendale WRP (LAG)	4.7 1.6 8.0			1.0	8.0
LA River Below LAG	8.7	2.4	8.0	1.0	8.0
Los Angeles Tributaries 10.1		2.3	8.0	1.0	8.0

Malibu Creek Attachment A to Resolution No. 2004-019R-Bacteria

Effective date: 1 24 2006. The WLAs for permittees under the NPDES General Stormwater Construction Permit are zero (0) days of allowable exceedances for the single sample limits and the rolling 30-day geometric mean.

Single Sample Limits are:
a. Total coliform density shall not exceed 10,000/100 ml.
b. Fecal coliform density shall not exceed 400/100 ml.
c. Enterococcus density shall not exceed 104/100 ml.
d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.

Rolling 30-day Geometric Mean Limits are:
a. Total coliform density shall not exceed 1,000/100 ml.
b. Fecal coliform density shall not exceed 200/100 ml.
c. Enterococcus density shall not exceed 35/100 ml.

Region 4 Marina del Rey Harbor, Mothers' Beach and Back Basins
Attachment A to Resolution No. 2003-012-Bacteria

Effective date: 3 18 2004. Discharges from general construction storm water permits are not expected to be a significant source of bacteria. Therefore, the WLAs for these discharges are zero (0) days of allowable exceedances for the single sample limits and the rolling 30-day geometric mean. Any future enrollees under a general NPDES permit, general industrial storm water permit or general construction storm water permit within the MdR Watershed will also be subject to a WLA of zero days of allowable exceedances.

Single Sample Limits are:
a. Total coliform density shall not exceed 10,000/100 ml.
b. Fecal coliform density shall not exceed 400/100 ml.
c. Enterococcus density shall not exceed 104/100 ml.
d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.

Rolling 30-day Geometric Mean Limits are:
a. Total coliform density shall not exceed 1,000/100 ml.
b. Fecal coliform density shall not exceed 200/100 ml.
c. Enterococcus density shall not exceed 35/100 ml.

Santa Clara River Nutrients TMDL (Adopted by Resolution No. 2003-011
Effective Date - March 23, 2004

Concentration-based wasteloads are allocated to municipal, industrial and construction stormwater sources regulated under NPDES permits. For stormwater permittees discharging into Reach 7, the thirty-day WLA for ammonia as nitrogen is 1.75 mg/L and the one-hour WLA for ammonia as nitrogen is 5.2 mg/L; the thirty-day average WLA for nitrate plus nitrite as nitrogen is 6.8 mg/L. For stormwater permittees discharging into Reach 3, the thirty-day WLA for ammonia as nitrogen is 2.0 mg/L and the one-hour WLA for ammonia as nitrogen is 4.2 mg/L; the thirty-day average WLA for nitrate plus nitrite nitrogen is 8.1 mg/L.

Region 8 RESOLUTION NO. R8-2007- 0024

Total Maximum Daily Loads (TMDLs) for San Diego Creek,
Upper and Lower Newport Bay, Orange County, California

Region 8 NPDES Construction Permit TMDL Completion Date: 1 24 1995 TMDL Type: River. Cr, Bay	Organochlorine Compounds							
	Total DDT		**Chlordane**		**Total PCBs**		**Toxaphene**	
	g/day	g/yr	g/day	g/yr	g/day	g/yr	g/day	g/yr
San Diego Creek	.27	99.8	**.18***	**64.3***	**.09***	**31.5***	.004 1.5	
Upper Newport Bay	.11	40.3 .06		23.4 .06		23.2	**X**	**X**
Lower Newport Bay	.04	14.9	.02 8.6 .17	60.7			**X**	**X**

*Red= Informational WLA only, not for enforcement purposes

Organochlorine Compounds TMDLs Implementation Tasks and Schedule

Regional Board staff shall develop a SWPPP Improvement Program that identifies the Regional Board's expectations with respect to the content of SWPPPs, including documentation regarding the selection and implementation of BMPs, and a sampling and analysis plan. The Improvement Program shall include specific guidance regarding the development and implementation of monitoring plans, including the constituents to be monitored, sampling frequency and analytical protocols. The SWPPP Improvement Program shall be completed by (*the date of OAL approval of this BPA*). ***No later than two months*** from completion of the Improvement Program, Board staff shall assure that the requirements of the Program are communicated to interested parties, including dischargers with existing authorizations under the General Construction Permit. Existing, authorized dischargers shall revise their project SWPPPs as needed to address the Program requirements as soon as possible but ***no later than (three months of completion of the SWPPP Improvement Program)***. Applicable SWPPPs that do not adequately address the Program requirements shall be considered inadequate and enforcement by the Regional Board shall proceed accordingly. The Caltrans and Orange County MS4 permits shall be revised as needed to assure that the permittees communicate the Regional Board's SWPPP expectations, based on the SWPPP Improvement Program, with the Standard Conditions of Approval.

APPENDIX 5:
Glossary

Active Areas of Construction
All areas subject to land surface disturbance activities related to the project including, but not limited to, project staging areas, immediate access areas and storage areas. All previously active areas are still considered active areas until final stabilization is complete. [The construction activity Phases used in this General Permit are the Preliminary Phase, Grading and Land Development Phase, Streets and Utilities Phase, and the Vertical Construction Phase.]

Active Treatment System (ATS)
A treatment system that employs chemical coagulation, chemical flocculation, or electrocoagulation to aid in the reduction of turbidity caused by fine suspended sediment.

Acute Toxicity Test
A chemical stimulus severe enough to rapidly induce a negative effect; in aquatic toxicity tests, an effect observed within 96 hours or less is considered acute.

Air Deposition
Airborne particulates from construction activities. .

Approved Signatory
A person who has legal authority to sign, certify, and electronically submit Permit Registration Documents and Notices of Termination on behalf of the Legally Responsible Person.

Beneficial Uses
As defined in the California Water Code, beneficial uses of the waters of the state that may be protected against quality degradation include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.

Best Available Technology Economically Achievable (BAT)
As defined by USEPA, BAT is a technology-based standard established by the Clean Water Act (CWA) as the most appropriate means available on a national basis for controlling the direct discharge of toxic and nonconventional pollutants to navigable waters. The BAT effluent limitations guidelines, in general, represent the best existing performance of treatment technologies that are economically achievable within an industrial point source category or subcategory.

Best Conventional Pollutant Control Technology (BCT)

As defined by USEPA, BCT is a technology-based standard for the discharge from existing industrial point sources of conventional pollutants including biochemical oxygen demand (BOD), total suspended sediment (TSS), fecal coliform, pH, oil and grease.

Best Professional Judgment (BPJ)
The method used by permit writers to develop technology-based NPDES permit conditions on a case-by-case basis using all reasonably available and relevant data.

Best Management Practices (BMPs)
BMPs are scheduling of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants. BMPs also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Chain of Custody (COC)
Form used to track sample handling as samples progress from sample collection to the analytical laboratory. The COC is then used to track the resulting analytical data from the laboratory to the client. COC forms can be obtained from an analytical laboratory upon request.

Coagulation
The clumping of particles in a discharge to settle out impurities, often induced by chemicals such as lime, alum, and iron salts.

Common Plan of Development
Generally a contiguous area where multiple, distinct construction activities may be taking place at different times under one plan. A plan is generally defined as any piece of documentation or physical demarcation that indicates that construction activities may occur on a common plot. Such documentation could consist of a tract map, parcel map, demolition plans, grading plans or contract documents. Any of these documents could delineate the boundaries of a common plan area. However, broad planning documents, such as land use master plans, conceptual master plans, or broad-based CEQA or NEPA documents that identify potential projects for an agency or facility are not considered common plans of development.

Daily Average Discharge
The discharge of a pollutant measured during any 24-hour period that reasonably represents a calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged during the day. For pollutants with limitations expressed in other units of measurement (e.g., concentration) the daily discharge is calculated as the average measurement of the pollutant

throughout the day (40 CFR 122.2). In the case of pH, the pH must first be converted from a log scale.

Debris
Litter, rubble, discarded refuse, and remains of destroyed inorganic anthropogenic waste.

Direct Discharge
A discharge that is routed directly to waters of the United States by means of a pipe, channel, or ditch (including a municipal storm sewer system), or through surface runoff.

Discharger
The Legally Responsible Person (see definition) or entity subject to this General Permit.

Dose Rate (for ATS)
In exposure assessment, dose (e.g. of a chemical) per time unit (e.g. mg/day), sometimes also called dosage.

Drainage Area
The area of land that drains water, sediment, pollutants, and dissolved materials to a common outlet.

Effluent
Any discharge of water by a discharger either to the receiving water or beyond the property boundary controlled by the discharger.

Effluent Limitation
Any numeric or narrative restriction imposed on quantities, discharge rates, and concentrations of pollutants which are discharged from point sources into waters of the United States, the waters of the contiguous zone, or the ocean.

Erosion
The process, by which soil particles are detached and transported by the actions of wind, water, or gravity.

Erosion Control BMPs
Vegetation, such as grasses and wildflowers, and other materials, such as straw, fiber, stabilizing emulsion, protective blankets, etc., placed to stabilize areas of disturbed soils, reduce loss of soil due to the action of water or wind, and prevent water pollution.

Field Measurements
Testing procedures performed in the field with portable field-testing kits or meters.

Final Stabilization
All soil disturbing activities at each individual parcel within the site have been completed in a manner consistent with the requirements in this General Permit.

First Order Stream
Stream with no tributaries.

Flocculants
Substances that interact with suspended particles and bind them together to form flocs.

Good Housekeeping BMPs
BMPs designed to reduce or eliminate the addition of pollutants to construction site runoff through analysis of pollutant sources, implementation of proper handling/disposal practices, employee education, and other actions.

Grading Phase (part of the Grading and Land Development Phase)
Includes reconfiguring the topography and slope including; alluvium removals; canyon cleanouts; rock undercuts; keyway excavations; land form grading; and stockpiling of select material for capping operations.

Hydromodification
Hydromodification is the alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources. Hydromodification can cause excessive erosion and/or sedimentation rates, causing excessive turbidity, channel aggradation and/or degradation.

Identified Organisms
Organisms within a sub-sample that is specifically identified and counted.

Inactive Areas of Construction
Areas of construction activity that are not active and those that have been active and are not scheduled to be re-disturbed for at least 14 days.

Index Period
The period of time during which bioassessment samples must be collected to produce results suitable for assessing the biological integrity of streams and rivers. Instream communities naturally vary over the course of a year,and sampling during the index period ensures that samples are collected during a time frame when communities are stable so that year-to-year consistency is obtained. The index period approach provides a cost-effective alternative to year-round sampling. Furthermore, sampling within the appropriate index period will yield results that are comparable to the assessment thresholds or criteria for a given region, which are established for the same index period. Because index

periods differ for different parts of the state, it is essential to know the index period for your area.

K Factor
The soil erodibility factor used in the Revised Universal Soil Loss Equation (RUSLE). It represents the combination of detachability of the soil, runoff potential of the soil, and the transportability of the sediment eroded from the soil.

Legally Responsible Person
The person who possesses the title of the land or the leasehold interest of a mineral estate upon which the construction activities will occur for the regulated site. For linear underground/overhead projects, it is in the person in charge of the utility company, municipality, or other public or private company or agency that owns or operates the LUP.

Likely Precipitation Event
Any weather pattern that is forecasted to have a 50% or greater chance of producing precipitation in the project area. The discharger shall obtain likely precipitation forecast information from the National Weather Service Forecast Office (e.g., by entering the zip code of the project's location at http://www.srh.noaa.gov/forecast).

Maximum Allowable Threshold Concentration (MATC)
The allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity testing conducted by an independent, third-party laboratory. A typical MATC would be:

The MATC is equal to the geometric mean of the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.

Natural Channel Evolution
The physical trend in channel adjustments following a disturbance that causes the river to have more energy and degrade or aggrade more sediment. Channels have been observed to pass through 5 to 9 evolution types. Once they pass though the suite of evolution stages, they will rest in a new state of equilibrium.

Non-Storm Water Discharges
Discharges are discharges that do not originate from precipitation events. They can include, but are not limited to, discharges of process water, air conditioner condensate, non-contact cooling water, vehicle wash water, sanitary wastes, concrete washout water, paint wash water, irrigation water, or pipe testing water.

Non-Visible Pollutants

Pollutants associated with a specific site or activity that can have a negative impact on water quality, but cannot be seen though observation (ex: chlorine). Such pollutants being discharged are not authorized.

Numeric Action Level (NAL)
Level is used as a warning to evaluate if best management practices are effective and take necessary corrective actions. Not an effluent limit.

Original Sample Material
The material (i.e., macroinvertebrates, organic material, gravel, etc.) remaining after the subsample has been removed for identification.

pH
Unit universally used to express the intensity of the acid or alkaline condition of a water sample. The pH of natural waters tends to range between 6 and 9, with neutral being 7. Extremes of pH can have deleterious effects on aquatic systems.

Post-Construction BMPs
Structural and non-structural controls which detain, retain, or filter the release of pollutants to receiving waters after final stabilization is attained.

Preliminary Phase (Pre-Construction Phase - Part of the Grading and Land Development Phase)
Construction stage including rough grading and/or disking, clearing and grubbing operations, or any soil disturbance prior to mass grading.

Project

Qualified SWPPP Developer
Individual who is authorized to develop and revise SWPPPs.

Qualified SWPPP Practitioner
Individual assigned responsibility for non-storm water and storm water visual observations, sampling and analysis, and responsibility to ensure full compliance with the permit and implementation of all elements of the SWPPP, including the preparation of the annual compliance evaluation and the elimination of all unauthorized discharges.

Qualifying Rain Event
Any event that produces 0.5 inches or more precipitation with a 48 hour or greater period between rain events.

R Factor
Erosivity factor used in the Revised Universal Soil Loss Equation (RUSLE). The R factor represents the erosivity of the climate at a particular location. An

average annual value of R is determined from historical weather records using erosivity values determined for individual storms. The erosivity of an individual storm is computed as the product of the storm's total energy, which is closely related to storm amount, and the storm's maximum 30-minute intensity.

Rain Event Action Plan (REAP)
Written document, specific for each rain event, that when implemented is designed to protect all exposed portions of the site within 48 hours of any likely precipitation event.

Remaining Sub sampled Material
The material (e.g., organic material, gravel, etc.) that remains after the organisms to be identified have been removed from the subsample for identification. (Generally, no macroinvertebrates are present in the remaining subsampled material, but the sample needs to be checked and verified using a complete Quality Assurance (QA) plan)

Routine Maintenance
Activities intended to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

Runoff Control BMPs
Measures used to divert runon from offsite and runoff within the site.

Run-on
Discharges that originate offsite and flow onto the property of a separate project site.

Revised Universal Soil Loss Equation (RUSLE)
Empirical model that calculates average annual soil loss as a function of rainfall and runoff erosivity, soil erodibility, topography, erosion controls, and sediment controls.

Sampling and Analysis Plan
Document that describes how the samples will be collected, under what conditions, where and when the samples will be collected, what the sample will be tested for, what test methods and detection limits will be used, and what methods/procedures will be maintained to ensure the integrity of the sample during collection, storage, shipping and testing (i.e., quality assurance/quality control protocols).

Sediment
Solid particulate matter, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Sedimentation
Process of deposition of suspended matter carried by water, wastewater, or other liquids, by gravity. It is usually accomplished by reducing the velocity of the liquid below the point at which it can transport the suspended material.

Sediment Control BMPs
Practices that trap soil particles after they have been eroded by rain, flowing water, or wind. They include those practices that intercept and slow or detain the flow of storm water to allow sediment to settle and be trapped (e.g., silt fence, sediment basin, fiber rolls, etc.).

Settleable Solids (SS)
Solid material that can be settled within a water column during a specified time frame. It is typically tested by placing a water sample into an Imhoff settling cone and then allowing the solids to settle by gravity for a given length of time. Results are reported either as a volume (mL/L) or a mass (mg/L) concentration.

Sheet Flow
Flow of water that occurs overland in areas where there are no defined channels where the water spreads out over a large area at a uniform depth.

Site

Soil Amendment
Any material that is added to the soil to change its chemical properties, engineering properties, or erosion resistance that could become mobilized by storm water.

Streets and Utilities Phase
Construction stage including excavation and street paving, lot grading, curbs, gutters and sidewalks, public utilities, public water facilities including fire hydrants, public sanitary sewer systems, storm sewer system and/or other drainage improvements.

Structural Controls
Any structural facility designed and constructed to mitigate the adverse impacts of storm water and urban runoff pollution

Suspended Sediment Concentration (SSC)
The measure of the concentration of suspended solid material in a water sample by measuring the dry weight of all of the solid material from a known volume of a collected water sample. Results are reported in mg/L.

Total Suspended Solids (TSS)
The measure of the suspended solids in a water sample includes inorganic substances, such as soil particles and organic substances, such as algae,

aquatic plant/animal waste, particles related to industrial/sewage waste, etc. The TSS test measures the concentration of suspended solids in water by measuring the dry weight of a solid material contained in a known volume of a sub-sample of a collected water sample. Results are reported in mg/L.

Toxicity
The adverse response(s) of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies.

Turbidity
The cloudiness of water quantified by the degree to which light traveling through a water column is scattered by the suspended organic and inorganic particles it contains. The turbidity test is reported in Nephelometric Turbidity Units (NTU) or Jackson Turbidity Units (JTU).

Vertical Construction Phase
The Build out of structures from foundations to roofing, including rough landscaping.

Waters of the United States
Generally refers to surface waters, as defined by the federal Environmental Protection Agency in 40 C.F.R. § 122.2.[1]

Water Quality Objectives (WQO)
Water quality objectives are defined in the California Water Code as limits or levels of water quality constituents or characteristics, which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area.

[1] The application of the definition of "waters of the United States" may be difficult to determine; there are currently several judicial decisions that create some confusion. If a landowner is unsure whether the discharge must be covered by this General Permit, the landowner may wish to seek legal advice.

APPENDIX 6:
Acronym List

ASBS	Areas of Special Biological Significance
ASTM	American Society of Testing and Materials; Standard Test Method for Particle-Size Analysis of Soils
ATS	Active Treatment System
BASMAA	Bay Area Storm water Management Agencies Association
BAT	Best Available Technology Economically Achievable
BCT	Best Conventional Pollutant Control Technology
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
BPJ	Best Professional Judgment
CAFO	Confined Animal Feeding Operation
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGP	NPDES General Permit for Storm Water Discharges Associated with Construction Activities
CIWQS	California Integrated Water Quality System
CKD	Cement Kiln Dust
COC	Chain of Custody
CPESC	Certified Professional in Erosion and Sediment Control
CPSWQ	Certified Professional in Storm Water Quality
CSMP	Construction Site Monitoring Program
CTB	Cement Treated Base
CTR	California Toxics Rule
CWA	Clean Water Act
CWC	California Water Code
CWP	Center for Watershed Protection
DADMAC	Diallyldimethyl-ammonium chloride
DDNR	Delaware Department of Natural Resources
DFG	Department of Fish and Game
DHS	Department of Health Services
DWQ	Division of Water Quality
EC	Electrical Conductivity
ELAP	Environmental Laboratory Accreditation Program
EPA	Environmental Protection Agency
ESA	Environmentally Sensitive Area
ESC	Erosion and Sediment Control
HSPF	Hydrologic Simulation Program Fortran
JTU	Jackson Turbidity Units
LID	Low Impact Development
LOEC	Lowest Observed Effect Concentration
LRP	Legally Responsible Person
LUP	Linear Underground/Overhead Projects

MATC	Maximum Allowable Threshold Concentration
MDL	Method Detection Limits
MRR	Monitoring and Reporting Requirements
MS4	Municipal Separate Storm Sewer System
MUSLE	Modified Universal Soil Loss Equation
NAL	Numeric Action Level
NEL	Numeric Effluent Limitation
NICET	National Institute for Certification in Engineering Technologies
NOAA	National Oceanic and Atmospheric Administration
NOEC	No Observed Effect Concentration
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NTR	National Toxics Rule
NTU	Nephelometric Turbidity Units
O&M	Operation and Maintenance
PAC	Polya luminum chloride
PAM	Polyacryla mide
PASS	Polya luminum chloride Silica/sulfate
POC	Pollutants of Concern
PoP	Probability of Precipitation
POTW	Publicly Owned Treatment Works
PRDs	Permit Registration Documents
PWS	Planning Watershed
QAMP	Quality Assurance Management Plan
QA/QC	Quality Assurance/Quality Control
REAP	Rain Event Action Plan
Regional Board	Regional Water Quality Control Board
ROWD	Report of Waste Discharge
RUSLE	Revised Universal Soil Loss Equation
RW	Receiv ing Water
SMARTS	Storm water Multi Application Reporting and Tracking System
SS	Settleable Solids
SSC	Suspended Sediment Concentration
SUSMP	Standard Urban Storm Water Mitigation Plan
SW	Storm Water
SWARM	Storm Water Annual Report Module
SWAMP	Surface Water Ambient Monitoring Program
SWMM	Storm Water Management Model
SWMP	Storm Water Management Program
SWPPP	Storm Water Pollution Prevention Plan
TC	Treatment Control
TDS	Total Dissolved Solids

TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
USACOE	U.S. Army Corps of Engineers
USC	United States Code
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WDID	Waste Discharge Identification Number
WDR	Waste Discharge Requirements
WLA	Waste Load Allocation
WET	Whole Effluent Toxicity
WRCC	Western Regional Climate Center
WQBEL	Water Quality Based Effluent Limitation
WQO	Water Quality Objective
WQS	Water Quality Standard

APPENDIX 7:
State and Regional Water Resources Control Board Contacts

NORTH COAST REGION (1)
5550 Skylane Blvd, Ste. A
Santa Rose, CA 95403
(707) 576-2220 FAX: (707)523-0135

SAN FRANCISCO BAY REGION (2)
1515 Clay Street, Ste. 1400
Oakland, CA 94612
(510) 622-2300 FAX: (510) 622-2640

CENTRAL COAST REGION (3)
895 Aerovista Place, Ste 101
San Luis Obispo, CA 93401
(805) 549-3147 FAX: (805) 543-0397

LOS ANGELES REGION (4)
320 W. 4th Street, Ste. 200
Los Angeles, CA 90013
(213) 576-6600 FAX: (213) 576-6640

CENTRAL VALLEY REGION (5S)
11020 Sun Center Dr., #200
Rancho Cordova, CA 95670-6114
(916) 464-3291 FAX: (916) 464-4645

FRESNO BRANCH OFFICE (5F)
1685 E St.
Fresno, CA 93706
(559) 445-5116 FAX: (559) 445-5910

REDDING BRANCH OFFICE (5R)
415 Knollcrest Drive, Ste. 100
Redding, CA 96002
(530) 224-4845 FAX: (530) 224-4857

LAHONTAN REGION (6 SLT)
2501 Lake Tahoe Blvd.
South Lake Tahoe, CA 96150
(530) 542-5400 FAX: (530) 544-2271

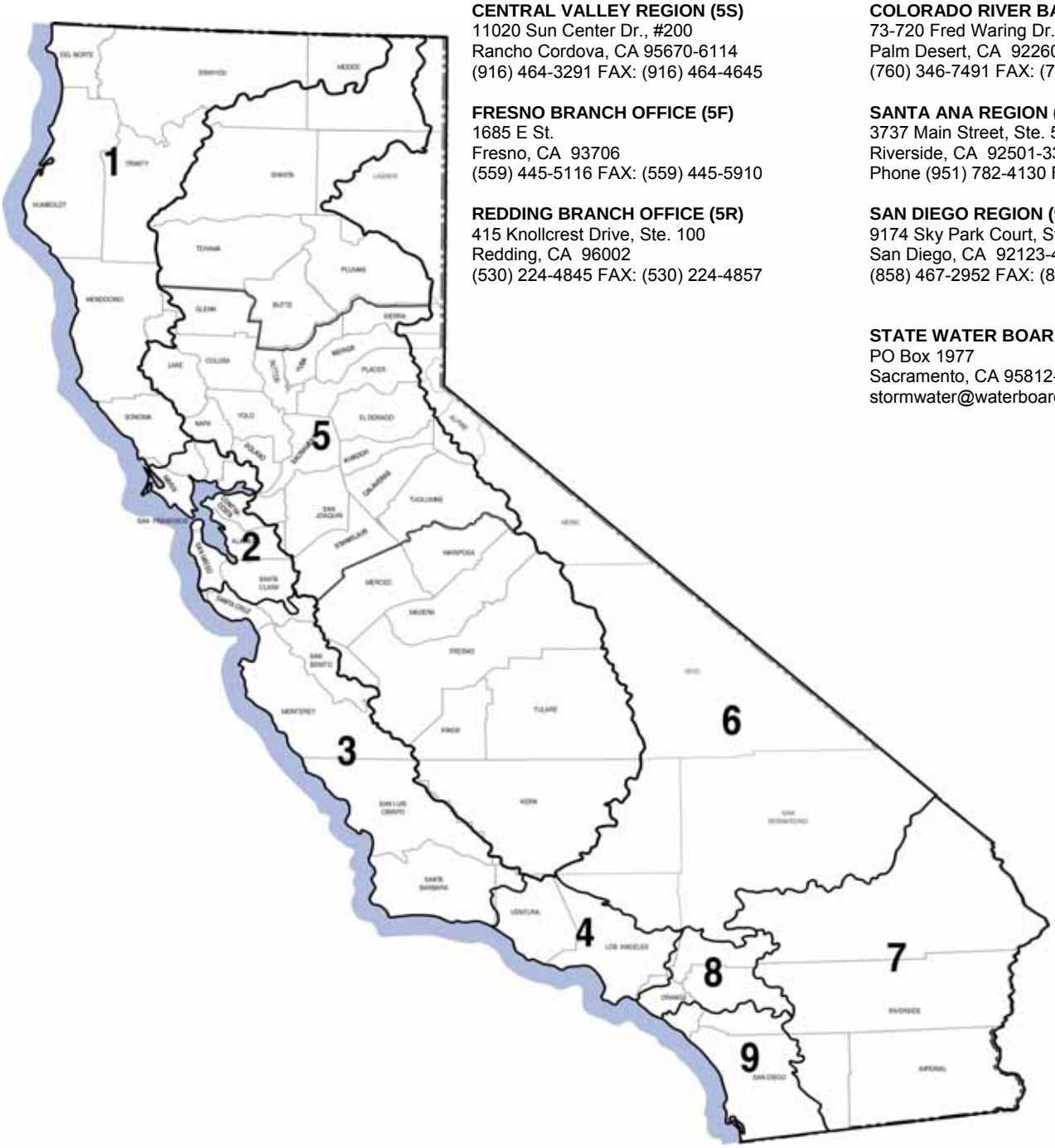
VICTORVILLE OFFICE (6V)
14440 Civic Drive, Ste. 200
Victorville, CA 92392-2383
(760) 241-6583 FAX: (760) 241-7308

COLORADO RIVER BASIN REGION (7)
73-720 Fred Waring Dr., Ste. 100
Palm Desert, CA 92260
(760) 346-7491 FAX: (760) 341-6820

SANTA ANA REGION (8)
3737 Main Street, Ste. 500
Riverside, CA 92501-3339
Phone (951) 782-4130 FAX: (951) 781-6288

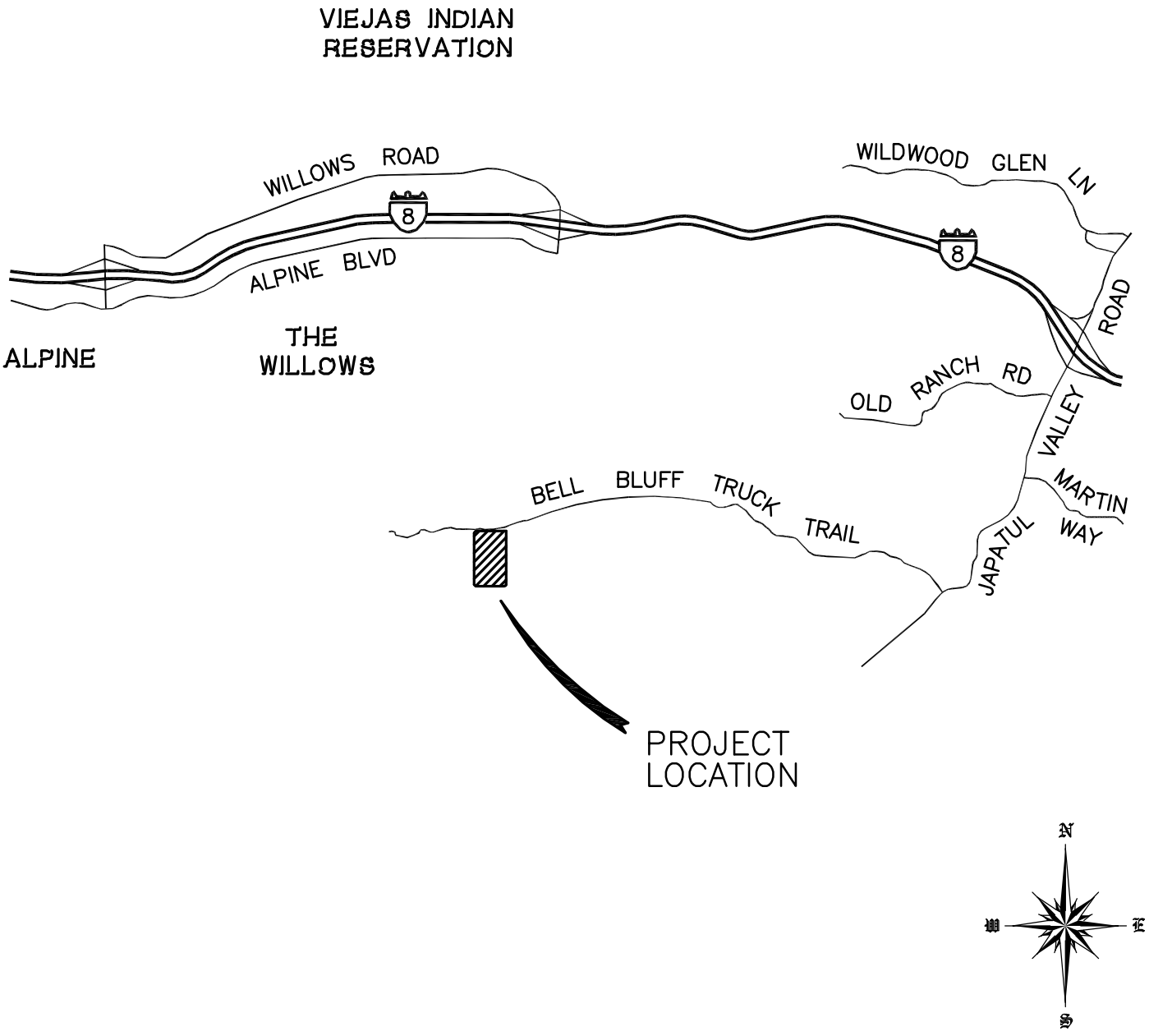
SAN DIEGO REGION (9)
9174 Sky Park Court, Ste. 100
San Diego, CA 92123-4340
(858) 467-2952 FAX: (858) 571-6972

STATE WATER BOARD
PO Box 1977
Sacramento, CA 95812-1977
stormwater@waterboards.ca.gov



Appendix III
Site Map

VICINITY MAP



Bureau Veritas North America, Inc.

11590 West Bernardo Court Suite 100
San Diego, CA 92127-1624
Tel: (858) 451-6100 Fax: (858) 451-2846
www.us.bureauveritas.com

SUNCREST SUBSTATION
ALPINE, CA

SCALE: NTS

DRAWN BY: JL

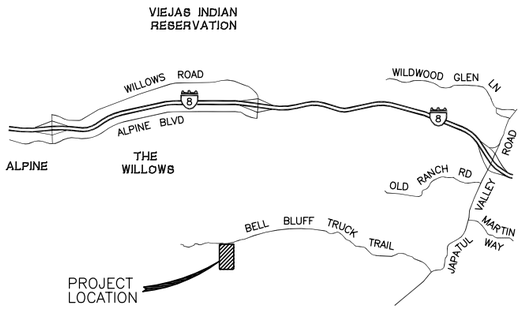
DATE: 1/28/10 SHEET 1 OF 1

Retain in this Appendix the current and all historic Site Maps

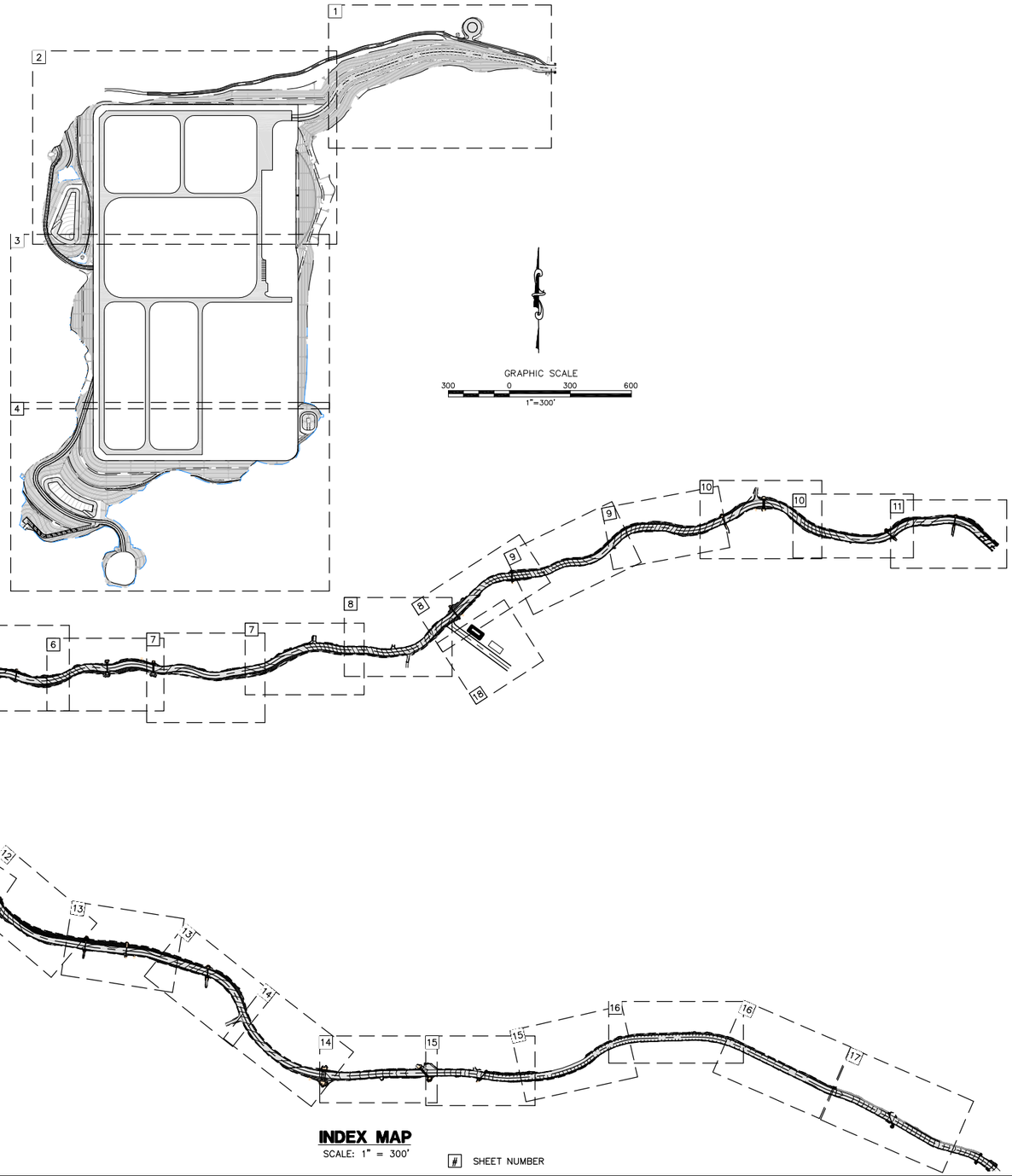
Draft Disclosure

This document represents the current SWPPP drawings for this project and will be revised prior to the start of construction.

SUNCREST SUBSTATION



VICINITY MAP
NTS



GRAPHIC SCALE
300 0 300 600
1"=300'

INDEX MAP
SCALE: 1" = 300'
[#] SHEET NUMBER

EROSION AND SEDIMENT CONTROL NOTES:

1. FOR BMP SHEETS REFER TO CALTRANS (MARCH 2003) AND SDG&E WATER QUALITY CONSTRUCTION BEST MANAGEMENT PRACTICES MANUAL (DECEMBER 2002) AND PROJECT'S FINAL APPROVED SWPPP.
2. CONTRACTOR TO IMPLEMENT STREET SWEEPING AND VACUUMING (PER BMP SHEET SC-7/BMP 1-07) ALONG ALL AREAS OF SOIL DISTURBANCE ALONG THE EXISTING ROADWAY.
3. VEHICLE AND EQUIPMENT CLEANING, FUELING, AND/OR MAINTENANCE (PER BMP SHEETS NS-8/BMP 3-03, NS-9/BMP 3-04, AND NS-10 RESPECTIVELY) SHALL NOT BE PERFORMED ON SITE.
4. IF DISCHARGES FROM IRRIGATION LINES, POTABLE WATER LINES, OR HYDRANT FLUSHING OCCUR ONSITE, CONTRACTOR MUST IMPLEMENT POTABLE WATER/IRRIGATION PER BMP SHEET NS-7, AS NECESSARY.
5. CONTRACTOR ALSO TO IMPLEMENT THE FOLLOWING CONSTRUCTION BMPS, AS NECESSARY:
   - SCHEDULING, PER BMP SHEETS EC-1/BMP 1-01
   - WIND EROSION CONTROL, PER BMP SHEETS WE-1/BMP 4-08
   - WATER CONSERVATION PRACTICES, PER BMP SHEET NS-1
   - ILLICIT CONNECTION/DISCHARGE, PER BMP SHEETS NS-6/BMP 2-06
6. NO WORK HAVING THE POTENTIAL TO CAUSE WATER POLLUTION, AS DETERMINED BY THE ENGINEER, SHALL BE PERFORMED UNTIL THE SWPPP HAS BEEN SUBMITTED TO THE ENGINEER BY THE CONTRACTOR, AND APPROVED.
7. THE CONTRACTOR SHALL CONSIDER OTHER CONTROL MEASURES, AS NECESSARY, TO SUPPLEMENT THE CRITICAL TEMPORARY CONTROL MEASURES SHOWN ON THESE PLANS, IN ORDER TO MEET THE POLLUTION CONTROL OBJECTIVES OF THE SWPPP.
8. ALL POLE & TOWER MAINTENANCE PADS TO BE DIKED AND THE DIKES MAINTAINED TO PREVENT WATER FROM FLOWING FROM THE PADS WITHOUT CAUSING EROSION, OR CONSTRUCT DRAINAGE FACILITIES TO THE SATISFACTION OF THE COUNTY DEPARTMENT OF PUBLIC WORKS THAT WILL ALLOW WATER TO DRAIN FROM THE PAD WITHOUT CAUSING EROSION.
9. TOPS OF ALL SLOPES TO BE DIKED OR TRENCHED TO PREVENT WATER FROM FLOWWING OVER THE CREST OF SLOPES.
10. SEE SHEET SCR-DT-001 FOR HYDROSEED MIX AND DETAILS.

SPECIAL NOTES:

1. RUN-ON DRAINAGE DIVERSION MEASURES SHALL BE CONSTRUCTED FIRST.
2. GRADING FOR THE SUNCREST SUBSTATION IS SCHEDULED TO OCCUR DURING THE DRY SEASON MONTHS. IN THE EVENT THAT GRADING OPERATIONS ARE CONDUCTED DURING THE RAINY SEASON, SETTLING PONDS WOULD BE INSTALLED IN THE FILL AREAS ON AN AS NEEDED BASIS AS RAINFALL OCCURS OR IS ANTICIPATED. SETTLING PONDS WOULD BE CONSTRUCTED BY LEAVING A PORTION OF THE FILL AREA LOWER THAN EDGES AND CONSTRUCTING EARTH BERMS AROUND THE EDGES OF THE TEMPORARY POND AREAS. THE LOCATION AND ELEVATION WOULD SHIFT AS THE FILLS ARE CONSTRUCTED. ONE SETTLING POND WOULD BE CONSTRUCTED IN EACH OF THE TWO LARGE FILL AREAS AT THE SOUTHWEST AND NORTHWEST CORNERS OF THE SUBSTATION PAD. THE VOLUME REQUIRED TO CONTAIN EXPECTED RUNOFF IS THE SAME AS THE TWO PERMANENT DETENTION PONDS THAT WILL BE COMPLETED AT THE END OF PAD GRADING. THE TEMPORARY SETTLING PONDS WOULD BE APPROXIMATELY 250 FEET LONG BY 80 FEET WIDE WITH A DEPTH OF 5 FEET. THE SITE GRADING CONTRACTOR WOULD DETERMINE THE EXACT CONFIGURATION OF THE PONDS SATISFYING THE VOLUME REQUIREMENTS DEPENDING ON THE AVAILABLE SPACE AND CONFIGURATION OF THE FILL AREAS AT THE TIME OF AN ANTICIPATED RAINFALL EVENT. THE PERMANENT DETENTION POND AREAS WOULD BE COMPLETED MIDWAY THROUGH PAD GRADING OPERATIONS AND WOULD BE THEN BE USED AS CONSTRUCTION PHASE SETTLING PONDS UNTIL THE COMPLETE STORM DRAIN SYSTEM IS COMPLETED.
3. THESE EROSION CONTROL PLANS SHOW PROJECT IMPROVEMENTS FOR ILLUSTRATION ONLY. SEE PROJECT IMPROVEMENT PLANS FOR IMPROVEMENT DETAILS.

STORMWATER MANAGEMENT NOTES

1. DURING THE RAINY SEASON FROM OCTOBER 1ST TO APRIL 30TH THE AMOUNT OF EXPOSED SOIL ALLOWED AT ONE TIME SHALL NOT EXCEED THAT WHICH CAN BE ADEQUATELY PROTECTED WITHIN 48 HOURS OF A PREDICTED RAIN.
2. 125% OF ALL NEEDED BMP MATERIALS SHALL BE STORED ONSITE YEAR-ROUND TO ALLOW FULL DEPLOYMENT AND INSTALLATION WITHIN 48 HOURS OF A PREDICTED RAIN.
3. THE PROPERTY OWNER SHALL COMPLY WITH ALL APPLICABLE STORMWATER REGULATIONS AT ALL TIMES. THE BMPs THAT HAVE BEEN INCORPORATED INTO THIS PLAN SHALL BE IMPLEMENTED AND MAINTAINED TO PREVENT ONSITE EROSION AND TO PREVENT DISCHARGES OF POLLUTANTS FROM LEAVING THE SITE. MAINTENANCE OF BMPs IS THE RESPONSIBILITY OF THE PROPERTY OWNER AND FAILURE TO PROPERLY INSTALL OR MAINTAIN THE BMPs MAY RESULT IN ENFORCEMENT ACTION BY THE COUNTY OF SAN DIEGO OR OTHERS. IF INSTALLED BMPs FAIL, THEY MUST BE REPAIRED OR REPLACED WITH AN ACCEPTABLE ALTERNATE AS SOON AS IT IS SAFE TO DO SO.
4. PERIMETER SEDIMENT CONTROL BMPs SHALL BE INSTALLED IMMEDIATELY AFTER THE AREA TO BE GRADED IS BRUSHED OR CLEARED, BUT PRIOR TO THE START OF GRADING OPERATIONS.
5. EROSION CONTROL BMPs USED FOR SLOPE STABILIZATION SHALL BE INSTALLED AS SOON AS THE FINISHED SLOPES ARE COMPLETE.
6. A PERIMETER BMP INSPECTION IS REQUIRED ON THE FIRST DAY OF GRADING.

REVISIONS

NO.	WORK DONE	DATE	BY:	APP'D:	NO.	WORK DONE	DATE	BY:	APP'D:	NO.	WORK DONE	DATE	BY:	APP'D:

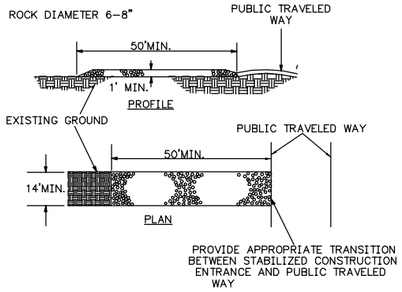
Bureau Veritas North America
11590 West Bernardo Court Suite 100
San Diego, CA 92127-1624
Tel: (858) 451-6100 Fax: (858) 451-2846
www.us.bureauveritas.com

SAN DIEGO GAS & ELECTRIC COMPANY
SAN DIEGO, CALIFORNIA

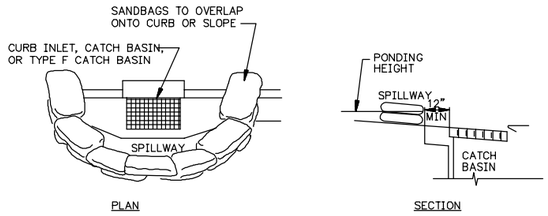
EROSION CONTROL PLANS FOR
SUNCREST SUBSTATION
TITLE SHEET

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APPROVED BY:	DATE:				
CAD NO.:	PLOT SCALE: 1 = 1				

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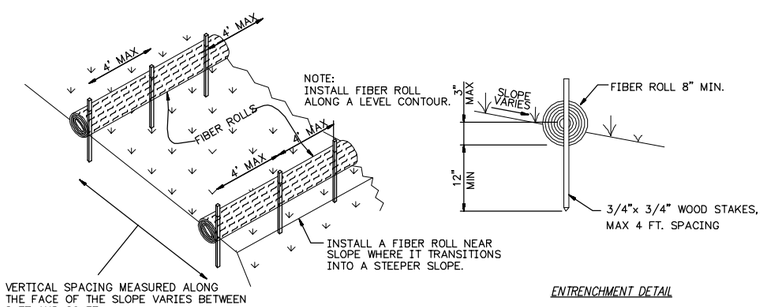
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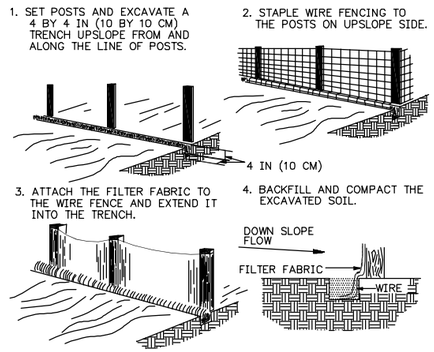
NOTES

1. LEAVE A GAP OF ONE BAG IN THE MIDDLE OF THE TOP ROW OF BAGS TO SERVE AS THE SPILLWAY. SPILLWAY HEIGHT SHALL BE LOWER THAN CURB HEIGHT AND SUFFICIENT IN SIZE TO PASS FLOWS FROM SEVERE STORM EVENT
2. PLACE 2 LAYERS OF OVERLAPPING SANDBAGS AND PACK TIGHTLY TOGETHER TO MINIMIZE THE SPACE BETWEEN BAGS
3. INSPECT AND REPAIR FILTERS AFTER EACH STORM EVENT. REMOVE SEDIMENT WHEN ONE HALF OF THE FILTER DEPTH HAS BEEN FILLED
4. USE SILT BAG/SILT SOCK WHEN INLET IS ADJACENT TO PUBLIC TRAVELED WAY.

B — GRAVEL BAG INLET PROTECTION — NO SCALE



C — FIBER ROLL — NO SCALE



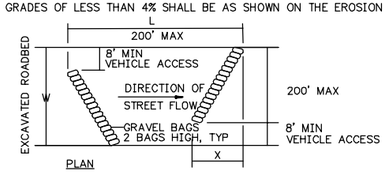
NOTES

1. SILT FENCE TO BE LOCATED WITHIN 5 FEET OF TOP OR TOE OF SLOPE WHERE APPLICABLE.
2. SILT FENCE WILL TERMINATE 1 FOOT ON EITHER SIDE OF RIP RAP ENERGY DISSIPATORS.

D — SILT FENCE — NO SCALE

NOTES

1. GRAVEL BAGS ARE ENCORAGED OVER THE USE OF SANDBAGS AND MAY BE REQUIRED IN AREAS WHICH ARE PARTICULARLY SENSITIVE TO SEDIMENT DEPOSITION
2. REQUIREMENTS FOR AND SPACING OF VELOCITY REDUCERS FOR STREETS WITH GRADES OF LESS THAN 4% SHALL BE AS SHOWN ON THE EROSION CONTROL PLAN



"W"	"X"	SLOPE	"L"
20' – 30'	5'	< 4%	100' MAX
		4% TO 10%	50' MAX
		> 10%	25 MAX

E — SANDBAG VELOCITY REDUCER — NO SCALE

SILTATION AND SEDIMENT CONTROL MEASURES NOTES

1. THE SEDIMENT BASINS SHALL BE PROVIDED AT THE LOWER END OF EVERY DRAINAGE AREA PRODUCING SEDIMENT RUNOFF. THE BASINS SHALL BE MAINTAINED AND CLEANED TO DESIGN CONTOURS AFTER EVERY RUNOFF PRODUCING STORM. THE BASINS SHOULD BE SEMI–PERMANENT STRUCTURES THAT WOULD REMAIN UNTIL SOIL STABILIZING VEGETATION HAS BECOME WELL ESTABLISHED ON ALL ERODIBLE SLOPES.
2. SEDIMENTATION BASINS MAY NOT BE REMOVED OR MADE INOPERATIVE WITHOUT PRIOR APPROVAL OF SDG&E REPRESENTATIVE.
3. UTILITY TRENCHES THAT ARE CUT THROUGH BASIN DIKES OR BASIN INLET DIKES SHALL BE PLUGGED WITH GRAVEL BAGS FROM TOP OF PIPE TO TOP OF DIKE.
4. ALL UTILITY TRENCHES SHALL BE BLOCKED AT THE PRESCRIBED INTERVALS WITH A DOUBLE ROW OF GRAVEL BAGS WITH A TOP ELEVATION THAT IS TWO GRAVEL BAGS BELOW THE GRADED SURFACE OF THE STREET. GRAVEL BAGS ARE TO BE PLACED WITH LAPPED COURSES. THE INTERVALS PRESCRIBED BETWEEN GRAVEL BAG BLOCKING SHALL DEPEND ON THE SLOPE OF THE GROUND SURFACE, BUT SHALL NOT EXCEED THE FOLLOWING:

GRADE OF THE STREET	INTERVAL
LESS THAN 2%	200 FEET MAXIMUM
2% TO 4%	100 FEET
4% TO 10%	50 FEET
OVER 10%	25 FEET

5. AFTER UTILITY TRENCHES ARE BACKFILLED AND COMPACTED, THE SURFACES OVER SUCH TRENCHES SHALL BE MOUNDED SLIGHTLY TO PREVENT CHANNELING OF WATER IN THE TRENCH AREA. CARE SHOULD BE EXERCISED TO PROVIDE FOR CROSS FLOW AT FREQUENT INTERVALS WHERE TRENCHES ARE NOT ON THE CENTERLINE OF A CROWNED STREET.
6. ALL BUILDING PADS SHOULD BE SLOPED TOWARDS THE DRIVEWAYS AND VELOCITY CHECK DAMS PROVIDED AT THE BASE OF ALL DRIVEWAYS DRAINING INTO THE STREET.
7. PROVIDE VELOCITY CHECK DAMS IN ALL UNPAVED GRADED CHANNELS AT THE INTERVALS INDICATED BELOW:

GRADE OF CHANNEL	INTERVALS BETWEEN CHECK DAMS
LESS THAN 3%	100 FEET
3% TO 6%	50 FEET
OVER 6%	25 FEET

8. PROVIDE VELOCITY CHECK DAMS IN ALL PAVED STREET AREAS ACCORDING TO INTERVALS INDICATED BELOW. VELOCITY CHECK DAMS MAY BE CONSTRUCTED OF GRAVEL BAGS, TIMBER, OR OTHER EROSION RESISTANT MATERIALS APPROVED BY SDG&E REPRESENTATIVE, AND SHALL EXTEND COMPLETELY ACROSS THE STREET OR CHANNEL AT RIGHT ANGLES TO THE CENTERLINE. VELOCITY CHECK DAMS MAY ALSO SERVE AS SEDIMENT TRAPS.

GRADE OF STREET	INTERVALS	NO. OF BAGS HIGH
LESS THAN 2%	AS REQUIRED, 200' MAX	1
2% TO 4%	100 FEET	1
4% TO 6%	50 FEET	1
6% TO 10%	50 FEET	2
MORE THAN 10%	25 FEET	2

9. PROVIDE A GRAVEL BAG SILT BASIN OR TRAP BY EVERY STORM DRAIN INLET TO PREVENT SEDIMENT FROM ENTERING DRAIN SYSTEM.
10. GRAVEL BAGS AND FILL MATERIAL SHALL BE STOCKPILED AT INTERVALS, READY FOR USE WHEN REQUIRED.
11. ALL EROSION CONTROL DEVICES WITHIN THE DEVELOPMENT SHOULD BE MAINTAINED DURING AND AFTER EVERY RUNOFF–PRODUCING STORM, IF POSSIBLE, MAINTENANCE CREWS WOULD BE REQUIRED TO HAVE ACCESS TO ALL AREAS.
12. PROVIDE ROCK RIP–RAP ON CURVES AND STEEP DROPS IN ALL EROSION PRONE DRAINAGE CHANNELS DOWNSTREAM FROM THE DEVELOPMENT. THIS PROTECTION WOULD REDUCE EROSION CAUSED BY THE INCREASED FLOWS THAT MAY BE ANTICIPATED FROM DENUDED SLOPES, OR FROM IMPERVIOUS SURFACES.
13. ANY PROPOSED ALTERNATE CONTROL MEASURES MUST BE APPROVED IN ADVANCE BY ALL RESPONSIBLE AGENCIES; IE, SDG&E REPRESENTATIVE, DEPARTMENT OF SANITATION AND FLOOD CONTROL, OFFICE OF ENVIRONMENTAL MANAGEMENT, ETC.

HYDROSEED MIX LEGEND - SEE SPECIFICATIONS FOR HYDROSEED COMPONENTS

SYMBOL	BOTANICAL NAME	COMMON NAME	LBS/ ACRE	PURITY	GEMINATION	SEED COUNT PER LB	PURE LIVE SEEDS PER LB
MIX #1	NATIVE REVEGETATION FOR FILL SLOPES						
	ADENOSTOMA FASCICULATA	CHAMISE	1.0				
	ADENOSTOMA SPARSIFOLIUM	RED SHANKS	1.0				
	ARTEMISIA CALIFORNICA	COASTAL SAGE	2.0				
	ARTEMISIA TRIDENTATA	SAGE	1.0				
	BACCHARIS CONSANGUINEA	COYOTE BRUSH	1.0				
	BACCHARIS SARATHROIDES	BROOM BACCHARIS	1.0				
	CAMISSONIA CHEIRANTHIFOLIUS	SUN CUPS	1.0				
	ENCELIA FARINOSA	DESERT ENCELIA	1.0				
	EPILOBIUM CANUM	CALIFORNIA FUCHSIA	1.0				
	ERIOGONUM FASCICULATUM 'FOLIOLOSUM'	CALIFORNIA BUCKWHEAT	1.0				
	ESCHSCHOLZIA CALIFORNICA	CALIFORNIA POPPY	1.0				
	LASTHENIA CHRYSTOSTEMA	DWARF GOLDFIELDS	10.0				
	LOTUS SCOPARIUS	DEER WEED	2.0				
	LUPINUS SUCCULENTUS	ARROYO LUPINE	1.0				
	MUHLENBERGIA RIGENS	DEER GRASS	1.0				
	NASSELLA PULCHRA	STIPA	1.0				
	PENSTEMON SPECTABILIS	PENSTEMON	1.0				
	SALVIA COLUMBARIAE	CHIA	0.5				
	SALVIA CLEVELANDII	SAN DIEGO SAGE	1.0				
	VULPIA MEGALURA	SMALL FESCUE	2.0				
	YUCCA SHIDIGERA	YUCCA	1.0				
MIX #2	NATIVE REVEGETATION FOR CUT SLOPES						
	ADENOSTOMA FASCICULATA	CHAMISE	1.0				
	ADENOSTOMA SPARSIFOLIUM	RED SHANKS	1.0				
	ARTEMISIA CALIFORNICA	COASTAL SAGE	2.0				
	ARTEMISIA TRIDENTATA	SAGE	1.0				
	BACCHARIS CONSANGUINEA	COYOTE BRUSH	1.0				
	BACCHARIS SARATHROIDES	BROOM BACCHARIS	1.0				
	CAMISSONIA CHEIRANTHIFOLIUS	SUN CUPS	1.0				
	ENCELIA FARINOSA	DESERT ENCELIA	1.0				
	EPILOBIUM CANUM	CALIFORNIA FUCHSIA	1.0				
	ERIOGONUM FASCICULATUM 'FOLIOLOSUM'	CALIFORNIA BUCKWHEAT	1.0				
	ESCHSCHOLZIA CALIFORNICA	CALIFORNIA POPPY	1.0				
	LASTHENIA CHRYSTOSTEMA	DWARF GOLDFIELDS	10.0				
	LOTUS SCOPARIUS	DEER WEED	2.0				
	LUPINUS SUCCULENTUS	ARROYO LUPINE	1.0				
	MUHLENBERGIA RIGENS	DEER GRASS	1.0				
	NASSELLA PULCHRA	STIPA	1.0				
	PENSTEMON SPECTABILIS	PENSTEMON	1.0				
	SALVIA COLUMBARIAE	CHIA	0.5				
	SALVIA CLEVELANDII	SAN DIEGO SAGE	1.0				
	VULPIA MEGALURA	SMALL FESCUE	2.0				
	YUCCA SHIDIGERA	YUCCA	1.0				

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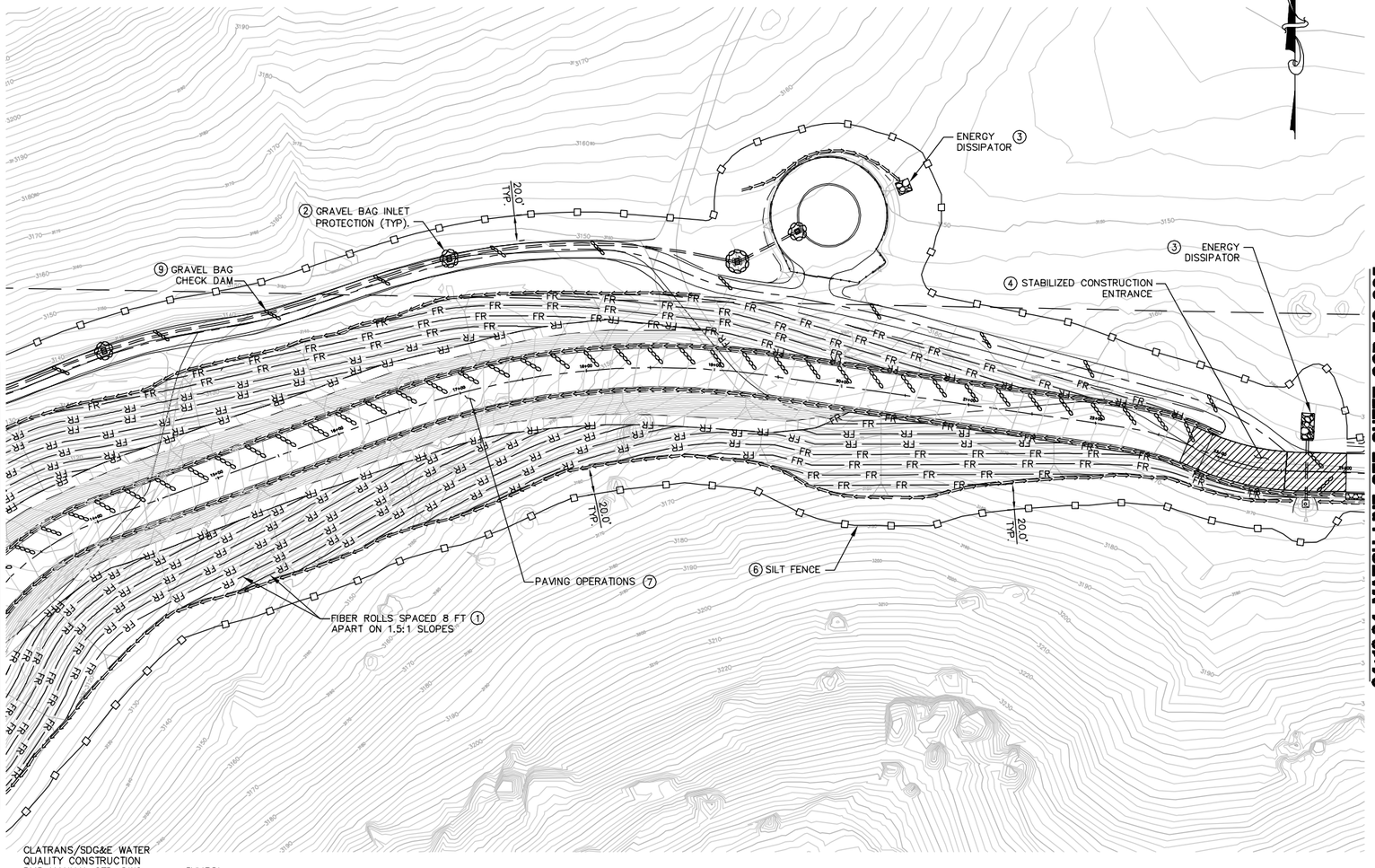
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SAN DIEGO, CALIFORNIA

SUNCREST SUBSTATION
EROSION CONTROL PLAN

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CONSTRUCTION NOTES

1. INSTALL FIBER ROLLS. SEE BMP SHEETS SC-5/BMP 1-03 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
2. INSTALL STORM DRAIN INLET PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
3. INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
4. INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.
5. INSTALL GRAVEL BAG BERM, TWO BAGS HIGH, SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
6. INSTALL SILT FENCE, SEE BMP SHEETS SC-1/BMP 1-02 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
7. PERFORM PAVING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
8. INSTALL SEDIMENTATION BASIN. SEE BMP SHEET SC-2 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES. (SEE SPECIAL NOTE 2 ON SHEET XX)
9. INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
10. MATERIAL DELIVERY AND STORAGE LOCATION. SEE BMP SHEETS WM-1/BMP 2-01 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
11. CONCRETE WASHOUT AREA. SEE BMP SHEET WM-8 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
12. SANITARY/SEPTIC WASTE LOCATION. SEE BMP SHEETS WM-9/BMP 2-07 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
13. SOLID WASTE LOCATION. SEE BMP SHEETS WM-5/BMP 2-04 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
14. PERFORM HYDROSEEDING OPERATIONS. SEE BMP SHEETS SS-3/BMP 4-04 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

LEGEND

DESCRIPTION	SEE CON. NOTE #	CLATRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
STORM WATER SAMPLING & MONITORING LOCATION			▲
CONCRETE DITCH			⇒ ⇒ ⇒
FIBER ROLLS	1	SC-5/BMP 1-03	FR
GRAVEL BAG INLET PROTECTION	2	SC-10/BMP 1-06	
ENERGY DISSIPATOR	3	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	4	TC-1/BMP 1-07	
GRAVEL BAG BERM	5	SC-6/BMP 1-04	GBB
SILT FENCE	6	SC-1/BMP 1-02	
PAVING OPERATIONS	7	NS-3/BMP 3-02	
SEDIMENTATION BASIN	8	SC-2	
GRAVEL BAGS	9	SC-4/BMP 1-04	
MATERIAL DELIVERY AND STORAGE AREA	10	WM-1/BMP 2-01	
CONCRETE WASHOUT AREA	11	WM-8	
SANITARY/SEPTIC WASTE LOCATION	12	WM-9/BMP 2-07	WS
SOLID WASTE LOCATION	13	WM-5/BMP 2-04	SWA
HYDROSEEDING OPERATIONS	14	SS-3/BMP 4-04	
HYDROSEED MIX #1			
HYDROSEED MIX #2			

GRAPHIC SCALE
50 0 50 100
1"=50'

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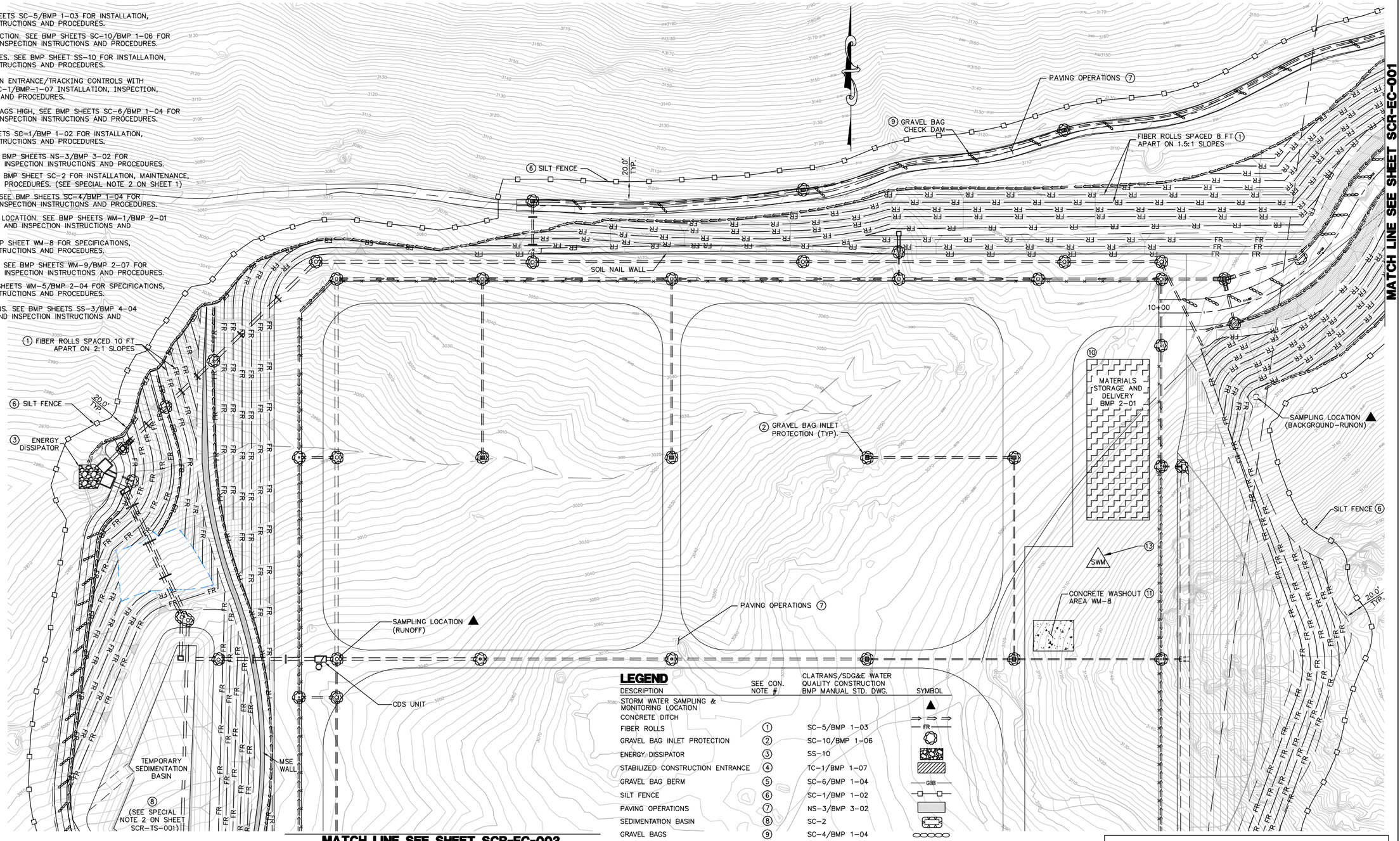
SUNCREST SUBSTATION
EROSION CONTROL PLAN

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CONSTRUCTION NOTES

1. INSTALL FIBER ROLLS. SEE BMP SHEETS SC-5/BMP 1-03 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
2. INSTALL STORM DRAIN INLET PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
3. INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
4. INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.
5. INSTALL GRAVEL BAG BERM, TWO BAGS HIGH. SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
6. INSTALL SILT FENCE, SEE BMP SHEETS SC-1/BMP 1-02 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
7. PERFORM PAVING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
8. INSTALL SEDIMENTATION BASIN. SEE BMP SHEET SC-2 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES. (SEE SPECIAL NOTE 2 ON SHEET 1)
9. INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
10. MATERIAL DELIVERY AND STORAGE LOCATION. SEE BMP SHEETS WM-1/BMP 2-01 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
11. CONCRETE WASHOUT AREA. SEE BMP SHEET WM-8 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
12. SANITARY/SEPTIC WASTE LOCATION. SEE BMP SHEETS WM-9/BMP 2-07 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
13. SOLID WASTE LOCATION. SEE BMP SHEETS WM-5/BMP 2-04 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
14. PERFORM HYDROSEEDING OPERATIONS. SEE BMP SHEETS SS-3/BMP 4-04 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.



GRAPHIC SCALE
50 0 50 100
1"=50'

LEGEND

DESCRIPTION	SEE CON. NOTE #	CLATRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
STORM WATER SAMPLING & MONITORING LOCATION			▲
CONCRETE DITCH			⇒⇒⇒
FIBER ROLLS	(1)	SC-5/BMP 1-03	FR
GRAVEL BAG INLET PROTECTION	(2)	SC-10/BMP 1-06	
ENERGY DISSIPATOR	(3)	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	(4)	TC-1/BMP 1-07	
GRAVEL BAG BERM	(5)	SC-6/BMP 1-04	GBB
SILT FENCE	(6)	SC-1/BMP 1-02	
PAVING OPERATIONS	(7)	NS-3/BMP 3-02	
SEDIMENTATION BASIN	(8)	SC-2	
GRAVEL BAGS	(9)	SC-4/BMP 1-04	
MATERIAL DELIVERY AND STORAGE AREA	(10)	WM-1/BMP 2-01	
CONCRETE WASHOUT AREA	(11)	WM-8	
SANITARY/SEPTIC WASTE LOCATION	(12)	WM-9/BMP 2-07	
SOLID WASTE LOCATION	(13)	WM-5/BMP 2-04	SWM
HYDROSEEDING OPERATIONS	(14)	SS-3/BMP 4-04	
HYDROSEED MIX #1			
HYDROSEED MIX #2			

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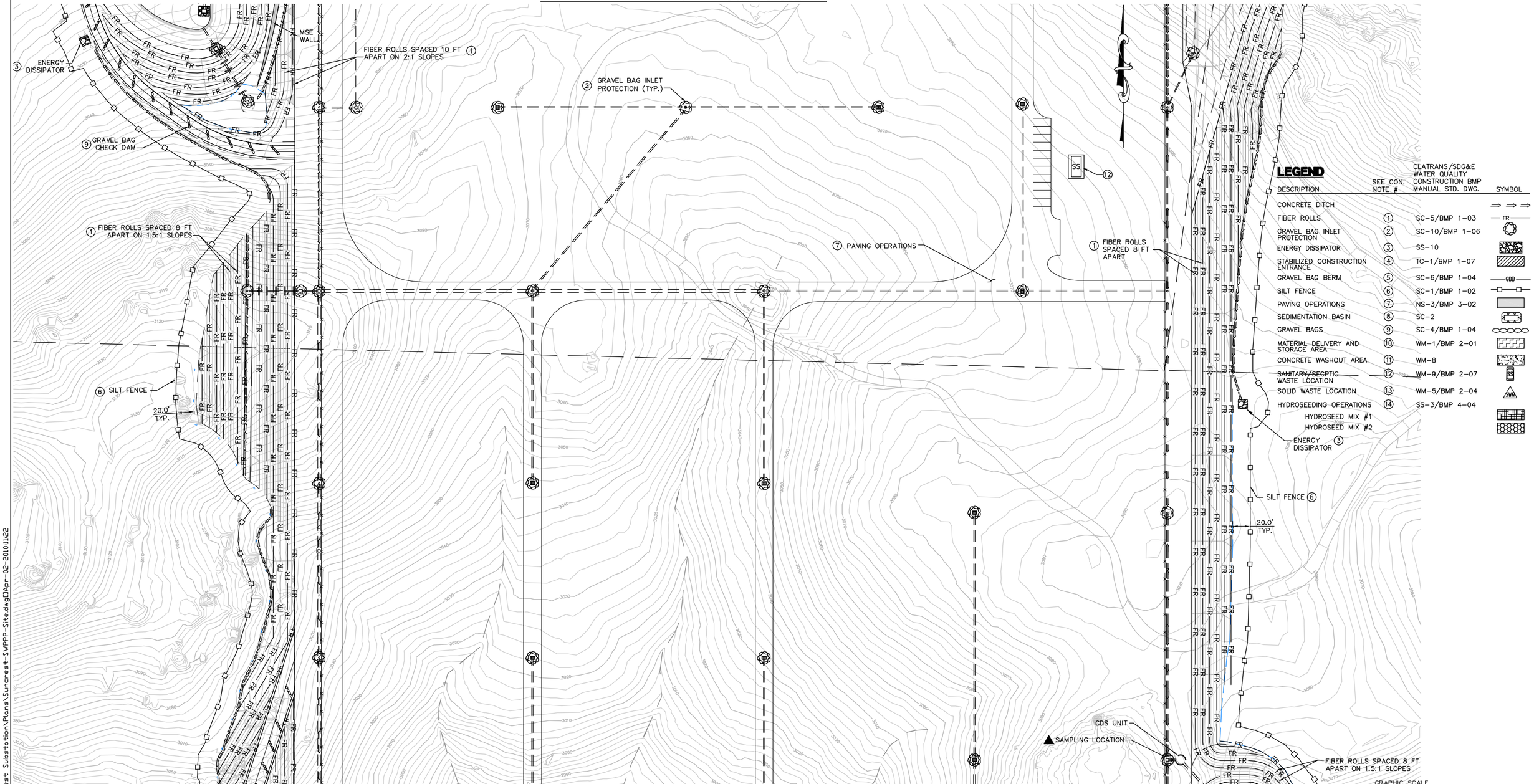
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SUNCREST SUBSTATION
EROSION CONTROL PLAN

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MATCH LINE SEE SHEET SCR-EC-002



MATCH LINE SEE SHEET SCR-EC-004

LEGEND

DESCRIPTION	SEE CON. NOTE #	CLATRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
CONCRETE DITCH			
FIBER ROLLS	①	SC-5/BMP 1-03	FR
GRAVEL BAG INLET PROTECTION	②	SC-10/BMP 1-06	
ENERGY DISSIPATOR	③	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	④	TC-1/BMP 1-07	
GRAVEL BAG BERM	⑤	SC-6/BMP 1-04	GBB
SILT FENCE	⑥	SC-1/BMP 1-02	
PAVING OPERATIONS	⑦	NS-3/BMP 3-02	
SEDIMENTATION BASIN	⑧	SC-2	
GRAVEL BAGS	⑨	SC-4/BMP 1-04	
MATERIAL DELIVERY AND STORAGE AREA	⑩	WM-1/BMP 2-01	
CONCRETE WASHOUT AREA	⑪	WM-8	
SANITARY/SECPTIC WASTE LOCATION	⑫	WM-9/BMP 2-07	
SOLID WASTE LOCATION	⑬	WM-5/BMP 2-04	
HYDROSEEDING OPERATIONS	⑭	SS-3/BMP 4-04	
HYDROSEED MIX #1			
HYDROSEED MIX #2			

CONSTRUCTION NOTES

① INSTALL FIBER ROLLS. SEE BMP SHEETS SC-5/BMP 1-03 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

② INSTALL STORM DRAIN INLET PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

③ INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

④ INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.

⑤ INSTALL GRAVEL BAG BERM, TWO BAGS HIGH, SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

CONSTRUCTION NOTES

⑥ INSTALL SILT FENCE, SEE BMP SHEETS SC-1/BMP 1-02 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

⑦ PERFORM PAVING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

⑧ INSTALL SEDIMENTATION BASIN. SEE BMP SHEET SC-2 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES. (SEE SPECIAL NOTE 2 ON SHEET XX)

⑨ INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

CONSTRUCTION NOTES

⑩ MATERIAL DELIVERY AND STORAGE LOCATION. SEE BMP SHEETS WM-1/BMP 2-01 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

⑪ CONCRETE WASHOUT AREA. SEE BMP SHEET WM-8 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

⑫ SANITARY/SECPTIC WASTE LOCATION. SEE BMP SHEETS WM-9/BMP 2-07 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

⑬ SOLID WASTE LOCATION. SEE BMP SHEETS WM-5/BMP 2-04 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

CONSTRUCTION NOTES

⑭ PERFORM HYDROSEEDING OPERATIONS. SEE BMP SHEETS SS-3/BMP 4-04 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

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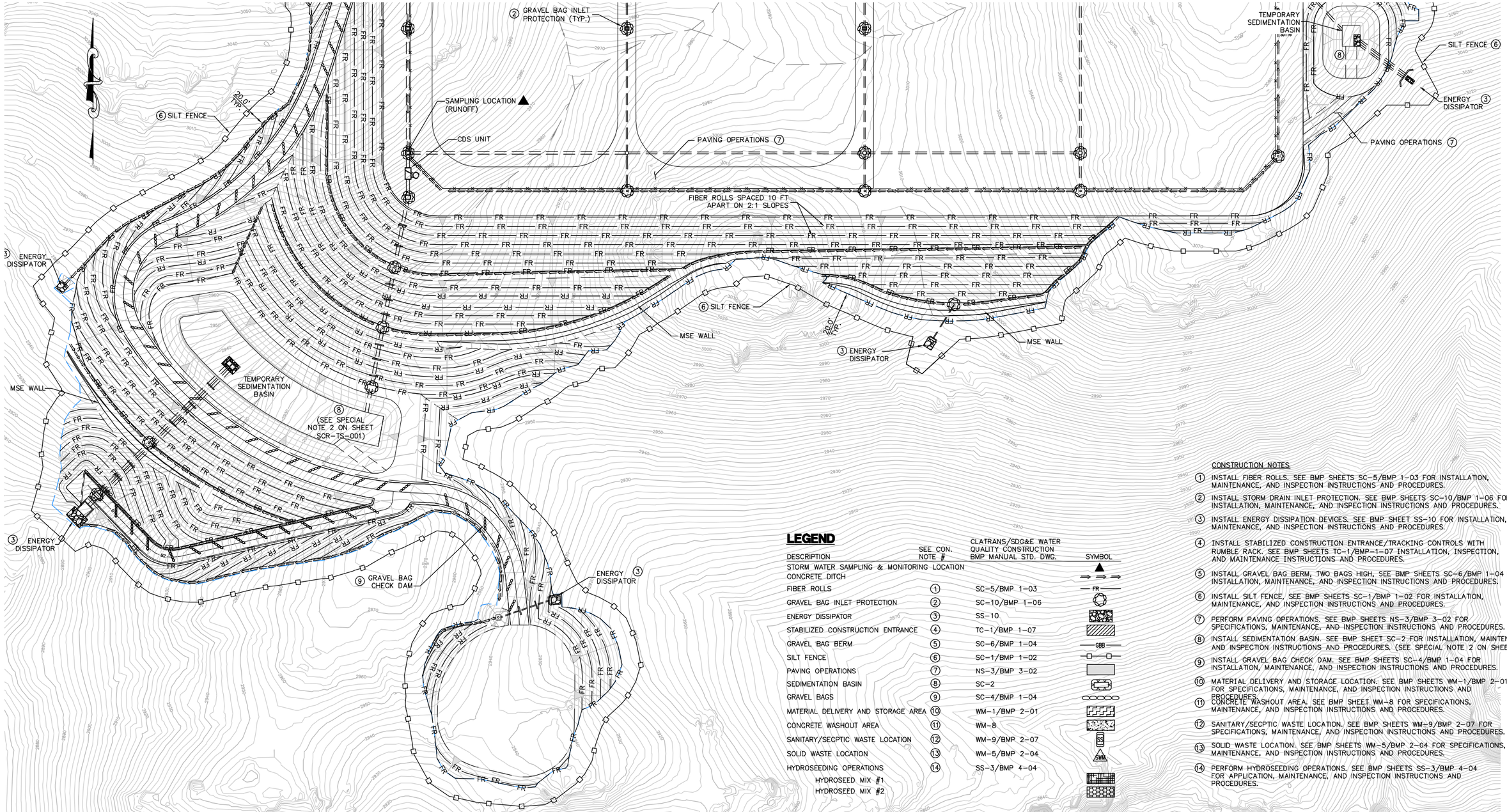
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SAN DIEGO, CALIFORNIA

SUNCREST SUBSTATION
EROSION CONTROL PLAN

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MATCH LINE SEE SHEET SCR-EC-003



LEGEND

DESCRIPTION	SEE CON. NOTE #	CLATRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
STORM WATER SAMPLING & MONITORING LOCATION			▲
CONCRETE DITCH			⇒⇒⇒
FIBER ROLLS	1	SC-5/BMP 1-03	FR
GRAVEL BAG INLET PROTECTION	2	SC-10/BMP 1-06	
ENERGY DISSIPATOR	3	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	4	TC-1/BMP 1-07	
GRAVEL BAG BERM	5	SC-6/BMP 1-04	GBB
SILT FENCE	6	SC-1/BMP 1-02	
PAVING OPERATIONS	7	NS-3/BMP 3-02	
SEDIMENTATION BASIN	8	SC-2	
GRAVEL BAGS	9	SC-4/BMP 1-04	
MATERIAL DELIVERY AND STORAGE AREA	10	WM-1/BMP 2-01	
CONCRETE WASHOUT AREA	11	WM-8	
SANITARY/SECPTIC WASTE LOCATION	12	WM-9/BMP 2-07	SS
SOLID WASTE LOCATION	13	WM-5/BMP 2-04	SW
HYDROSEEDING OPERATIONS	14	SS-3/BMP 4-04	
HYDROSEED MIX #1			
HYDROSEED MIX #2			

CONSTRUCTION NOTES

1. INSTALL FIBER ROLLS. SEE BMP SHEETS SC-5/BMP 1-03 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
2. INSTALL STORM DRAIN INLET PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
3. INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
4. INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.
5. INSTALL GRAVEL BAG BERM, TWO BAGS HIGH, SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
6. INSTALL SILT FENCE, SEE BMP SHEETS SC-1/BMP 1-02 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
7. PERFORM PAVING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
8. INSTALL SEDIMENTATION BASIN. SEE BMP SHEET SC-2 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES. (SEE SPECIAL NOTE 2 ON SHEET 1)
9. INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
10. MATERIAL DELIVERY AND STORAGE LOCATION. SEE BMP SHEETS WM-1/BMP 2-01 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
11. CONCRETE WASHOUT AREA. SEE BMP SHEET WM-8 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
12. SANITARY/SECPTIC WASTE LOCATION. SEE BMP SHEETS WM-9/BMP 2-07 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
13. SOLID WASTE LOCATION. SEE BMP SHEETS WM-5/BMP 2-04 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
14. PERFORM HYDROSEEDING OPERATIONS. SEE BMP SHEETS SS-3/BMP 4-04 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

GRAPHIC SCALE
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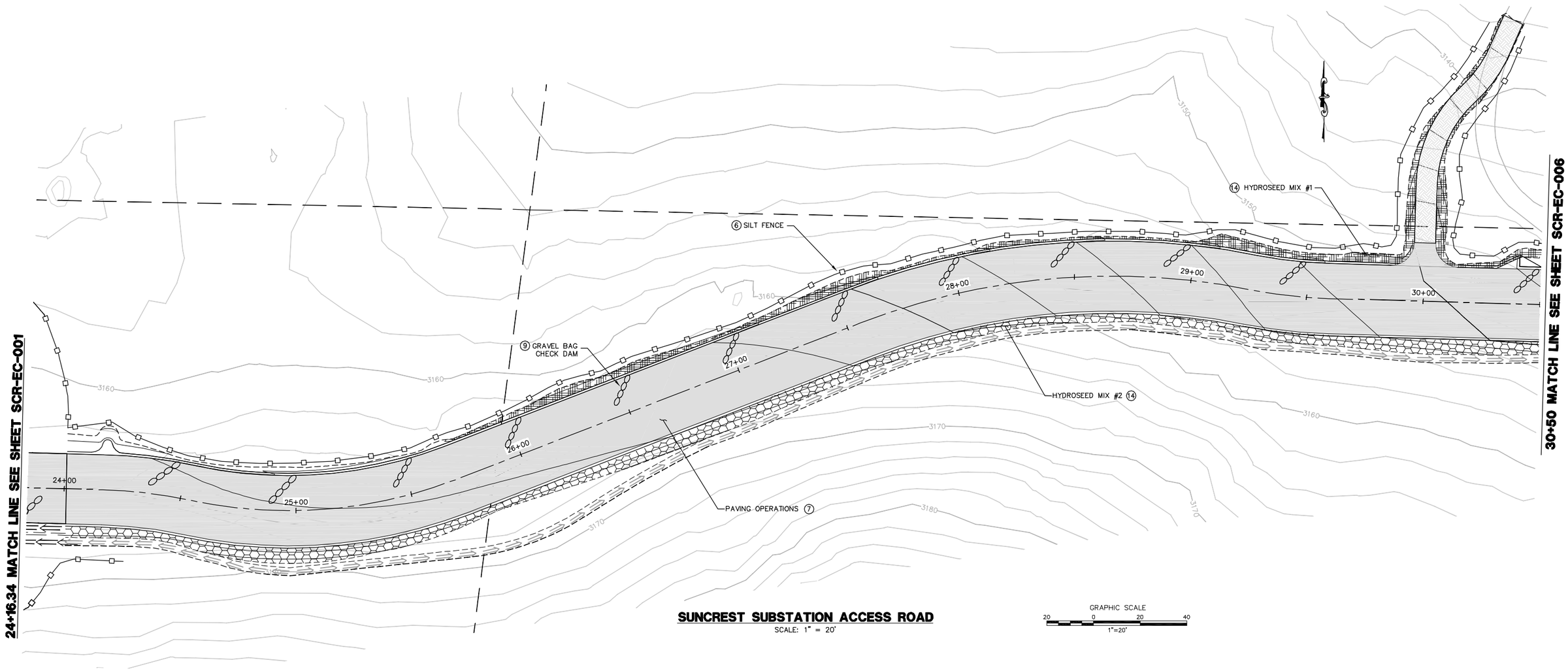
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SUNCREST SUBSTATION
EROSION CONTROL PLAN

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CHECKED BY: –	DATE:				
APPROVED BY: –	DATE:				SCR-EC-004
CAD NO.:	PLOT SCALE: 1 = 1				

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SUNCREST SUBSTATION ACCESS ROAD

SCALE: 1" = 20'

GRAPHIC SCALE
20 0 20 40
1"=20'

LEGEND

DESCRIPTION	SEE CON. NOTE #	CLATRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
CONCRETE DITCH			
GRAVEL BAG INLET PROTECTION	②	SC-10/BMP 1-06	
ENERGY DISSIPATOR	③	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	④	TC-1/BMP 1-07	
GRAVEL BAG BERM	⑤	SC-6/BMP 1-04	GBB
SILT FENCE	⑥	SC-1/BMP 1-02	
PAVING OPERATIONS	⑦	NS-3/BMP 3-02	
GRAVEL BAGS	⑨	SC-4/BMP 1-04	
HYDROSEEDING OPERATIONS	⑭	SS-3/BMP 4-04	
HYDROSEED MIX #1			
HYDROSEED MIX #2			

CONSTRUCTION NOTES

② INSTALL STORM DRAIN INLET PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

③ INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

④ INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.

⑤ INSTALL GRAVEL BAG BERM, TWO BAGS HIGH, SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

⑥ INSTALL SILT FENCE, SEE BMP SHEETS SC-1/BMP 1-02 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

⑦ PERFORM PAVING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

⑨ INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

⑭ PERFORM HYDROSEEDING OPERATIONS. SEE BMP SHEETS SS-3/BMP 4-04 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

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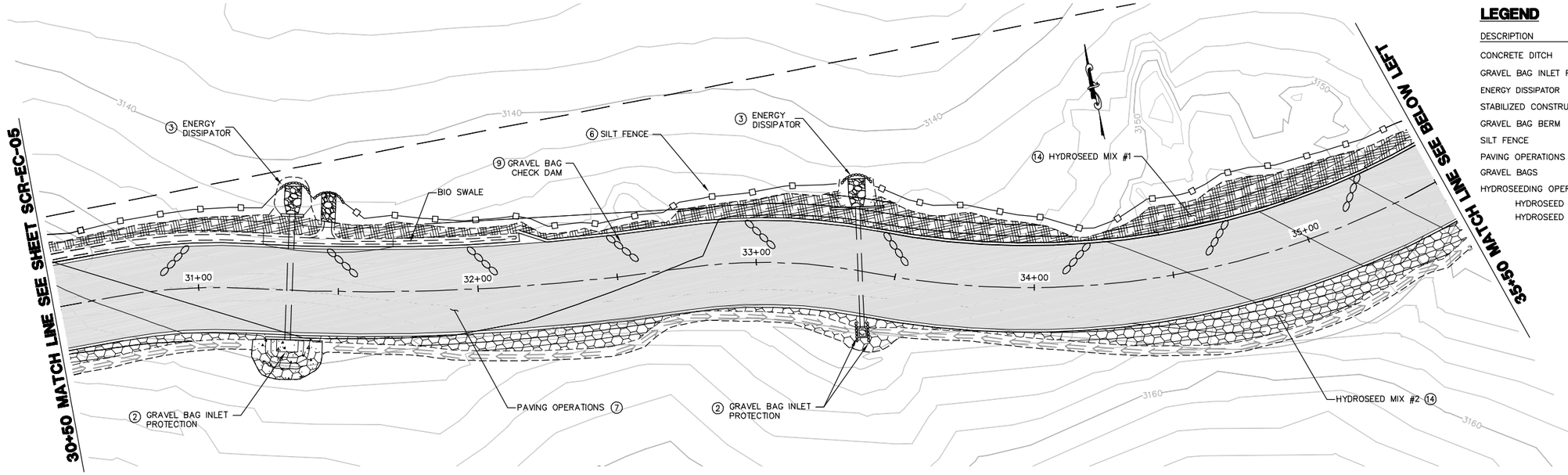
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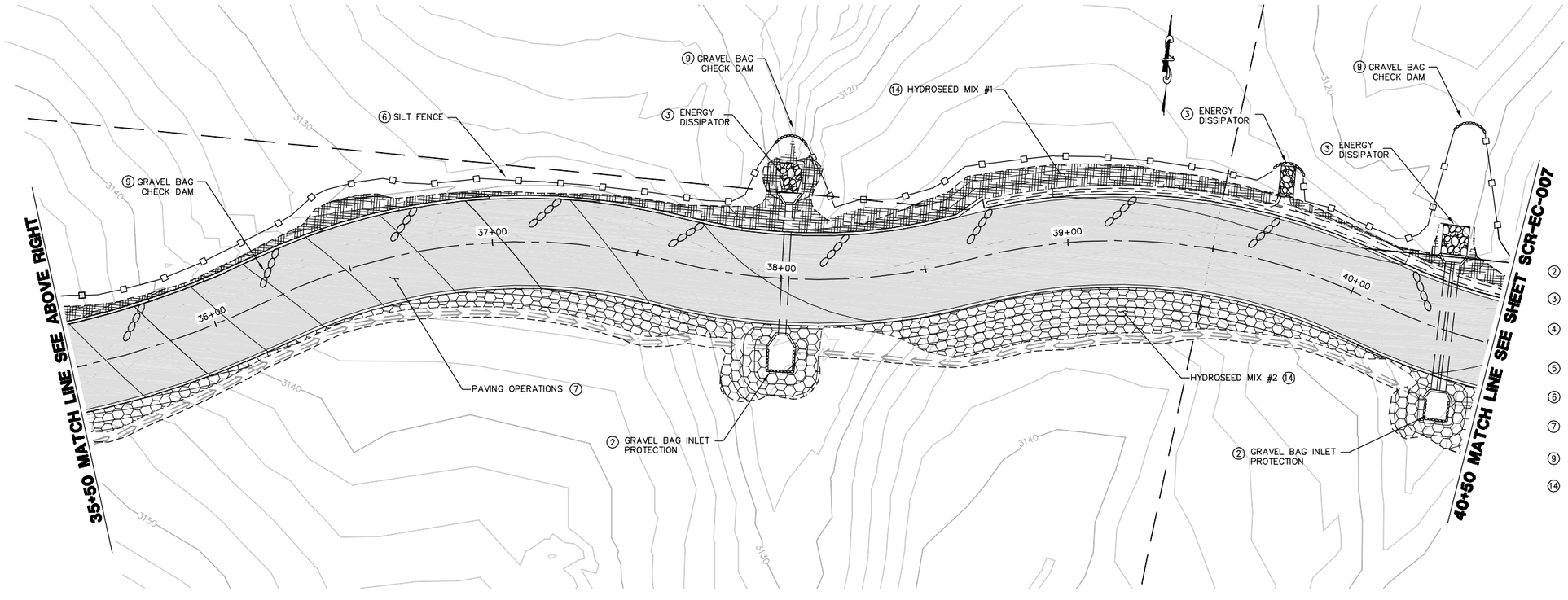
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SAN DIEGO, CALIFORNIA

SUNCREST SUBSTATION ACCESS ROAD
EROSION CONTROL

DRAWN BY: 00	DATE:	SCALE: 1" = 20'	W.O. REV. 0
CHECKED BY:	DATE:		
APPROVED BY:	DATE:		
CAD NO.:	PLOT SCALE: 1 = 1		

SCR-EC-005





LEGEND

DESCRIPTION	SEE CON. NOTE #	CLATRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
CONCRETE DITCH			
GRAVEL BAG INLET PROTECTION	(2)	SC-10/BMP 1-06	
ENERGY DISSIPATOR	(3)	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	(4)	TC-1/BMP 1-07	
GRAVEL BAG BERM	(5)	SC-6/BMP 1-04	GBB
SILT FENCE	(6)	SC-1/BMP 1-02	
PAVING OPERATIONS	(7)	NS-3/BMP 3-02	
GRAVEL BAGS	(9)	SC-4/BMP 1-04	
HYDROSEEDING OPERATIONS	(14)	SS-3/BMP 4-04	
HYDROSEED MIX #1			
HYDROSEED MIX #2			

SUNCREST SUBSTATION ACCESS ROAD
SCALE: 1" = 20'

GRAPHIC SCALE
20 0 20 40
1"=20'

CONSTRUCTION NOTES

(2) INSTALL STORM DRAIN INLET PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(3) INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(4) INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.

(5) INSTALL GRAVEL BAG BERM, TWO BAGS HIGH, SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(6) INSTALL SILT FENCE, SEE BMP SHEETS SC-1/BMP 1-02 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(7) PERFORM PAVING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(9) INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(14) PERFORM HYDROSEEDING OPERATIONS. SEE BMP SHEETS SS-3/BMP 4-04 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

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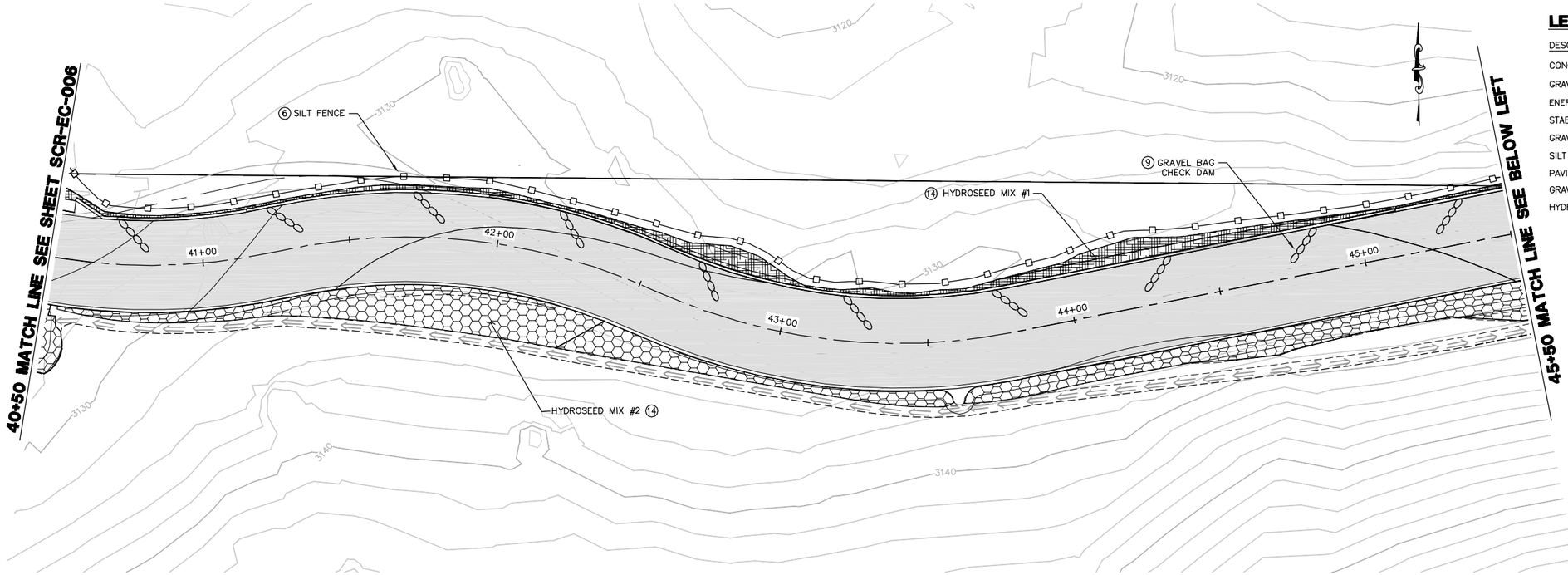
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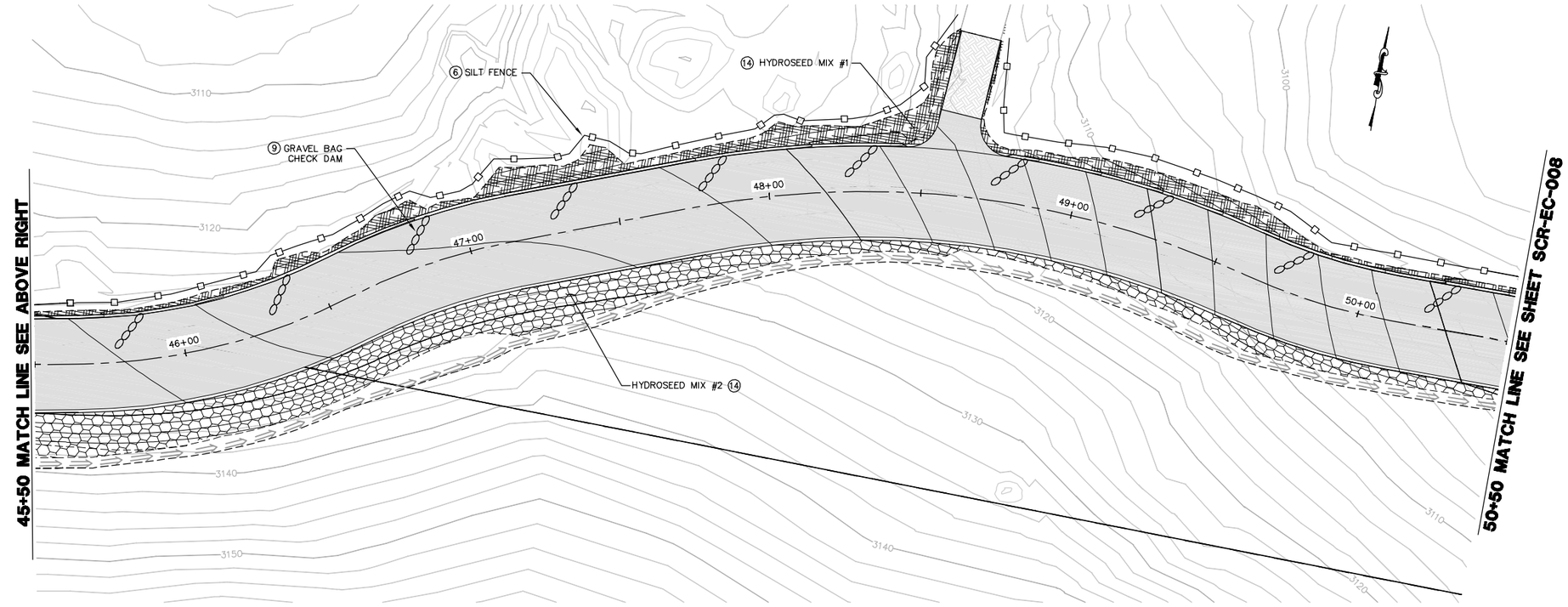
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SAN DIEGO, CALIFORNIA

SUNCREST SUBSTATION ACCESS ROAD
EROSION CONTROL

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CAD NO.:	PLOT SCALE: 1 = 1				

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LEGEND

DESCRIPTION	SEE CON. NOTE #	CLATRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
CONCRETE DITCH			
GRAVEL BAG INLET PROTECTION	(2)	SC-10/BMP 1-06	
ENERGY DISSIPATOR	(3)	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	(4)	TC-1/BMP 1-07	
GRAVEL BAG BERM	(5)	SC-6/BMP 1-04	GBB
SILT FENCE	(6)	SC-1/BMP 1-02	
PAVING OPERATIONS	(7)	NS-3/BMP 3-02	
GRAVEL BAGS	(9)	SC-4/BMP 1-04	
HYDROSEEDING OPERATIONS	(14)	SS-3/BMP 4-04	
HYDROSEED MIX #1			
HYDROSEED MIX #2			

CONSTRUCTION NOTES

(2) INSTALL STORM DRAIN INLET PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(3) INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(4) INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.

(5) INSTALL GRAVEL BAG BERM, TWO BAGS HIGH, SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(6) INSTALL SILT FENCE, SEE BMP SHEETS SC-1/BMP 1-02 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(7) PERFORM PAVING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(9) INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(14) PERFORM HYDROSEEDING OPERATIONS. SEE BMP SHEETS SS-3/BMP 4-04 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

SUNCREST SUBSTATION ACCESS ROAD
SCALE: 1" = 20'

GRAPHIC SCALE
20 0 20 40
1"=20'

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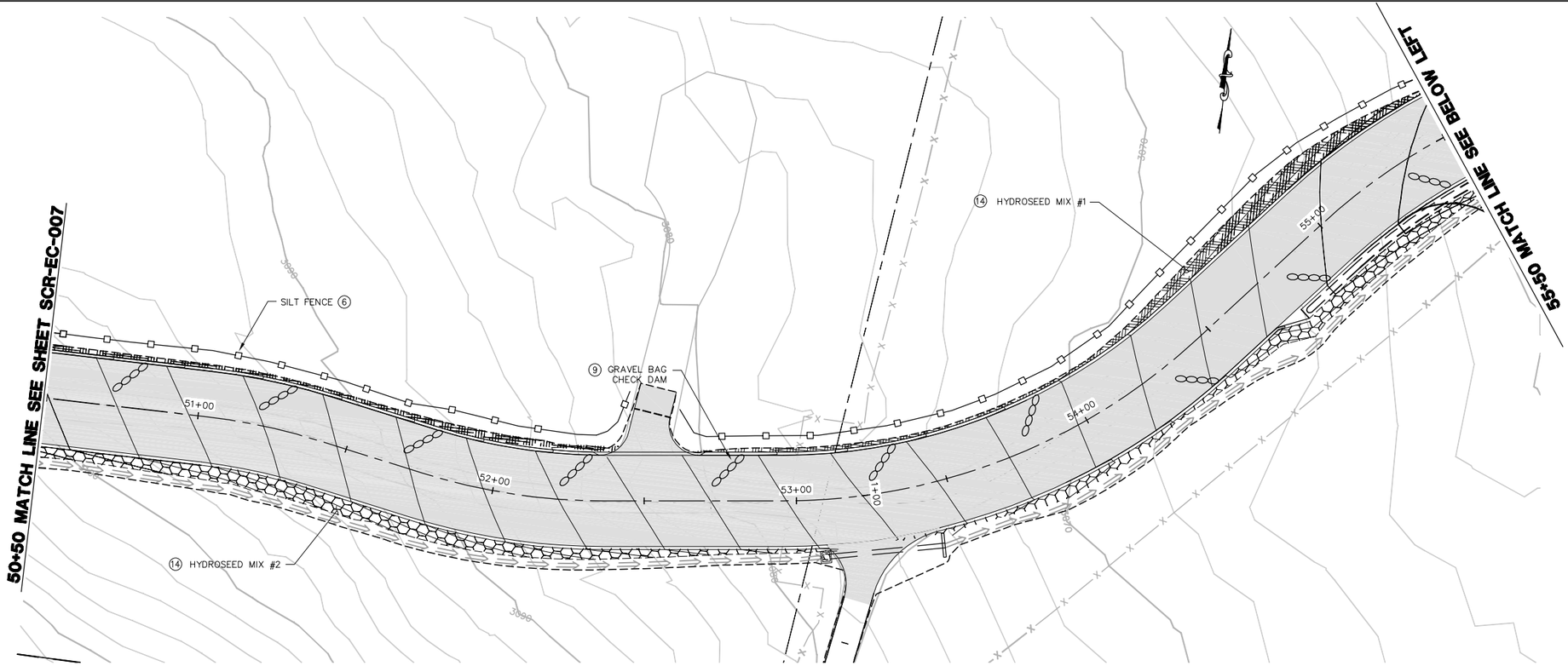
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SUNCREST SUBSTATION ACCESS ROAD
EROSION CONTROL

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CHECKED BY:	DATE:				
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LEGEND

DESCRIPTION	SEE CON. NOTE #	CLATRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
STORM WATER SAMPLING & MONITORING LOCATION			▲
CONCRETE DITCH			⇒ ⇒ ⇒
GRAVEL BAG INLET PROTECTION	(2)	SC-10/BMP 1-06	
ENERGY DISSIPATOR	(3)	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	(4)	TC-1/BMP 1-07	
GRAVEL BAG BERM	(5)	SC-6/BMP 1-04	GBB
SILT FENCE	(6)	SC-1/BMP 1-02	
PAVING OPERATIONS	(7)	NS-3/BMP 3-02	
GRAVEL BAGS	(9)	SC-4/BMP 1-04	
HYDROSEEDING OPERATIONS	(14)	SS-3/BMP 4-04	
HYDROSEED MIX #1			
HYDROSEED MIX #2			

CONSTRUCTION NOTES

(2) INSTALL STORM DRAIN INLET PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(3) INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(4) INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.

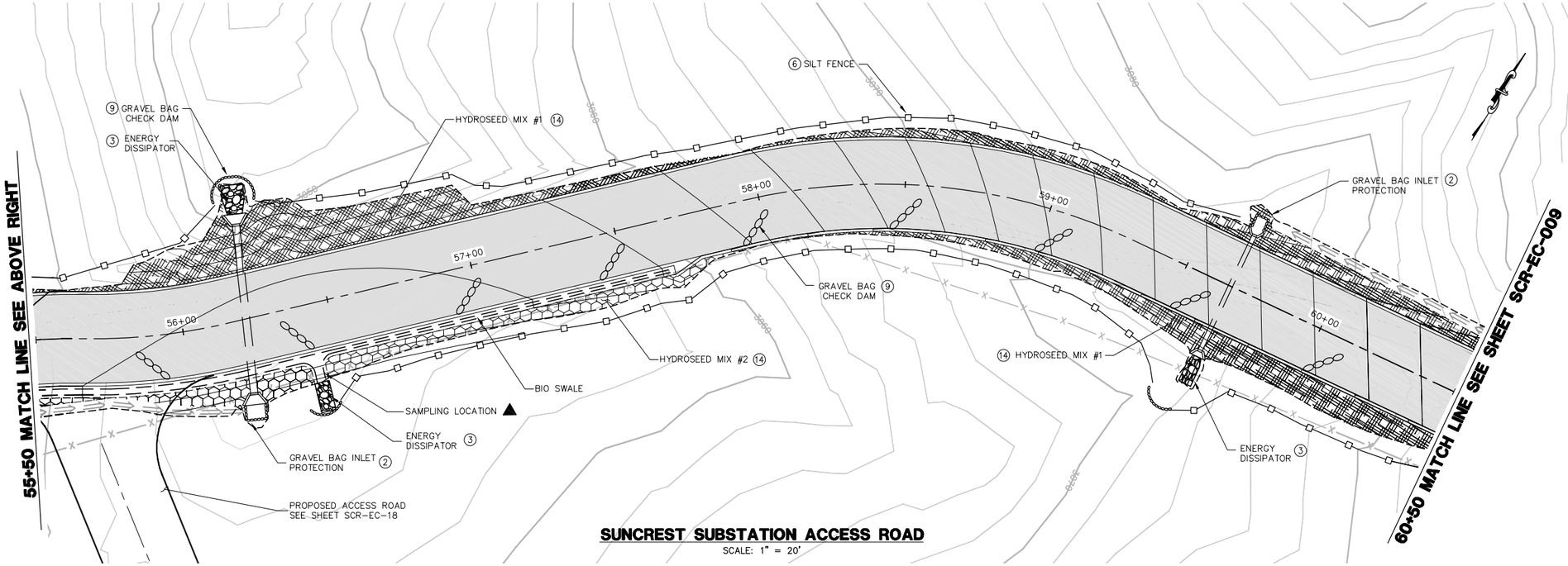
(5) INSTALL GRAVEL BAG BERM, TWO BAGS HIGH, SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(6) INSTALL SILT FENCE, SEE BMP SHEETS SC-1/BMP 1-02 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(7) PERFORM PAVING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(9) INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(14) PERFORM HYDROSEEDING OPERATIONS. SEE BMP SHEETS SS-3/BMP 4-04 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.



GRAPHIC SCALE
20 0 20 40
1"=20'

SUNCREST SUBSTATION ACCESS ROAD

SCALE: 1" = 20'

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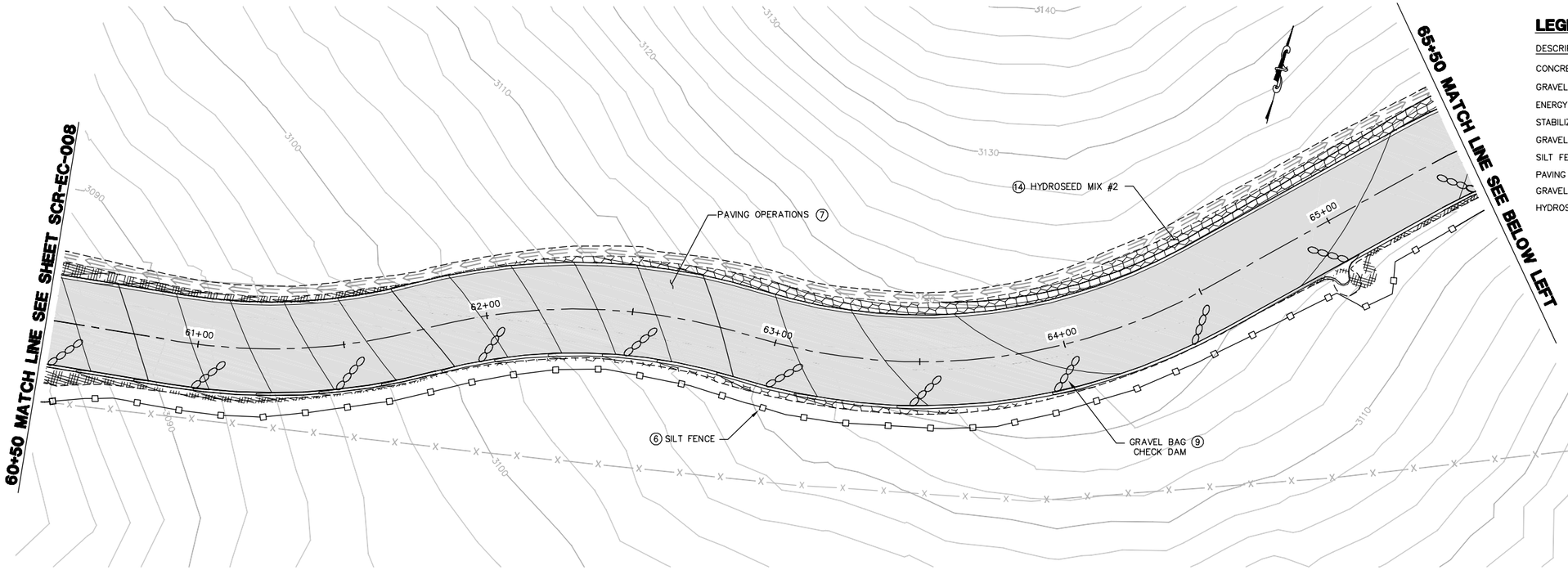
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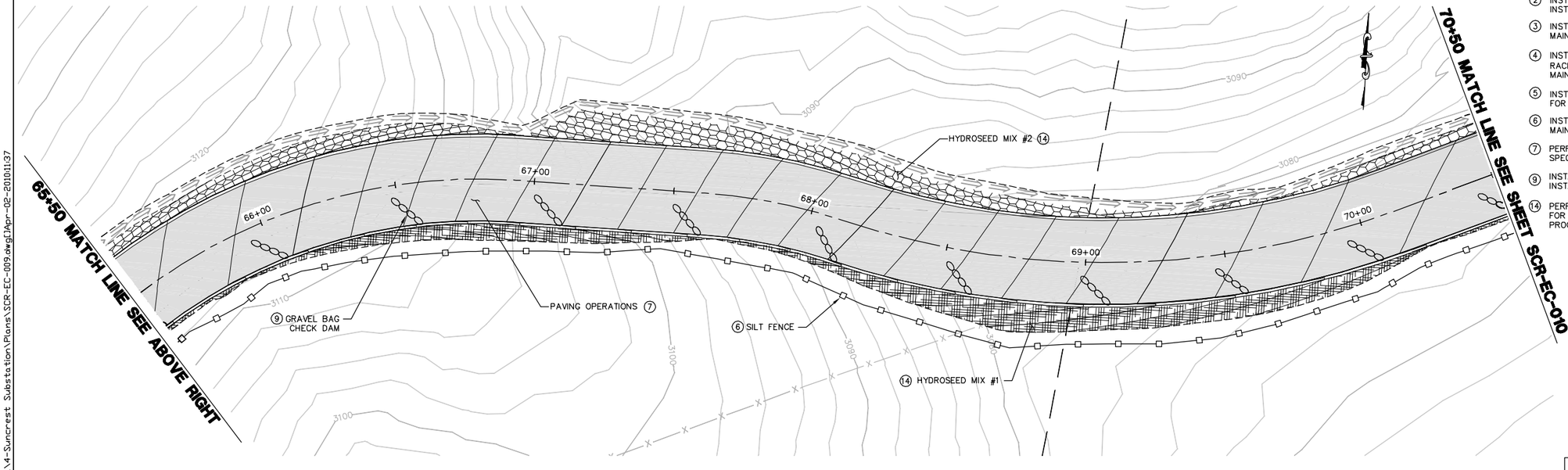
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SAN DIEGO, CALIFORNIA

SUNCREST SUBSTATION ACCESS ROAD
EROSION CONTROL

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LEGEND

DESCRIPTION	SEE CON. NOTE #	CLATRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
CONCRETE DITCH			
GRAVEL BAG INLET PROTECTION	(2)	SC-10/BMP 1-06	
ENERGY DISSIPATOR	(3)	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	(4)	TC-1/BMP 1-07	
GRAVEL BAG BERM	(5)	SC-6/BMP 1-04	GBB
SILT FENCE	(6)	SC-1/BMP 1-02	
PAVING OPERATIONS	(7)	NS-3/BMP 3-02	
GRAVEL BAGS	(9)	SC-4/BMP 1-04	
HYDROSEEDING OPERATIONS	(14)	SS-3/BMP 4-04	
HYDROSEED MIX #1			
HYDROSEED MIX #2			

CONSTRUCTION NOTES

(2) INSTALL STORM DRAIN INLET PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(3) INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(4) INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.

(5) INSTALL GRAVEL BAG BERM, TWO BAGS HIGH, SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(6) INSTALL SILT FENCE, SEE BMP SHEETS SC-1/BMP 1-02 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(7) PERFORM PAVING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(9) INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(14) PERFORM HYDROSEEDING OPERATIONS. SEE BMP SHEETS SS-3/BMP 4-04 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

SUNCREST SUBSTATION ACCESS ROAD

SCALE: 1" = 20'

GRAPHIC SCALE
20 0 20 40
1"=20'

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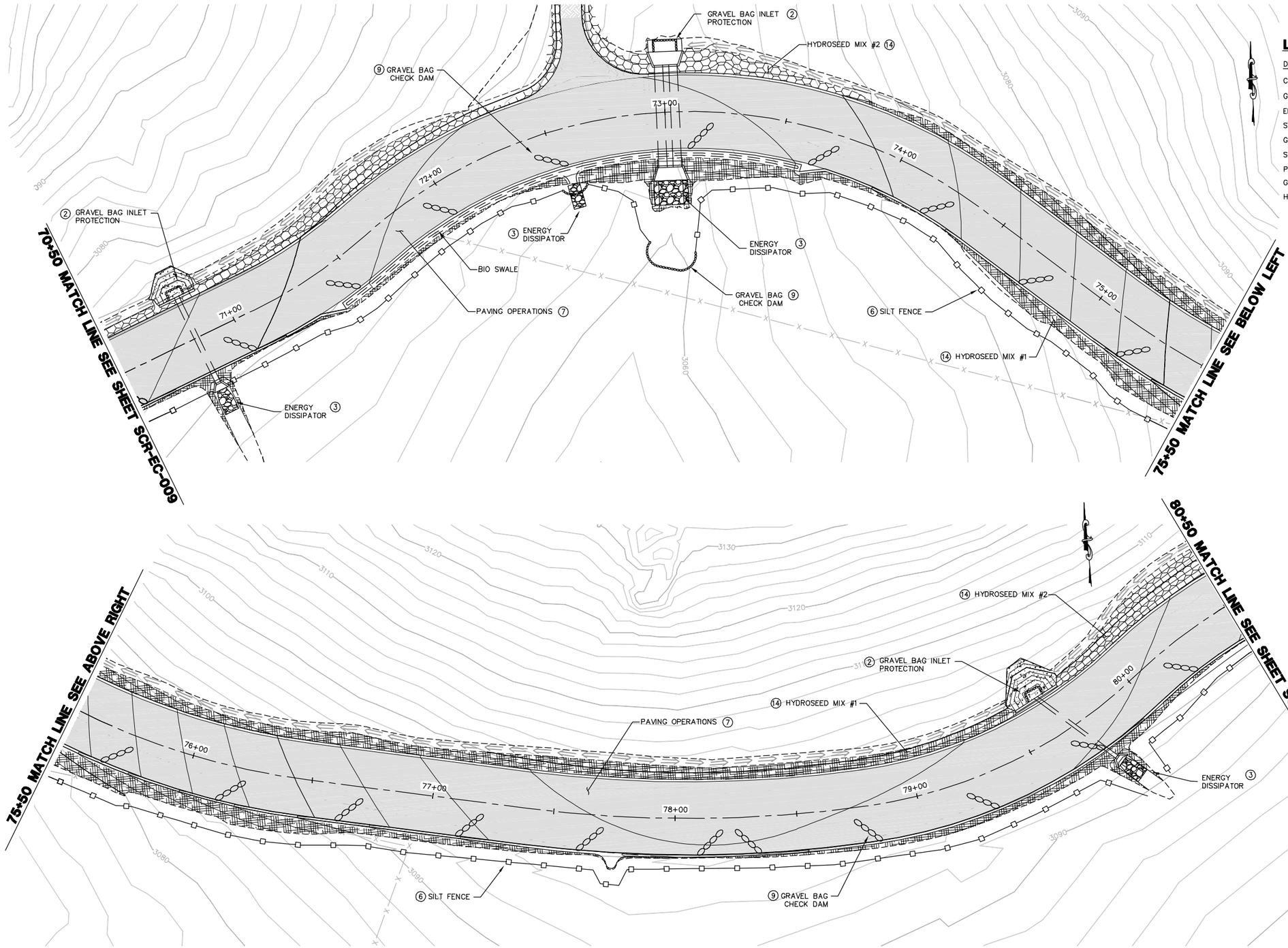
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SAN DIEGO, CALIFORNIA

SUNCREST SUBSTATION ACCESS ROAD
EROSION CONTROL

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LEGEND

DESCRIPTION	SEE CON. NOTE #	CLATRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
CONCRETE DITCH			
GRAVEL BAG INLET PROTECTION	(2)	SC-10/BMP 1-06	
ENERGY DISSIPATOR	(3)	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	(4)	TC-1/BMP 1-07	
GRAVEL BAG BERM	(5)	SC-6/BMP 1-04	GBB
SILT FENCE	(6)	SC-1/BMP 1-02	
PAVING OPERATIONS	(7)	NS-3/BMP 3-02	
GRAVEL BAGS	(9)	SC-4/BMP 1-04	
HYDROSEEDING OPERATIONS	(14)	SS-3/BMP 4-04	
HYDROSEED MIX #1			
HYDROSEED MIX #2			

CONSTRUCTION NOTES

(2) INSTALL STORM DRAIN INLET PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(3) INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(4) INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.

(5) INSTALL GRAVEL BAG BERM, TWO BAGS HIGH, SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(6) INSTALL SILT FENCE, SEE BMP SHEETS SC-1/BMP 1-02 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(7) PERFORM PAVING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(9) INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(14) PERFORM HYDROSEEDING OPERATIONS. SEE BMP SHEETS SS-3/BMP 4-04 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

SUNCREST SUBSTATION ACCESS ROAD

SCALE: 1" = 20'

GRAPHIC SCALE
20 0 20 40
1"=20'

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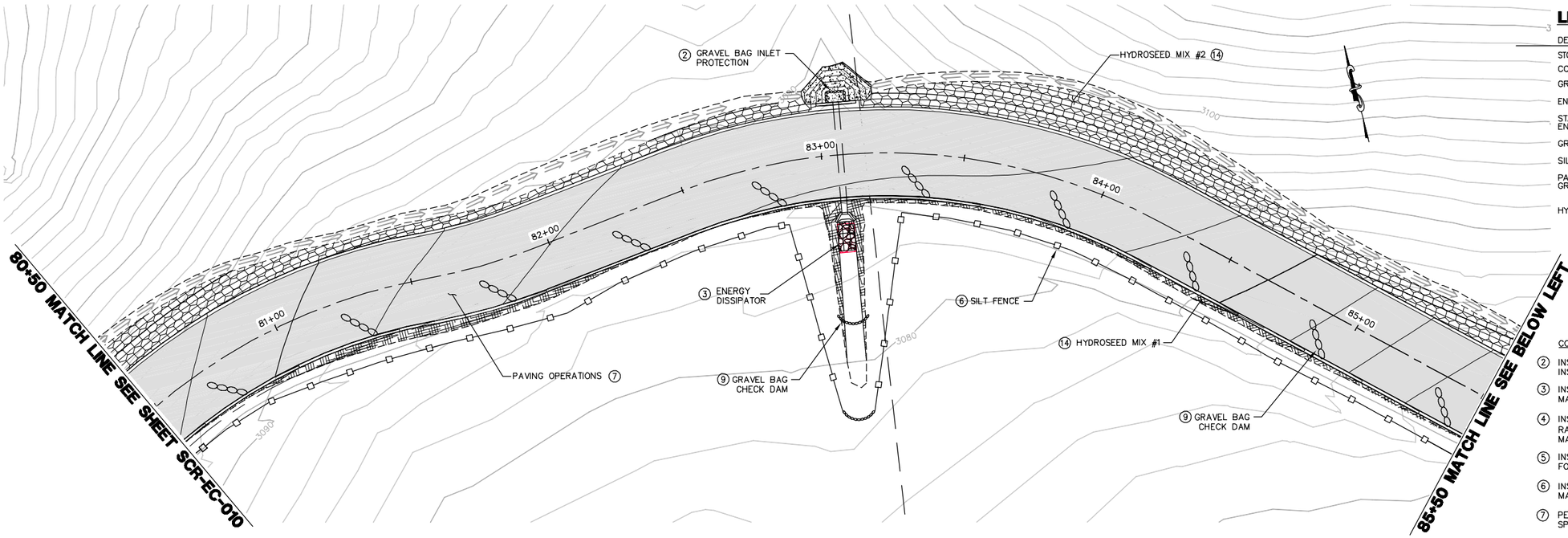
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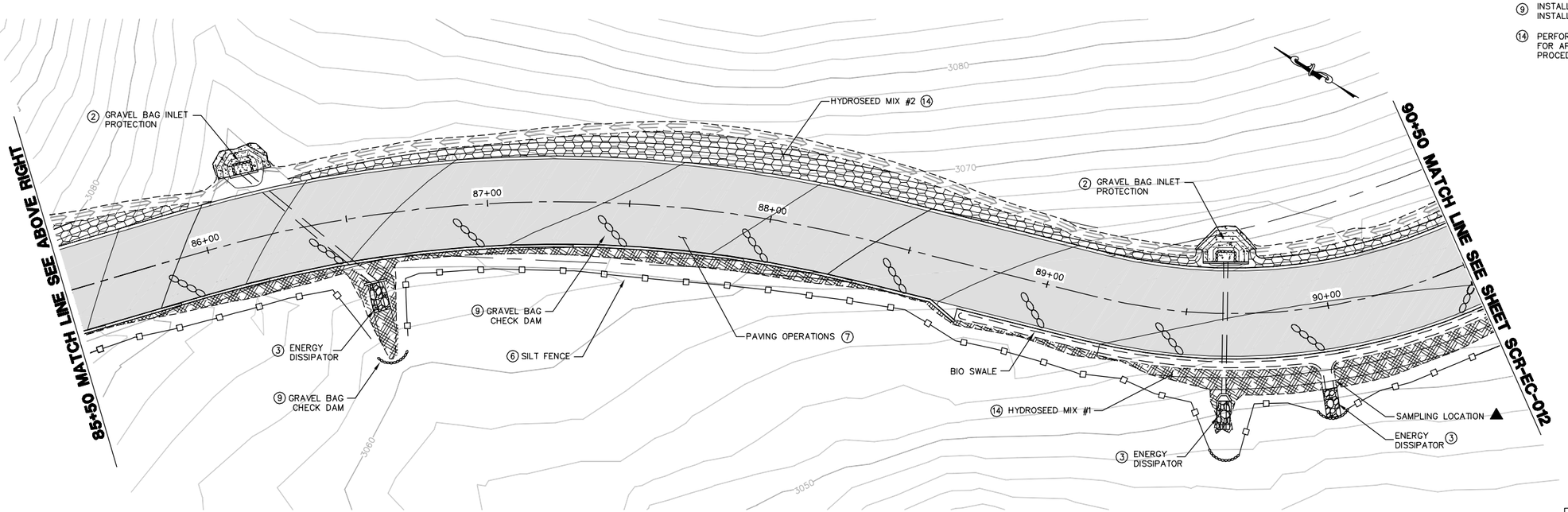
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SAN DIEGO, CALIFORNIA

SUNCREST SUBSTATION ACCESS ROAD
EROSION CONTROL

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CAD NO.:		PLOT SCALE: 1 = 1			

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LEGEND

DESCRIPTION	SEE CON. NOTE #	CLATRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
STORM WATER SAMPLING & MONITORING LOCATION			
CONCRETE DITCH			
GRAVEL BAG INLET PROTECTION	②	SC-10/BMP 1-06	
ENERGY DISSIPATOR	③	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	④	TC-1/BMP 1-07	
GRAVEL BAG BERM	⑤	SC-6/BMP 1-04	GBB
SILT FENCE	⑥	SC-1/BMP 1-02	
PAVING OPERATIONS GRAVEL BAGS	⑦	NS-3/BMP 3-02	
	⑨	SC-4/BMP 1-04	
HYDROSEEDING OPERATIONS	⑭	SS-3/BMP 4-04	
HYDROSEED MIX #1			
HYDROSEED MIX #2			

CONSTRUCTION NOTES

② INSTALL STORM DRAIN INLET PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

③ INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

④ INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.

⑤ INSTALL GRAVEL BAG BERM, TWO BAGS HIGH, SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

⑥ INSTALL SILT FENCE, SEE BMP SHEETS SC-1/BMP 1-02 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

⑦ PERFORM PAVING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

⑨ INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

⑭ PERFORM HYDROSEEDING OPERATIONS. SEE BMP SHEETS SS-3/BMP 4-04 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

SUNCREST SUBSTATION ACCESS ROAD
SCALE: 1" = 20'

GRAPHIC SCALE
20 0 20 40
1"=20'

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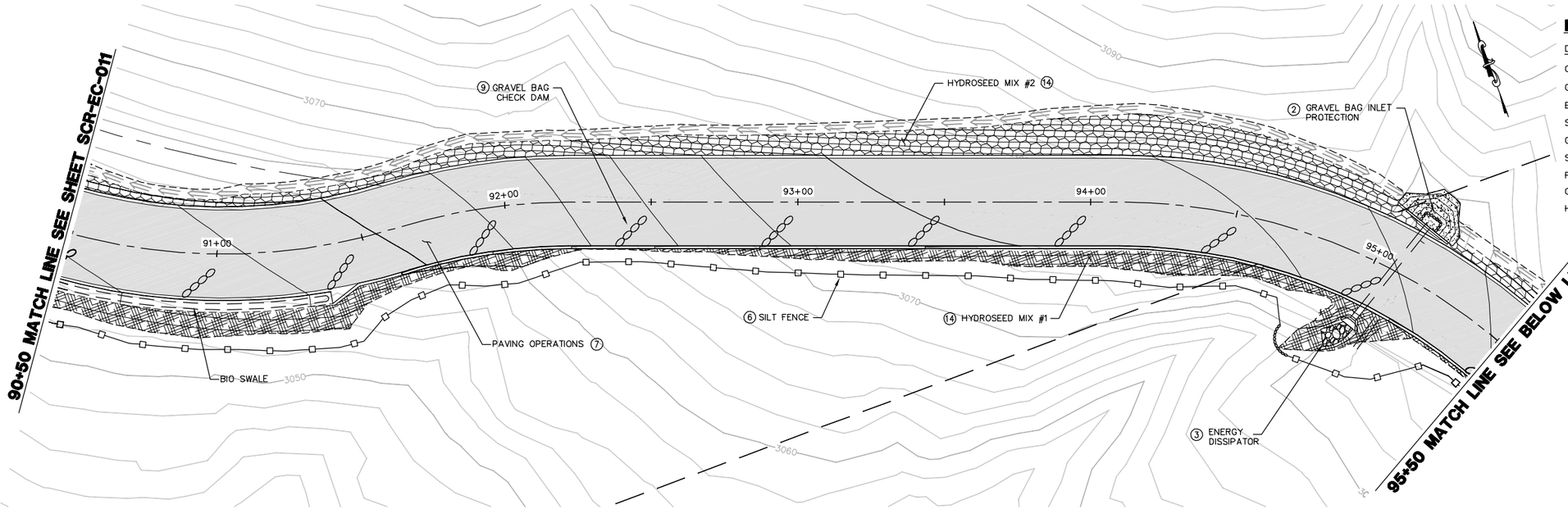
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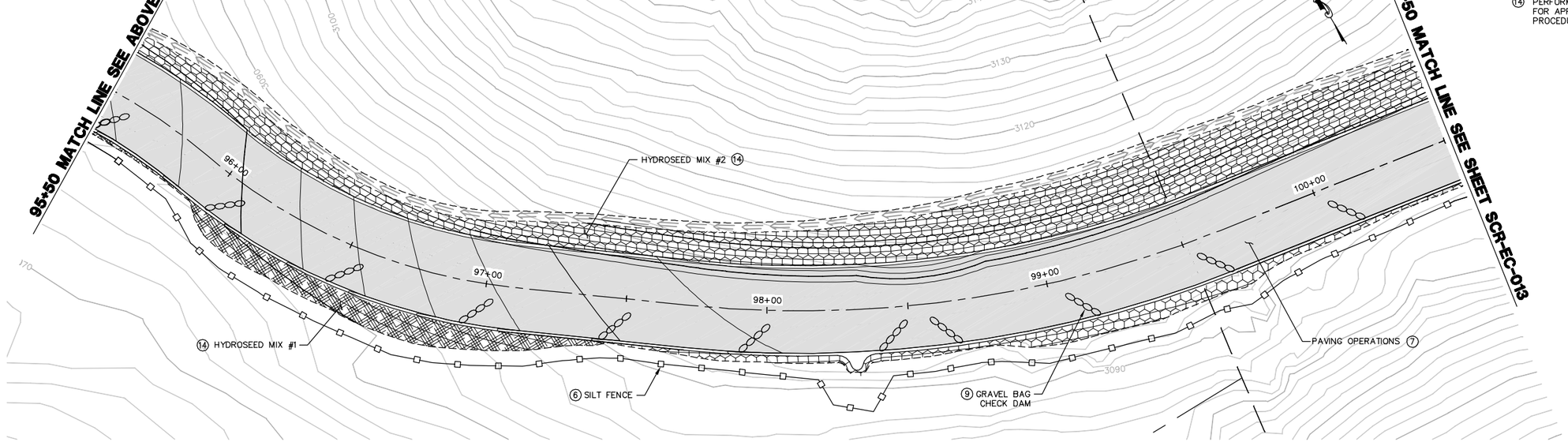
SUNCREST SUBSTATION ACCESS ROAD
EROSION CONTROL

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LEGEND

DESCRIPTION	SEE CON. NOTE #	CLATRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
CONCRETE DITCH			
GRAVEL BAG INLET PROTECTION	2	SC-10/BMP 1-06	
ENERGY DISSIPATOR	3	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	4	TC-1/BMP 1-07	
GRAVEL BAG BERM	5	SC-6/BMP 1-04	GBB
SILT FENCE	6	SC-1/BMP 1-02	
PAVING OPERATIONS	7	NS-3/BMP 3-02	
GRAVEL BAGS	9	SC-4/BMP 1-04	
HYDROSEEDING OPERATIONS	14	SS-3/BMP 4-04	
HYDROSEED MIX #1			
HYDROSEED MIX #2			

CONSTRUCTION NOTES

2. INSTALL STORM DRAIN INLET PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
3. INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
4. INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.
5. INSTALL GRAVEL BAG BERM, TWO BAGS HIGH, SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
6. INSTALL SILT FENCE, SEE BMP SHEETS SC-1/BMP 1-02 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
7. PERFORM PAVING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
9. INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.
14. PERFORM HYDROSEEDING OPERATIONS. SEE BMP SHEETS SS-3/BMP 4-04 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

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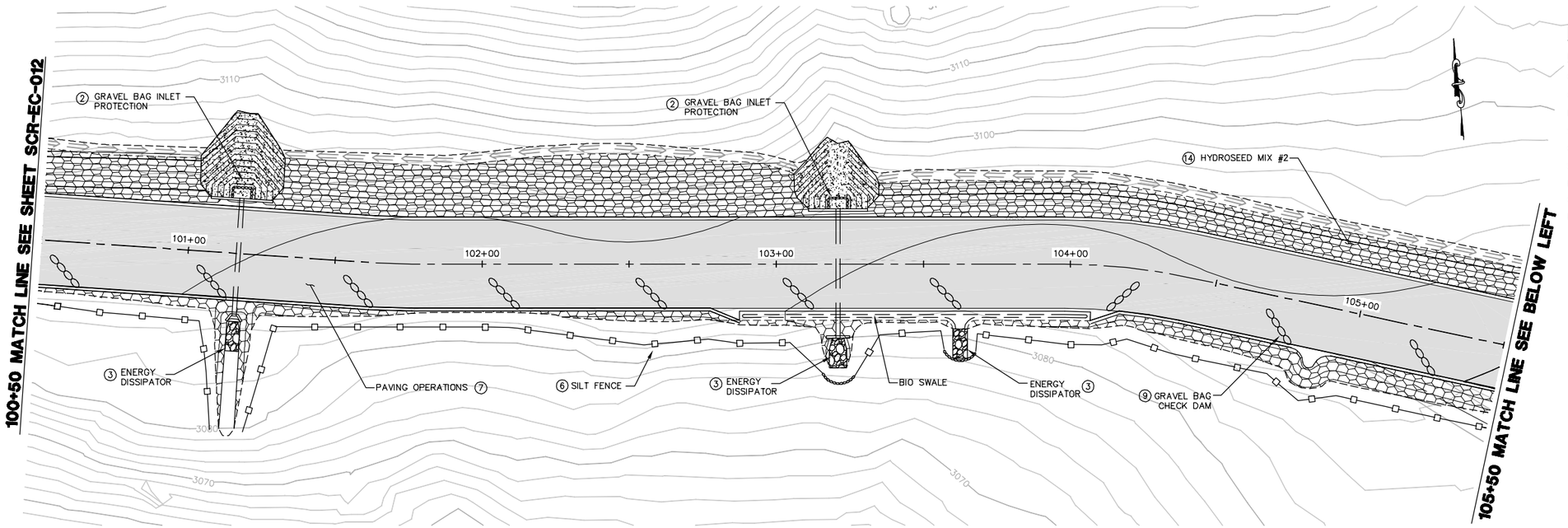
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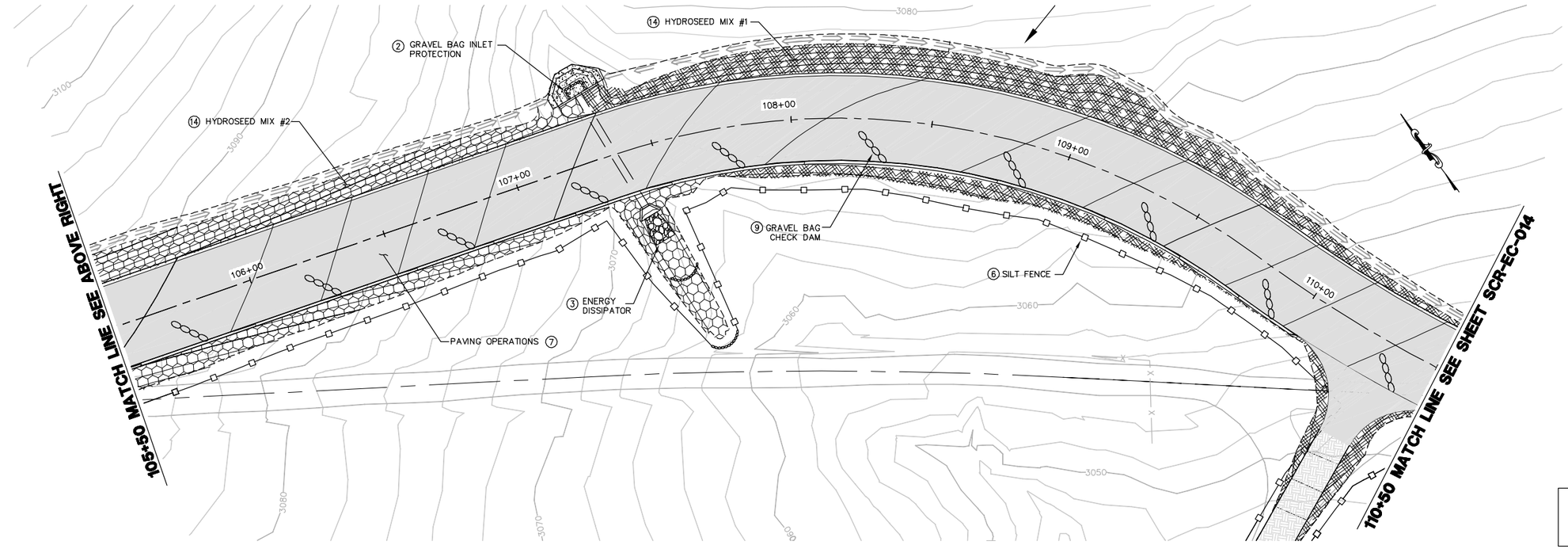
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SUNCREST SUBSTATION ACCESS ROAD
EROSION CONTROL

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LEGEND

DESCRIPTION	SEE CON. NOTE #	CLATRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
CONCRETE DITCH			
GRAVEL BAG INLET PROTECTION	(2)	SC-10/BMP 1-06	
ENERGY DISSIPATOR	(3)	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	(4)	TC-1/BMP 1-07	
GRAVEL BAG BERM	(5)	SC-6/BMP 1-04	GBB
SILT FENCE	(6)	SC-1/BMP 1-02	
PAVING OPERATIONS	(7)	NS-3/BMP 3-02	
GRAVEL BAGS	(9)	SC-4/BMP 1-04	
HYDROSEEDING OPERATIONS	(14)	SS-3/BMP 4-04	
HYDROSEED MIX #1			
HYDROSEED MIX #2			

CONSTRUCTION NOTES

(2) INSTALL STORM DRAIN INLET PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(3) INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(4) INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.

(5) INSTALL GRAVEL BAG BERM, TWO BAGS HIGH, SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(6) INSTALL SILT FENCE, SEE BMP SHEETS SC-1/BMP 1-02 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(7) PERFORM PAVING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(9) INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(14) PERFORM HYDROSEEDING OPERATIONS. SEE BMP SHEETS SS-3/BMP 4-04 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

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GRAPHIC SCALE
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1"=20'

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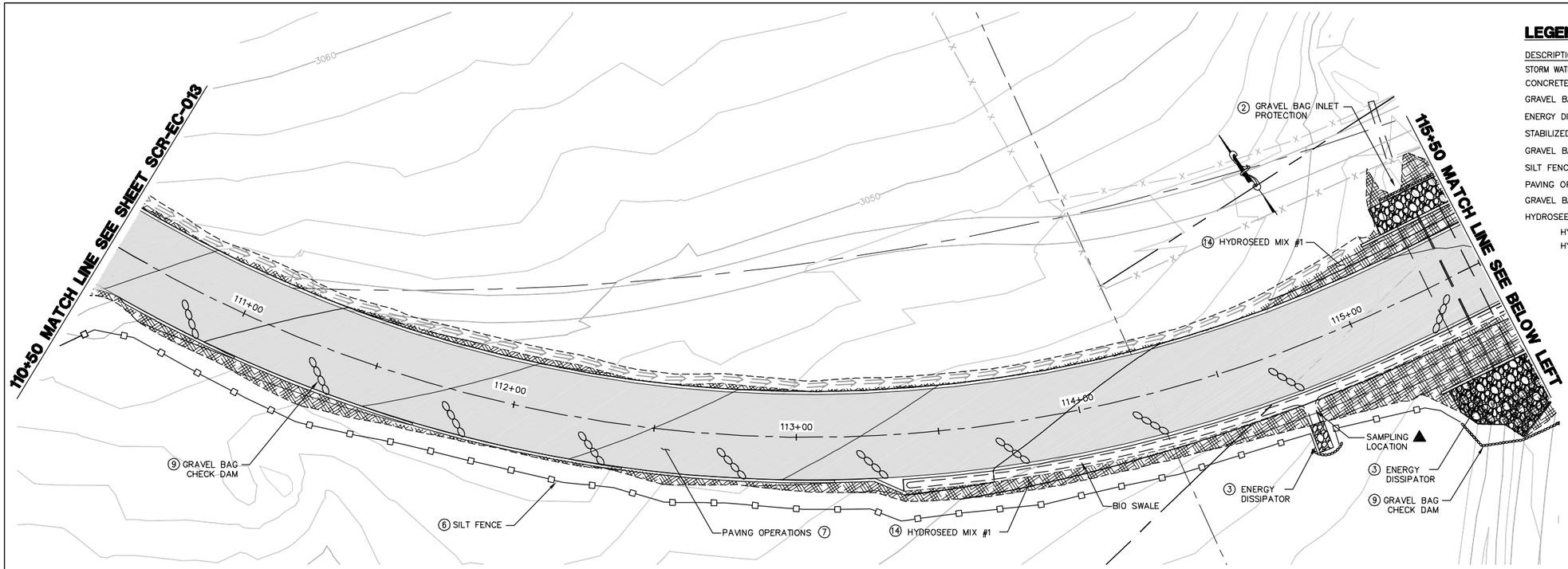
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EROSION CONTROL

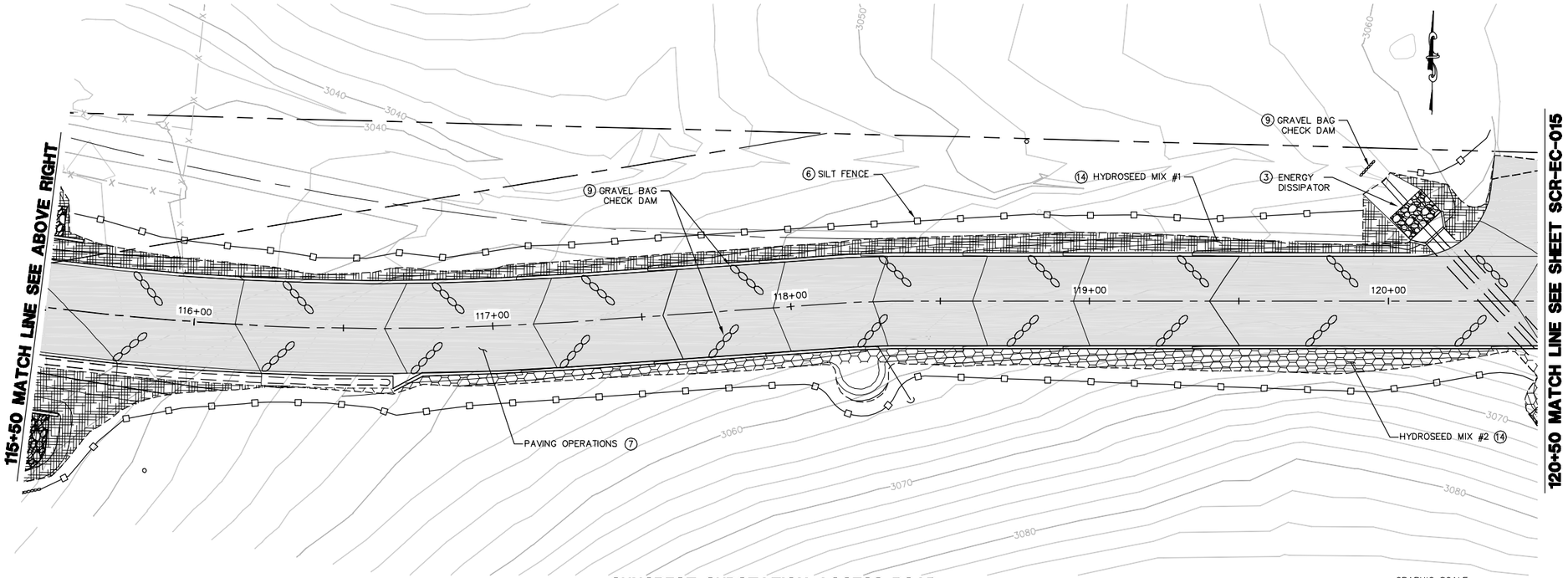
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LEGEND

DESCRIPTION	SEE CON. NOTE #	CLATRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
STORM WATER SAMPLING & MONITORING LOCATION			▲
CONCRETE DITCH			⇒ ⇒ ⇒
GRAVEL BAG INLET PROTECTION	(2)	SC-10/BMP 1-06	
ENERGY DISSIPATOR	(3)	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	(4)	TC-1/BMP 1-07	
GRAVEL BAG BERM	(5)	SC-6/BMP 1-04	GBB
SILT FENCE	(6)	SC-1/BMP 1-02	
PAVING OPERATIONS	(7)	NS-3/BMP 3-02	
GRAVEL BAGS	(9)	SC-4/BMP 1-04	
HYDROSEEDING OPERATIONS	(14)	SS-3/BMP 4-04	
HYDROSEED MIX #1			
HYDROSEED MIX #2			



CONSTRUCTION NOTES

(2) INSTALL STORM DRAIN INLET PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(3) INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(4) INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.

(5) INSTALL GRAVEL BAG BERM, TWO BAGS HIGH, SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(6) INSTALL SILT FENCE, SEE BMP SHEETS SC-1/BMP 1-02 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(7) PERFORM PAVING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(9) INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(14) PERFORM HYDROSEEDING OPERATIONS. SEE BMP SHEETS SS-3/BMP 4-04 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

SUNCREST SUBSTATION ACCESS ROAD
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GRAPHIC SCALE
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1"=20'

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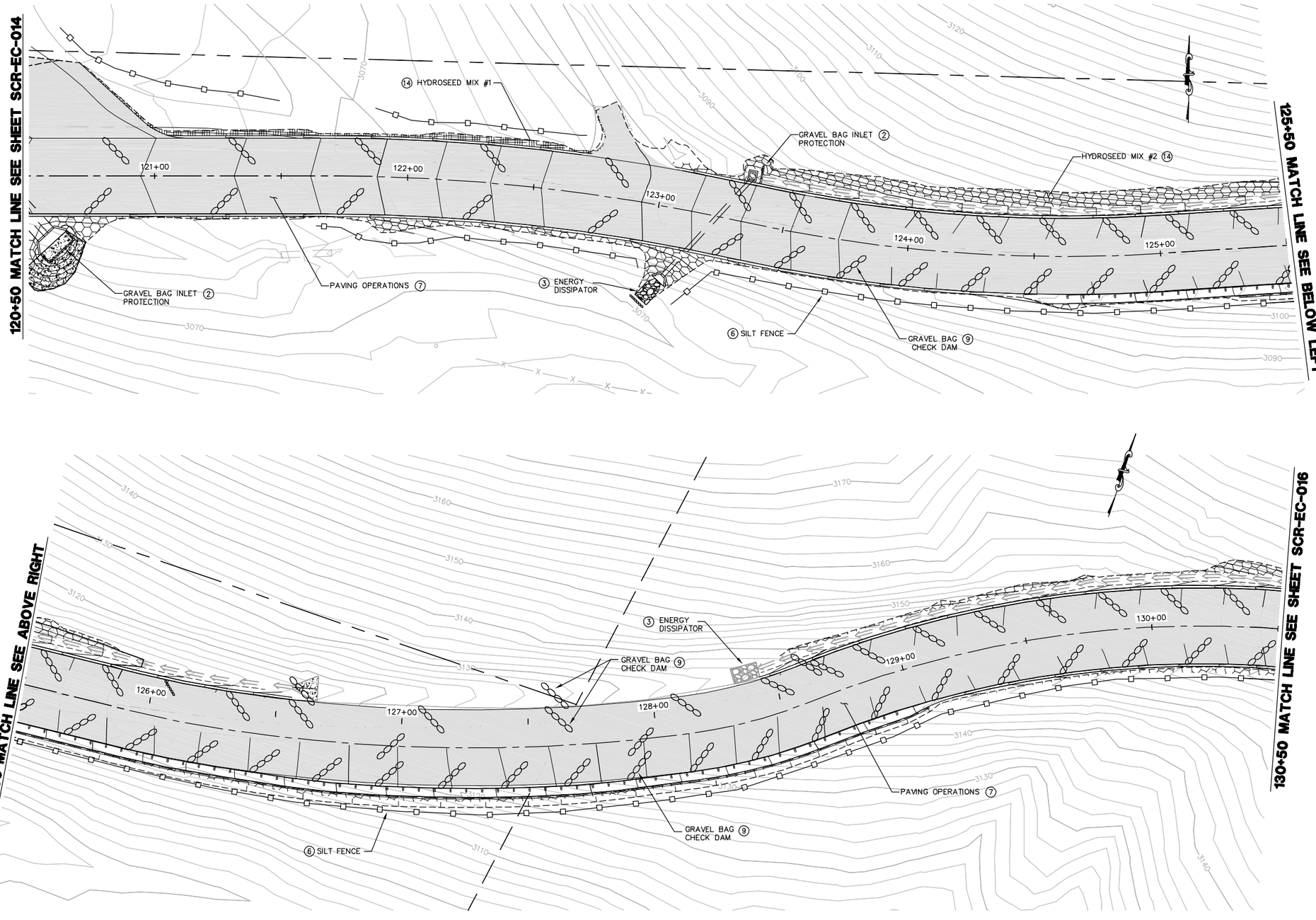
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LEGEND

DESCRIPTION	SEE CON. NOTE #	CLATRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
CONCRETE DITCH			
GRAVEL BAG INLET PROTECTION	(2)	SC-10/BMP 1-06	
ENERGY DISSIPATOR	(3)	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	(4)	TC-1/BMP 1-07	
GRAVEL BAG BERM	(5)	SC-6/BMP 1-04	GBB
SILT FENCE	(6)	SC-1/BMP 1-02	
PAVING OPERATIONS	(7)	NS-3/BMP 3-02	
GRAVEL BAGS	(9)	SC-4/BMP 1-04	
HYDROSEEDING OPERATIONS	(14)	SS-3/BMP 4-04	
HYDROSEED MIX #1			
HYDROSEED MIX #2			

CONSTRUCTION NOTES

(2) INSTALL STORM DRAIN INLET PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(3) INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(4) INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.

(5) INSTALL GRAVEL BAG BERM, TWO BAGS HIGH, SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(6) INSTALL SILT FENCE, SEE BMP SHEETS SC-1/BMP 1-02 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(7) PERFORM PAVING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(9) INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(14) PERFORM HYDROSEEDING OPERATIONS. SEE BMP SHEETS SS-3/BMP 4-04 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

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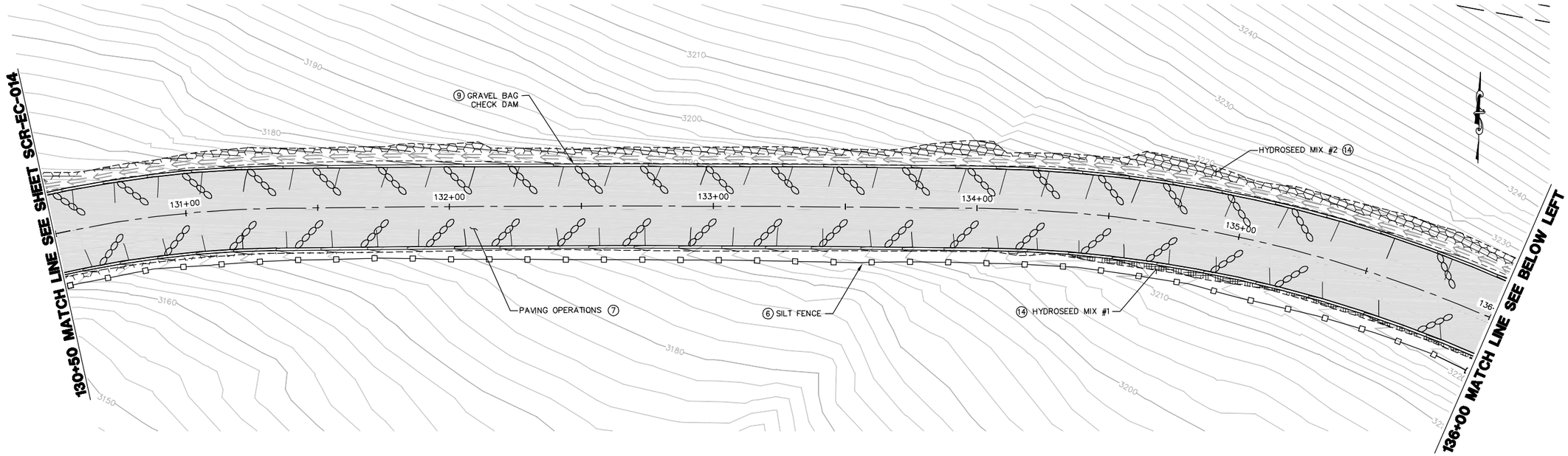
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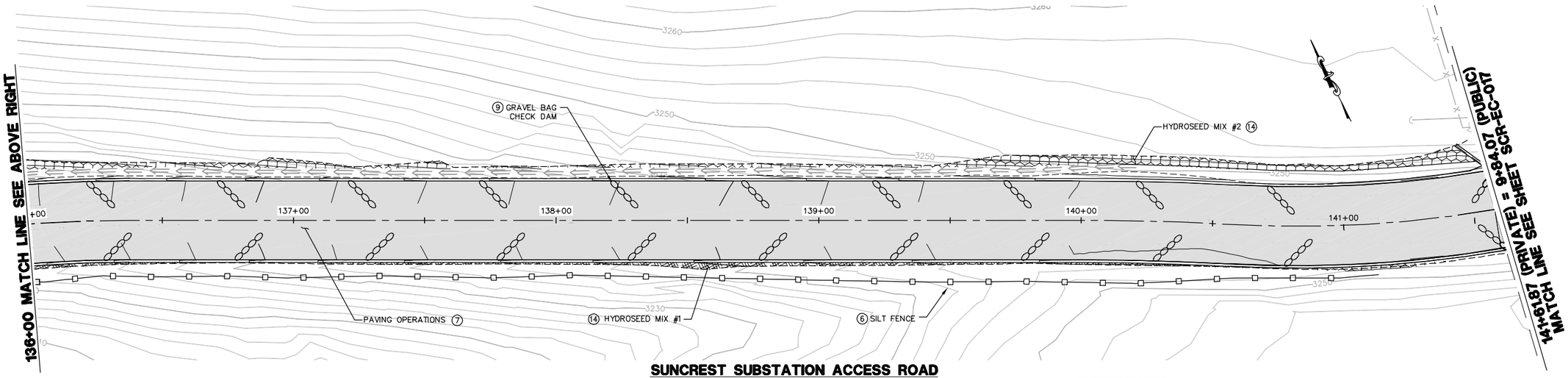
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EROSION CONTROL

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SUNCREST SUBSTATION ACCESS ROAD

SCALE: 1" = 20'

LEGEND

DESCRIPTION	SEE CON. NOTE #	CLATRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
CONCRETE DITCH			
GRAVEL BAG INLET PROTECTION	(2)	SC-10/BMP 1-06	
ENERGY DISSIPATOR	(3)	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	(4)	TC-1/BMP 1-07	
GRAVEL BAG BERM	(5)	SC-6/BMP 1-04	GBB
SILT FENCE	(6)	SC-1/BMP 1-02	
PAVING OPERATIONS	(7)	NS-3/BMP 3-02	
GRAVEL BAGS	(9)	SC-4/BMP 1-04	
HYDROSEEDING OPERATIONS	(14)	SS-3/BMP 4-04	
HYDROSEED MIX #1			
HYDROSEED MIX #2			

CONSTRUCTION NOTES

(2) INSTALL STORM DRAIN INLET PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(3) INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(4) INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.

(5) INSTALL GRAVEL BAG BERM, TWO BAGS HIGH, SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(6) INSTALL SILT FENCE, SEE BMP SHEETS SC-1/BMP 1-02 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(7) PERFORM PAVING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(9) INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(14) PERFORM HYDROSEEDING OPERATIONS. SEE BMP SHEETS SS-3/BMP 4-04 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

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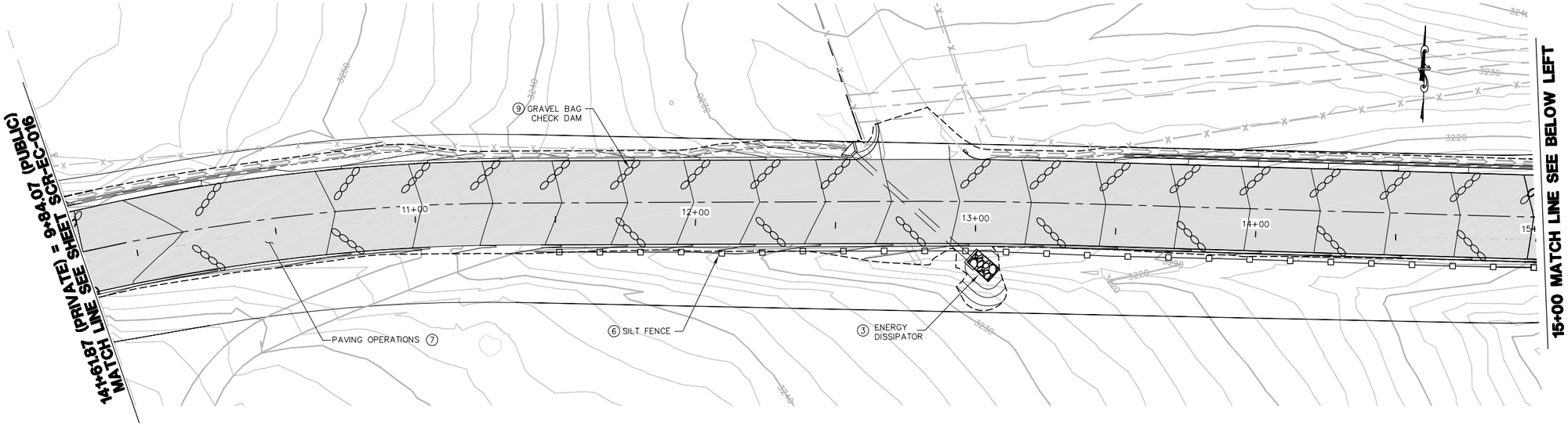
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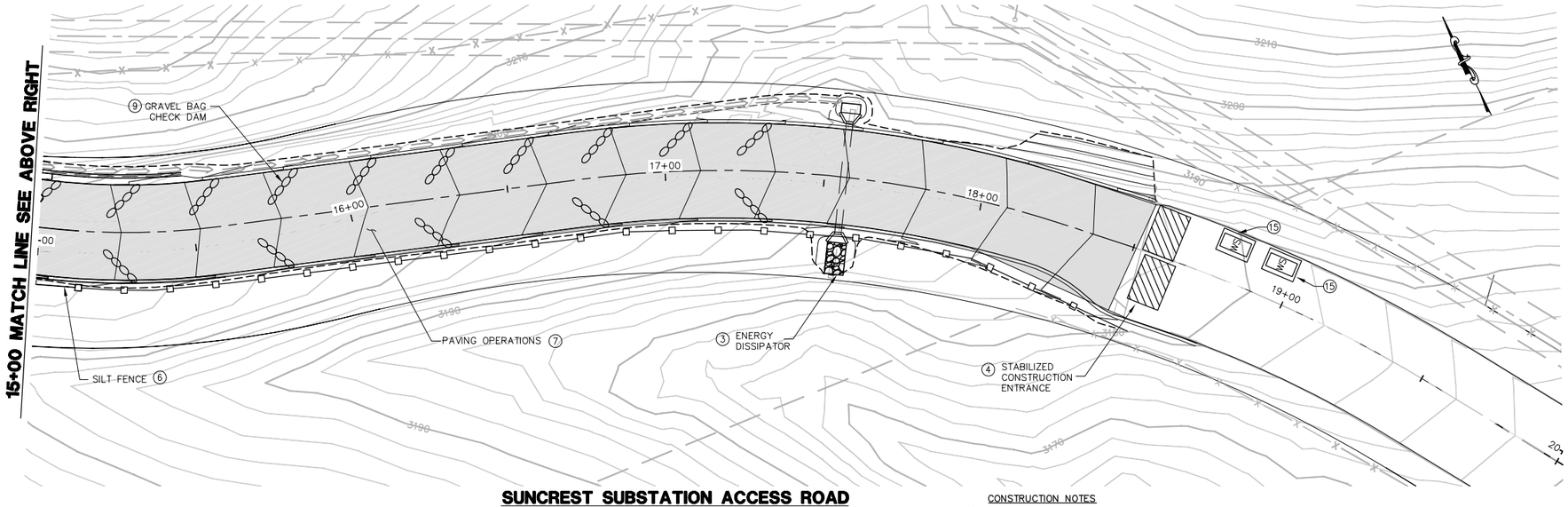
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SUNCREST SUBSTATION ACCESS ROAD
EROSION CONTROL

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SUNCREST SUBSTATION ACCESS ROAD

SCALE: 1" = 20'

GRAPHIC SCALE
20 0 20 40
1"=20'

LEGEND

DESCRIPTION	SEE CON. NOTE #	CLATRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
CONCRETE DITCH			
GRAVEL BAG INLET PROTECTION	(2)	SC-10/BMP 1-06	
ENERGY DISSIPATOR	(3)	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	(4)	TC-1/BMP 1-07	
GRAVEL BAG BERM	(5)	SC-6/BMP 1-04	GBB
SILT FENCE	(6)	SC-1/BMP 1-02	
PAVING OPERATIONS	(7)	NS-3/BMP 3-02	
GRAVEL BAGS	(9)	SC-4/BMP 1-04	
HYDROSEEDING OPERATIONS	(14)	SS-3/BMP 4-04	
HYDROSEED MIX #1			
HYDROSEED MIX #2			
VEHICLE AND EQUIPMENT WASH STATION	(15)	NS-8/BMP 3-03	WS

CONSTRUCTION NOTES

(2) INSTALL STORM DRAIN INLET PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(3) INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(4) INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.

(5) INSTALL GRAVEL BAG BERM, TWO BAGS HIGH, SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(6) INSTALL SILT FENCE, SEE BMP SHEETS SC-1/BMP 1-02 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(7) PERFORM PAVING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(9) INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(14) PERFORM HYDROSEEDING OPERATIONS. SEE BMP SHEETS SS-3/BMP 4-04 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(15) APPROXIMATE VEHICLE AND EQUIPMENT WASH STATION LOCATION. SEE BMP SHEETS NS-8/BMP 3-03 FOR SPECIFICATIONS, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES. CONTRACTOR TO UPDATE PLANS IF LOCATION OR NUMBER OF STATIONS CHANGE.

FOR BID ONLY
NOT FOR CONSTRUCTION

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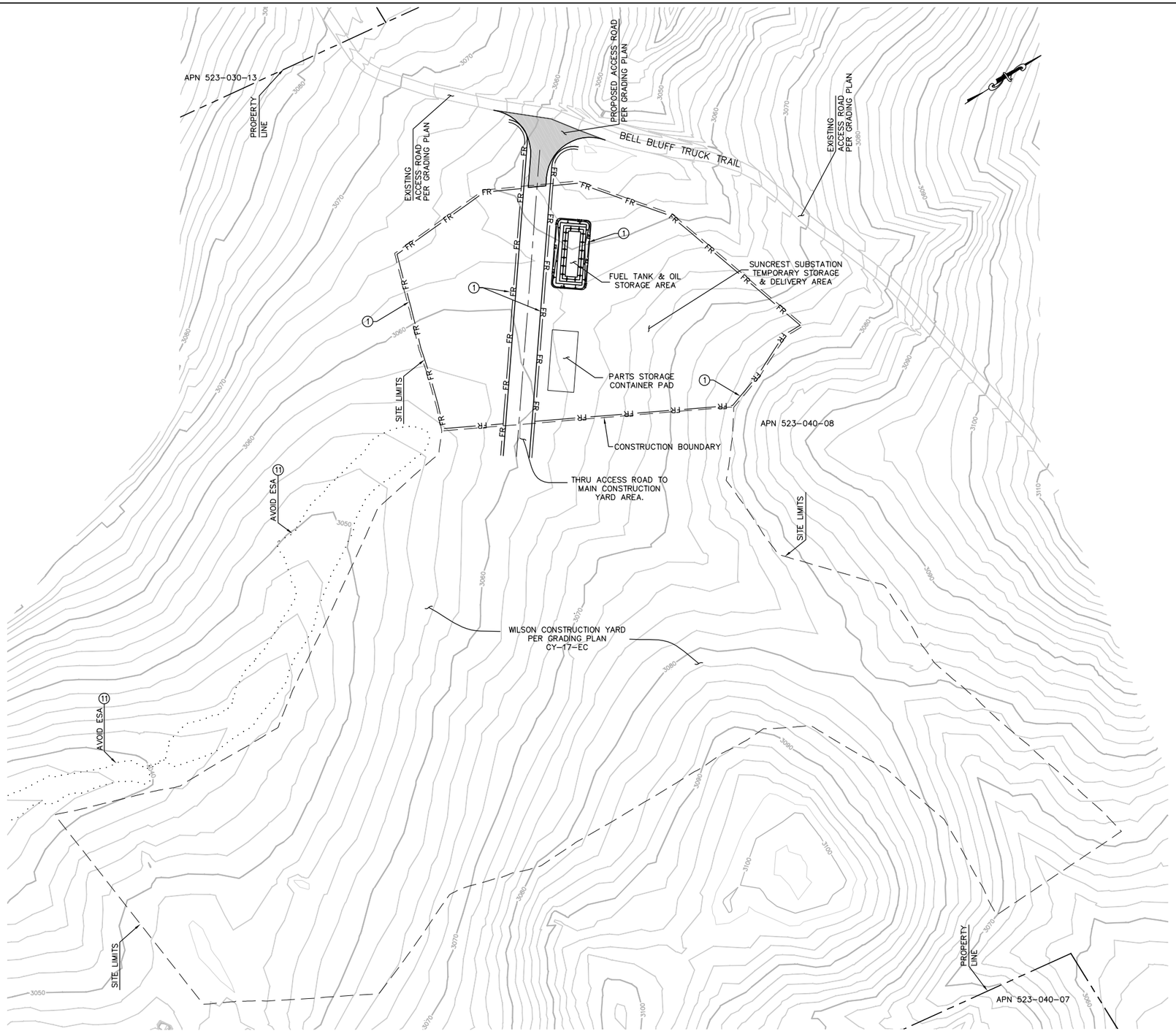
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SAN DIEGO, CALIFORNIA

SUNCREST SUBSTATION ACCESS ROAD
EROSION CONTROL

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DISTURBED AREA:
CONSTRUCTION YARD: 468,898 SF
ROAD: 3,083 SF
TOTAL: 471,981 SF

WILSON YARD PLAN
SCALE: 1" = 60'

GRAPHIC SCALE
60 0 60 120
1"=60'

NOTE:
NOT ALL ITEMS INDICATED IN LEGENDS AND NOTES APPLY TO EACH SHEET.

EROSION CONTROL PLAN LEGEND:

DESCRIPTION	SEE CON. NOTE #	CALTRANS/SDG&E WATER QUALITY CONSTRUCTION BMP MANUAL STD. DWG.	SYMBOL
FIBER ROLLS	(1)	SC-5/BMP 1-03	FR
RUN-OFF COLLECTION POINT PROTECTION	(2)	SC-10/BMP 1-06	
ENERGY DISSIPATOR	(3)	SS-10	
STABILIZED CONSTRUCTION ENTRANCE	(4)	TC-1/BMP-1-07	
GRAVEL BAG BERM	(5)	SC-6/BMP 1-04	GBB
PAVING AND GRINDING OPERATIONS	(6)	NS-3/BMP 3-02 & 3-05	
GRAVEL CHECK DAM	(7)	SC-4/BMP 1-04	
STRUCTURE DEMOLITION/REMOVAL OVER OR ADJACENT TO WATERS	(8)	NS-15	
OVER-WATER PROTECTION	(9)	BMP 3-08	
BORING LOCATION	(10)		
ENVIRONMENTALLY SENSITIVE AREA	(11)	(SEE CONSTRUCTION NOTE)	
STORM DRAIN INLET PROTECTION	(12)	SC-10/BMP 1-06	
RUN ON/RUN OFF SAMPLING LOCATION			▲/★

GENERAL GRADING PLAN LEGEND:
NOTE: THESE ITEMS TO BE CONSTRUCTED PER GRADING PLANS, INDICATED HERE FOR REFERENCE ONLY.

TOWER
WATER BAR (PER GRADING PLAN)
DOWN DRAIN (PER GRADING PLAN)
GRADED SWALE (PER GRADING PLAN)

CONSTRUCTION NOTES:
(1) INSTALL FIBER ROLLS. SEE BMP SHEETS SC-5/BMP 1-03 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(2) INSTALL RUN-OFF COLLECTION POINT PROTECTION. SEE BMP SHEETS SC-10/BMP 1-06 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(3) INSTALL ENERGY DISSIPATION DEVICES. SEE BMP SHEET SS-10 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(4) INSTALL STABILIZED CONSTRUCTION ENTRANCE/TRACKING CONTROLS WITH RUMBLE RACK. SEE BMP SHEETS TC-1/BMP-1-07 INSTALLATION, INSPECTION, AND MAINTENANCE INSTRUCTIONS AND PROCEDURES.

(5) INSTALL GRAVEL BAG BERM, TWO BAGS HIGH. SEE BMP SHEETS SC-6/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(6) PERFORM PAVING AND GRINDING OPERATIONS. SEE BMP SHEETS NS-3/BMP 3-02 AND BMP 3-05 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(7) INSTALL GRAVEL BAG CHECK DAM. SEE BMP SHEETS SC-4/BMP 1-04 FOR INSTALLATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(8) PERFORM STRUCTURE DEMOLITION/REMOVAL OVER OR ADJACENT TO WATERS. SEE BMP SHEET NS-15 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(9) INSTALL OVER-WATER PROTECTION. SEE BMP SHEET BMP 3-08 FOR APPLICATION, MAINTENANCE, AND INSPECTION INSTRUCTIONS AND PROCEDURES.

(10) A 10' RADIUS CIRCLE OF FIBER ROLLS SHALL BE PLACED NEAR THE BORING SITE PRIOR TO THE START OF GEOTECHNICAL INVESTIGATION. SPOILS SHALL BE PLACED WITHIN THE CIRCLE AND RECOMPACTED TO MATCH NATIVE SOIL AFTER COMPLETION OF THE BORING.

(11) CONSTRUCTION ACTIVITIES SHALL AVOID IMPACTS TO ENVIRONMENTALLY SENSITIVE AND/OR JURISDICTIONAL DELINEATED AREAS TO THE MAXIMUM EXTENT PRACTICAL. ENVIRONMENTAL RESOURCE MANAGER TO DELINEATE WITH TEMPORARY ORANGE FENCING.

(12) INSTALL STORM DRAIN INLET PROTECTION . SEE BMP SHEETS SC-10/BMP 1-08 FOR INSTALLATION, MAINTENANCE, INSPECTION INSTRUCTIONS AND PROCEDURES.

EROSION AND SEDIMENT CONTROL NOTES:
1. FOR BMP SHEETS REFER TO CALTRANS (MARCH 2003) AND SDG&E WATER QUALITY CONSTRUCTION BEST MANAGEMENT PRACTICES MANUAL (DECEMBER 2002) AND PROJECTS FINAL APPROVED SWPPP.
2. CONTRACTOR TO IMPLEMENT STREET SWEEPING AND VACUUMING (PER BMP SHEET SC-7/BMP 1-07) ALONG ALL AREAS OF THE OFFSITE EXISTING PAVED ROADWAY WHERE SEDIMENT IS OBSERVED.
3. IF DISCHARGES FROM IRRIGATION LINES, POTABLE WATER LINES, OR HYDRANT FLUSHING OCCUR ONSITE, CONTRACTOR MUST IMPLEMENT POTABLE WATER/IRRIGATION PER BMP SHEET NS-7, AS NECESSARY.
4. CONTRACTOR ALSO TO IMPLEMENT THE FOLLOWING CONSTRUCTION BMPS, AS NECESSARY:
   - SCHEDULING, PER BMP SHEETS EC-1/BMP 1-01
   - WIND EROSION CONTROL, PER BMP SHEETS WE-1/BMP 4-08
   - WATER CONSERVATION PRACTICES, PER BMP SHEET NS-1
   - ILLICIT CONNECTION/DISCHARGE, PER BMP SHEETS NS-6/BMP 2-06
5. NO WORK HAVING THE POTENTIAL TO CAUSE WATER POLLUTION, AS DETERMINED BY THE ENGINEER, SHALL BE PERFORMED UNTIL THE SWPPP HAS BEEN SUBMITTED TO THE ENGINEER BY THE CONTRACTOR, AND APPROVED.
6. THE CONTRACTOR SHALL CONSIDER OTHER CONTROL MEASURES, AS NECESSARY, TO SUPPLEMENT THE CRITICAL TEMPORARY CONTROL MEASURES SHOWN ON THESE PLANS, IN ORDER TO MEET THE POLLUTION CONTROL OBJECTIVES OF THE SWPPP.
7. VEHICLE AND EQUIPMENT CLEANING, FUELING, AND/OR MAINTENANCE (PER BMP SHEETS NS-6/BMP 3-03, NS-9/BMP 3-04, AND NS-10 RESPECTIVELY) SHALL NOT BE PERFORMED ON SITE.

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SAN DIEGO GAS & ELECTRIC COMPANY
SAN DIEGO, CALIFORNIA

EROSION CONTROL PLANS FOR
SUNCREST SUBSTATION ACCESS ROAD
EROSION CONTROL-WILSON YARD

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Appendix IV
Calculations / Analysis

Risk Determination Analysis

Not Applicable

Construction for this project will begin under the existing permit 99-08DWQ. On July 1, 2010 the 99-08 DWQ permit expires and is replaced by the 2009-0009-DWQ Permit. This project will be grandfathered into the assignment of Risk Level 1. Therefore, this project is not required to submit risk assessment calculations at this time. If this project is still active after September 2, 2011 risk assessment will be performed.

Computational Sheet for Determining Run-on Discharges

Existing Site Conditions

Area Runoff Coefficient		=	N/A	(A)
Area Rainfall Intensity		=	N/A	(B)
Drainage Area		=	N/A	(C)
Site Area Run-on Discharge	(A) x (B) x (C)	=	N/A*	(D)

* There is no run-on anticipated at the substation area. A small portion of the existing terrain to the southeast of the substation entrance will drain toward the project but will pass through the project area via an underground storm drain, daylighting on the west side of the project to continue on its original drainage course. BMP's in the areas where soil disturbance will occur along the linear project route will be installed and maintained based on field visits.

Computation Sheet for Determining Runoff Coefficients

Total Site Area	=	78	(A)

Existing Site Conditions

Impervious Site Area[1]	=	1.23	(B)
Impervious Site Area Runoff Coefficient [2, 4]	=	0.95	(C)
Pervious Site Area[3]	=	76.77	(D)
Pervious Site Area Runoff Coefficient[4]	=	0.30	(E)
Existing Site Area Runoff Coefficient $\frac{(B \times C) + (D \times E)}{(A)}$	=	0.31	(F)

Proposed Site Conditions (after construction)

Impervious Site Area[1]	=	24.96	(G)
Impervious Site Area Runoff Coefficient [2, 4]	=	0.95	(H)
Pervious Site Area[3]	=	53.04	(I)
Pervious Site Area Runoff Coefficient[4]	=	0.40	(J)
Proposed Site Area Runoff Coefficient $\frac{(G \times H) + (I \times J)}{(A)}$	=	0.57	(K)

1. Includes paved areas, areas covered by buildings, and other impervious surfaces.
2. Use 0.95 unless lower or higher runoff coefficient can be verified.
3. Includes areas of vegetation, most unpaved or uncovered soil surfaces, and other pervious areas.
4. See the table on the following page for typical C values.

Table 819.2B

Runoff Coefficients for Developed Areas

Type of Drainage Area	Runoff Coefficient
Business:	
Downtown areas	0.70 - 0.95
Neighborhood areas	0.50 - 0.70
Residential:	
Single-family areas	0.30 - 0.50
Multi-units, detached	0.40 - 0.60
Multi-units, attached	0.60 - 0.75
Suburban	0.25 - 0.40
Apartment dwelling areas	0.50 - 0.70
Industrial:	
Light areas	0.50 - 0.80
Heavy areas	0.60 - 0.90
Parks, cemeteries:	0.10 - 0.25
Playgrounds:	0.20 - 0.40
Railroad yard areas:	0.20 - 0.40
Unimproved areas:	0.10 - 0.30
Lawns:	
Sandy soil, flat, 2%	0.05 - 0.10
Sandy soil, average, 2-7%	0.10 - 0.15
Sandy soil, steep, 7%	0.15 - 0.20
Heavy soil, flat, 2%	0.13 - 0.17
Heavy soil, average, 2-7%	0.18 - 0.25
Heavy soil, steep, 7%	0.25 - 0.35
Streets:	
Asphaltic	0.70 - 0.95
Concrete	0.80 - 0.95
Brick	0.70 - 0.85
Drives and walks	0.75 - 0.85
Roofs:	0.75 - 0.95

Particle Size Analysis Results

Not Applicable

Alternative Risk Analysis

Not Applicable

2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS REQUIRING TMDLS

SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD

USEPA APPROVAL DATE: JUNE 28, 2007

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
9	R	Long Canyon Creek	90283000	Total Dissolved Solids	Source Unknown	8.3 Miles	2019
9	R	Los Penasquitos Creek	90610000	Phosphate	Source Unknown	12 Miles	2019
				Total Dissolved Solids	Source Unknown	12 Miles	2019
9	E	Los Penasquitos Lagoon	90610000	Sedimentation/Siltation	Nonpoint/Point Source	469 Acres	2019
9	L	Loveland Reservoir	90931000	Aluminum	Source Unknown	420 Acres	2019
				Manganese	Source Unknown	420 Acres	2019
				Oxygen, Dissolved	Source Unknown	420 Acres	2019
				pH *This listing was made by USEPA for 2006.*	Source Unknown	420 Acres	2019
9	B	Mission Bay (area at mouth of Rose Creek only)	90640000	Eutrophic	Nonpoint/Point Source	9.2 Acres	2019
				Lead	Nonpoint/Point Source	9.2 Acres	2019

2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS REQUIRING TMDLS

SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD

USEPA APPROVAL DATE: JUNE 28, 2007

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
9	C	San Diego Bay Shoreline, Chula Vista Marina	90912000				
				Copper		0.41 Miles	2019
					Source Unknown		
9	B	San Diego Bay Shoreline, Downtown Anchorage	90821000				
				Benthic Community Effects		7.4 Acres	2019
					Nonpoint/Point Source		
				Sediment Toxicity		7.4 Acres	2019
					Nonpoint/Point Source		
9	C	San Diego Bay Shoreline, G Street Pier	90821000				
				Indicator bacteria		0.42 Miles	2006
					Urban Runoff/Storm Sewers		
					Unknown Nonpoint Source		
					Unknown point source		
9	B	San Diego Bay Shoreline, near Chollas Creek	90822000				
				Benthic Community Effects		15 Acres	2006
					Nonpoint/Point Source		
				Sediment Toxicity		15 Acres	2006
					Nonpoint/Point Source		
9	B	San Diego Bay Shoreline, near Coronado Bridge	90822000				
				Benthic Community Effects		37 Acres	2019
					Nonpoint/Point Source		
				Sediment Toxicity		37 Acres	2019
				Includes Crosby Street/Cesar Chavez Park area, that will receive additional monitoring.			
					Nonpoint/Point Source		
9	B	San Diego Bay Shoreline, near sub base	90810000				
				Benthic Community Effects		16 Acres	2019
					Nonpoint/Point Source		
				Sediment Toxicity		16 Acres	2019
					Nonpoint/Point Source		

2006 CWA SECTION 303(d) LIST OF WATER QUALITY LIMITED SEGMENTS REQUIRING TMDLS

SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD

USEPA APPROVAL DATE: JUNE 28, 2007

REGION	TYPE	NAME	CALWATER WATERSHED	POLLUTANT/STRESSOR	POTENTIAL SOURCES	ESTIMATED SIZE AFFECTED	PROPOSED TMDL COMPLETION
9	L	Sweetwater Reservoir	90921000	Oxygen, Dissolved	Source Unknown	925 Acres	2019
9	R	Tecolote Creek	90650000	Cadmium	Nonpoint/Point Source	6.6 Miles	2019
				Copper	Nonpoint/Point Source	6.6 Miles	2019
				Indicator bacteria	Nonpoint/Point Source	6.6 Miles	2006
				Lead	Nonpoint/Point Source	6.6 Miles	2019
				Phosphorus	Source Unknown	6.6 Miles	2019
				Toxicity	Nonpoint/Point Source	6.6 Miles	2019
				Turbidity	Source Unknown	6.6 Miles	2019
				Zinc	Nonpoint/Point Source	6.6 Miles	2019
9	R	Temecula Creek	90251000	Nitrogen	Source Unknown	44 Miles	2019
				Phosphorus	Source Unknown	44 Miles	2019

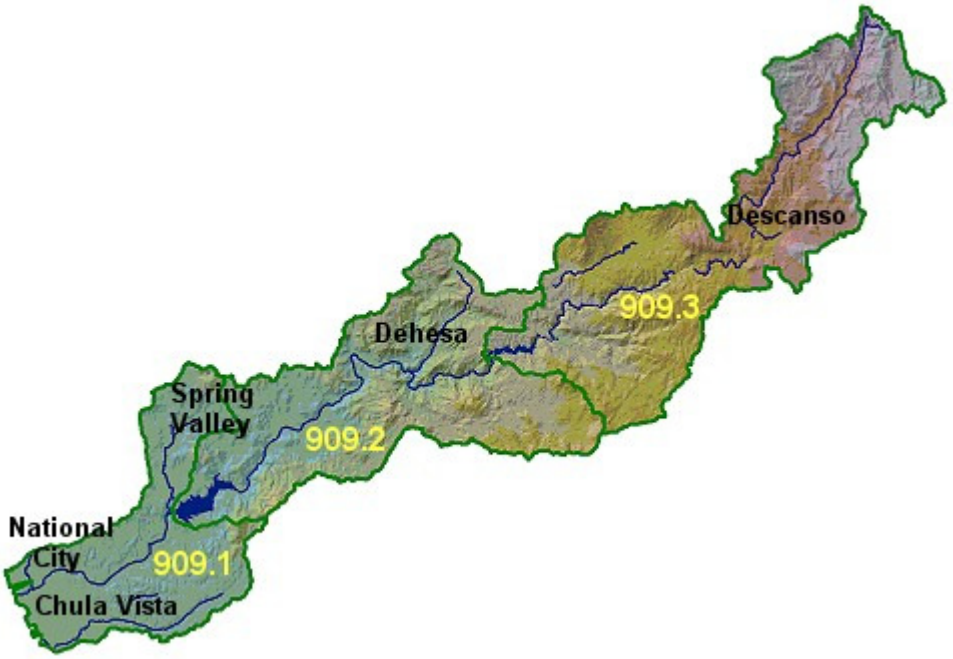
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Sweetwater Watershed

Plan Projects Stewards



Hydrologic Unit 909.11 - 909.35

Hydrologic Areas:	Lower Sweetwater 909.1 Middle Sweetwater 909.2 Upper Sweetwater 909.3
Major Water Bodies:	Sweetwater River, Sweetwater Reservoir, Loveland Reservoir, and San Diego Bay
CWA 303(d) List:	Loveland Reservoir: aluminum, manganese, dissolved oxygen; San Diego Bay Shoreline (Chula Vista Marina): copper; Sweetwater Reservoir: dissolved oxygen
Major Impacts:	Surface and groundwater quality degradation, habitat degradation and loss, and invasive species
Constituents of Concern:	coliform bacteria, trace metals and other toxics
Sources / Activities:	agricultural and urban runoff

The Sweetwater River watershed along with the Otay and Pueblo San Diego watersheds combine to form the San Diego Bay watershed area. The Sweetwater River watershed is the largest of the three encompassing 230 of the approximately 415 square mile total. Over 86% of the watershed is within unincorporated jurisdictions. The dominant land uses in the Sweetwater River watershed are urban (29%), open space / agriculture (22%), and undeveloped (49%).

Approximately two-thirds of the land area categorized as urban is composed of residential communities. Approximately 300,000 people currently reside within the Sweetwater River watershed, and this amount is projected to increase to 365,000 by 2015. The most important watershed issues are related to the protection of municipal water supplies, and the protection and restoration of sensitive wetland and wildlife habitats.

Between the headwaters and the outlet to San Diego Bay, the watershed contains a variety of habitat types including oak and pine woodlands, riparian forest, chaparral, coastal sage scrub, and coastal salt marsh. The upper watershed contains large undeveloped areas within the Cleveland National Forest and Cuyamaca Rancho State Park, the unincorporated communities of Pine Valley, Descanso, and Alpine, and the Viejas Indian Reservation. Unincorporated rural and suburban communities characterize the central part of the watershed. The urbanized lower portion of the Sweetwater watershed contains portions of several cities including San Diego, National City, Chula Vista, La Mesa, and Lemon Grove. Of the cities within the watershed, Chula Vista is the most important in terms of land area.

There are many beneficial water uses within the Sweetwater Watershed as designated in the State Water Resources Control Board's San Diego Region Basin Plan.

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Sweetwater Watershed

Beneficial Water Uses

Plan Projects Stewards

Return to Sweetwater Watershed page

Beneficial water uses within the Sweetwater Watershed as designated in the State Water Resources Control Board's San Diego Region Basin Plan.

Beneficial Uses	Inland Surface Water	Coastal Waters	Reservoirs and Lakes	Ground Water
Municipal and Domestic Supply	X		X	X
Agricultural Supply	X		X	X
Industrial Service Supply	X	X	X	X
Industrial Process Supply	X		X	
Navigation		X		
Contact Water Recreation	X	X	X	
Non-Contact Water Recreation	X	X	X	
Commercial and Sport Fishing		X		
Biological Habitats of Special Signif.	X	X		
Warm Freshwater Habitat	X		X	
Cold Freshwater Habitat	X		X	
Wildlife Habitat	X	X	X	
Rare, Threatened, or End.	X	X		
Marine Habitat		X		
Migration of Aquatic Organisms		X		
Estuarine Habitat		X		
Shellfish Harvesting		X		

Summary of beneficial use designations.

Plan Projects Stewards

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Sediment Basin Sizing

Calculations for temporary sediment basins will be done in the field during construction based on the area of disturbance, utilizing option 2 of *Caltrans Storm Water Quality Handbooks, Construction Site Best Management Practices Manual, March 1, 2003.*

> Option 2: Sediment basin(s), as measured from the bottom of the basin to the principal outlet, shall have at least a capacity equivalent to 102 cubic meters (3,600 cubic feet) of storage per 0.4 hectare (1 acre) draining into the sediment basin. The length of the basin shall be more than twice the width of the basin. The length is determined by measuring the distance between the inlet and the outlet; and the depth must not be less than 0.9 m (3 ft) nor greater than 1.5 m (5 ft) for safety reasons and for maximum efficiency.

In the event that grading operations are conducted during the rainy season, sediment basins will be installed in the fill areas on an as needed basis as rainfall occurs or is anticipated. Sediment basins will be constructed by leaving a portion of the fill area lower than edges and constructing earth berms around the edges of the temporary basin areas. The location and elevation will shift as the fills are constructed. One sediment basin will be constructed in each of the two large fill areas at the southwest and northwest corners of the substation pad. The temporary sediment basins will be approximately 250 feet long by 80 feet wide with a depth of 5 feet. The site grading contractor would determine the exact configuration of the basins satisfying the volume requirements depending on the available space and configuration of the fill areas at the time of an anticipated rainfall event. The permanent detention pond areas will be completed midway through pad grading operations and will be then be used as construction phase sediment basins until the entire storm drain system is completed.

Post-Construction Water Balance Calculator

Not Applicable

Appendix V
Construction Materials

Appendix V
List of Potential Pollutant Sources

Activity	Typical Materials
Asphalt Work	Asphalt (conventional and rubberized) Cold mix Asphalt emulsion Asphalt releases – Monocyclic Terpet Liquid asphalt Aluminate Aluminum sulfate Chip seal, seal coat, tack coat, slurry seal or fog seal
Concrete Work	Concrete curing compound – resin based “Monkey blood” (a retardant compound used for concrete curing) Arbitolor Arabitol (1,2,3,4,5-pentane pentol) pH from concrete sawing or freshly placed or washed off Portland cement products Cement Diesel fuel (sprayed on wooden forms as a non-sticking compound between concrete and wood) Concrete mix Concrete slurry
Cleaning	Various citrus based cleaners Solvents Thinners De-greasers Acids Bases Detergents Trisodium phosphate Sodium Hypochlorite
Vehicle and Equipment	Oil, Grease, Fuel Grease Coolant/antifreeze Diesel Gasoline Lubricants Hydraulic and/or brake fluid Adhesives (glues, caulk, sealants)
Pipe Work	Pipe joint compound ABS and PVC primers Chlorine – water line flushing disinfection

Appendix V
List of Potential Pollutant Sources

Activity	Typical Materials
Painting	Paints Thinners Mineral spirits Latex paint (propylene glycol) Epoxy Silicone
Electrical Work (Materials and Equipment)	Wooden electrical utility poles Electrical transformers and other electrical equipment Pole anchors Guy wires Conductor cable Stub supports Electrical distribution wire
Gas Work (Material and Equipment)	Poly pipe Steel pipe Pipe wrap primer Pipe wrap Pipe pillows Pipe skids or blocks Welding rods Miscellaneous steel fittings Metal and plastic pipelines Valves, pressure regulators Cable and conduit
Landscaping	Herbicides Pesticides Fertilizers Mulch Compost
Brick Work	Etching compounds Acid wash of brick work

Appendix V
List of Potential Pollutant Sources

Activity	Typical Materials
Soil Stabilization	Wood fiber mulch Compost Wood and bark chips Straw mulch Emulsified asphalt Lime Plant gums Bonded fiber matrix Coconut fiber Paper mulch Grass Various proprietary products
Dust Palliatives	EnviroKleen Soil Sement PX-300
Woodwork	Lumber treatment/ preservative Water sealants Stains Sawdust
Structural finishing	Plaster Fire retardants Epoxies Paints (see painting) Tar Urethane

Appendix VI
Construction BMP Manual

M A N U A L



WATER QUALITY CONSTRUCTION BEST MANAGEMENT PRACTICES MANUAL

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URS Project No. 27644947.03B00

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Appendix A Definitions and Acronyms

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BMP PROGRAM OVERVIEW

Water Quality Construction BMP Manual

The purpose of this Manual is to provide standardized best management practices (BMPs) to reduce or eliminate pollutants in runoff from Sempra Energy Utilities[1] (SEU) construction projects for water quality protection. This Manual applies to projects conducted by San Diego Gas and Electric Company (SDG&E), Southern California Gas Company (SCG) (hereon known as Utilities or Utility), and their contractors. The utilities service area encompasses 23,000 square miles of diverse terrain throughout most of Central and Southern California, from Visalia to the Mexican border. Utility projects within the service area are conducted in more than 530 communities and in over 200 municipal jurisdictions. Many of these projects throughout the service area are subject to a variety of National Pollutant Discharge Elimination System (NPDES) permits.

Because of the breadth of jurisdictions and applicable permits that apply to utility projects, this Manual has been developed to provide a consistent approach to water quality management to be applied by the utilities and their contractors throughout their service areas. Most construction projects performed by the utilities and their contractors are linear pipeline or electric installations, which are usually short term, fast moving, and are low impact on narrow corridor sections of land. Many of the BMPs presented in this Manual have used the best and most practical pollution prevention features from several sources such as State of California and Caltrans BMPs that integrate well into our unique utility construction activities.

This Manual is organized into three main sections: BMP Program Overview; BMP Selection and Implementation; and BMP Details. The BMP Details section is divided into four functional BMP categories, 1-Sediment Controls, 2-Waste and Materials Management Controls, 3-Non-Storm Water Discharge Controls and 4-Erosion Control and Soil Stabilization. Within each of these categories, specific information, including "When" and "How" to implement the BMP, plus Maintenance and Inspection information are provided for each BMP. Pictures and diagrams are also provided on several BMPs for easy reference.[2]

The Manual is a tool designed to assist with the identification of BMPs appropriate for use on a specific site or project. The Manual provides guidance to SEU in their support for water quality goals and meeting regulatory requirements. The BMP selection process provides users with guidance for typical BMPs that may apply to standard SEU construction projects. During BMP selection, the users of this Manual should take into account the benefits and limitations of each of the BMPs considered in the context of the site conditions. Finally, BMP success is contingent not only on appropriate design and implementation, but on the coordination and communication between the designers, engineers, and the field construction teams.

Utility Type Projects

Most Utility projects are very different from commercial or residential developments, building sites, and Caltrans projects. Utility projects are smaller, short term, long and thin, impacting narrow corridors of land. Utility projects are constantly moving or progressing along the route

[1] Sempra Energy Utilities is composed of San Diego Gas & Electric Company and Southern California Gas Company.
[2] Photographs provided in this Manual have been obtained from URS Corp., Great Circle Int'l, LLC, and Caltrans.

and thus have minimal exposure of soil or transportable materials to storm water at any one time. Often, utility projects are in the Right-of–Ways of streets or along utility corridors that must be maintained to ensure safe access to electric and gas lines. BMPs usually are only in place for a few days or even hours. Therefore, BMPs will typically be implemented just prior to a forecasted storm event.

BMP Field Guide

The BMP Field Guide is a separate document developed from the Water Quality BMP Manual that contains the condensed BMPs and supporting information. The Field Guide was designed to be a "pocket sized" reference to the BMP Manual. The primary audience for the Field Guide is the SEU Construction and Maintenance crews who perform operations and activities within the utility service territory.

Training Program

The importance of training and of integrating the elements of employee and contractor training for pollution prevention controls into a comprehensive training program is part of the Utilities overall Water Quality Pollution Prevention Program. All applicable company employees and contractors hired by the company have the responsibility to comply with environmental laws, rules, and regulations. Training for the prevention of environmental related incidents is conducted for applicable employees who perform any operation or activity that has the potential to cause a pollutant to be released into the environment. Records are maintained as to when employees have received this training and instruction. Verification of contractor training should also be obtained.

Applicable employees should know and contact their local Environmental Representatives for support and guidance on any aspects of the Training Program.

BMP SELECTION AND IMPLEMENTATION

General Protocol

To select BMPs that are appropriate for a given project, the following steps should be followed:

Step 1 – Identify Activities, Pollutants and Issues of Concern
Step 2 – Evaluate Site Conditions and Select BMPs
Step 3 – Implement, Monitor, and Maintain the BMPs

Step 1 – Identify Activities, Pollutants, and Issues of Concern

The first step in BMP selection is to identify the project activities, the potential pollutants of concern and the local issues of concern. Project activities may include saw cutting, trenching, excavation, stockpiling of soil, grading and grubbing, access road maintenance, paving, or other activities with the potential to impact storm water and non-storm water discharges. Pollutants of concern may include sediment; petroleum products such as fuel, oil, and grease from vehicle and equipment operation; paving materials such as concrete and asphalt components; other materials used or stored on site, such as pesticides, herbicides, fertilizer, detergents, paint, adhesives, and solvents; and project wastes such as litter, debris, hazardous wastes, and liquid wastes. The local issues of concern may include:

- Proximity to sensitive receiving waters (environmentally sensitive areas or Clean Water Act Section 303(d) listed water bodies, examples: Santa Monica Bay, San Diego Bay).
- Local regulatory requirements influencing BMP selection, or timing of BMP implementation.

Step 2 – Evaluate Site Conditions and Select BMPs

To assist in BMP selection, this Water Quality Construction BMP Manual presents BMPs that are anticipated to be most applicable to utility construction projects. Utility projects are unique in that they are typically very short-term and fast moving, have minimal exposure of soil or transportable materials at any one time to storm water. The selector should consider any project-specific requirements or factors such as BMP effectiveness, cost, availability, feasibility, and suitability for the site. For example, important site conditions to consider include the amount of soil disturbance, anticipated weather conditions, soil type and erodibility, flow path length, and slope of exposed soil. Selected BMPs can and should be modified to suit the scope of the project and site conditions. Table 1 presents guidelines for BMP selection and implementation at a construction site. Table 2 presents a BMP selection worksheet for utility activities. These implementation guidelines and selection worksheet can be used to select BMPs for a specific project. Finally, a selector may discover a better BMP for their situation not listed in Tables 1 or 2. Environmental Services encourages creative and practical pollution prevention techniques. These new techniques can be shared with others to support the water quality goals of the region.

Step 3 – Implement, Monitor, and Maintain the BMP System

It is important that selected BMPs be implemented in a sequence that maximizes protection of water quality, be monitored regularly for effectiveness and be maintained as necessary throughout the project. Most BMPs will only be implemented when needed, and/or when a storm

event is forecasted or occurs. Table 1 presents a suggested schedule for BMP implementation and sequencing. Steps in this schedule should be reviewed for each project as applicable. All BMPs should be monitored and inspected regularly and particularly before, and after rain events. BMPs should be maintained during a project in accordance with the procedures outlined in the BMP Details Section.

BMP Installation Contractors

This Water Quality Construction BMP Manual identifies some utility activities and operations that may require outside contractors to install the applicable BMPs. However, the utility crews will implement most BMPs. Most types of BMP materials are readily available from local suppliers.

Table 1
BMP SELECTION AND SEQUENCING GUIDE

Step No.	Description	What to Do	BMP Options
1.	Before Construction	Before construction, evaluate, mark, and protect important trees and associated rooting zones, unique areas (e.g., wetlands), and other areas to be preserved, especially in perimeter areas.	4-01, other user-defined BMPs
2.	Site Access Areas (construction entrances, roadways equipment parking areas)	Stabilize site entrances and access roads if applicable prior to earthwork.	1-07, other user-defined BMPs
3.	Storm Drain Inlet Protection	Install inlet protection at down-gradient inlets that project runoff/tracking might impact.	1-06, other user-defined BMPs
4.	Perimeter Sediment Control	Install perimeter sediment controls (silt fence, fiber rolls, etc.) as applicable prior to land disturbing activities. Install additional runoff control measures during construction as needed.	1-02, 1-03, 1-04, 1-05, other user-defined BMPs
5.	Material and Waste Storage Areas	Prepare staging areas, material storage and disposal areas as applicable. Grade to reduce run-on and runoff, install perimeter controls, obtain clean-up materials, plastic covers for stockpiles, etc. prior to storing materials on site.	2-01 through 2-08, 1-08, other user-defined BMPs
6.	Earthwork (trenching, excavation, grading, surface roughening, grubbing)	Begin excavation, trenching, or grading after installing applicable sediment and runoff control measures. Install additional control measures as work progresses as needed.	through 1-09, other user-defined BMPs
7.	Surface Stabilization (temporary and permanent seeding, mulching)	Apply temporary or permanent soil stabilization measures as applicable on all disturbed areas where work is delayed or completed.	4-01 through 4-08, other user-defined BMPs
8.	Construction and Paving (install utilities, buildings, paving)	Implement applicable control practices as work takes place.	3-01 through 3-10, other user-defined BMPs
9.	Final Stabilization and Landscaping	Stabilize open areas as applicable. Remove temporary control measures and install final stabilization controls appropriately (topsoil, trees and shrubs, permanent seeding, mulching, sodding, riprap)	3-07, 4-03, 4-04, other user-defined BMPs

Table 2
BMP SELECTION WORKSHEET FOR UTILITY ACTIVITIES

Sempra Energy Utility BMP No.	BMP Options	Construction				Maint. And Repair				
		Potholing	Overhead Electric	Underground Electric	Underground Gas	Gen. Maint. and Repair	Inspect and Repair	Tree Trimming	Veg. Control	Insulator Washing
Section 1 Sediment Controls										
Choose from one or more of the following BMP options when applicable:										
BMP-1-01	Scheduling									
BMP-1-02	Silt Fence									
BMP-1-03	Fiber Rolls									
BMP-1-04	Gravel Bag Berm									
BMP-1-05	Sand bag Barrier									
BMP-1-06	Storm Drain Inlet Protection									
BMP-1-07	Tracking Controls									
BMP-1-08	Stockpile Management									
Other-User Defined	BMP Description:									
Section 2 Waste Management and Material Controls										
Choose from one or more of the following BMP options when applicable:										
BMP-2-01	Material Delivery and Storage									
BMP-2-02	Material Use									
BMP-2-03	Spill Control									
BMP-2-04	Solid Waste Management									
BMP-2-05	Hazardous Materials/Waste Management									
BMP-2-06	Contaminated Soil Management									
BMP-2-07	Sanitary/Septic Waste Management									
BMP-2-08	Liquid Waste Management									
Other-User Defined	BMP Description:									
Section 3 Non-Storm Water Discharge Controls										
Choose from one or more of the following BMP options when applicable:										
BMP-3-01	Dewatering Operations									
BMP-3-02	Paving Operations									

Table 2 (continued)
BMP SELECTION WORKSHEET FOR UTILITY ACTIVITIES

Sempra Energy Utility BMP No.	BMP Options	Construction				Maint. And Repair				
		Potholing	Overhead Electric	Underground Electric	Underground Gas	Gen. Maint. and Repair	Inspect and Repair	Tree Trimming	Veg. Control	Insulator Washing
Section 3 Non-Storm Water Discharge Controls (Continued)										
BMP-3-03	Vehicle and Equipment Washing									
BMP-3-04	Vehicle and Equipment Fueling									
BMP-3-05	Concrete/Coring/Sawcutting and Drilling Waste Management									
BMP-3-06	Dewatering Utility Substructures and Vaults									
BMP-3-07	Vegetation Management including Mechanical and Chemical Weed Control									
BMP-3-08	Over-Water Protection									
BMP-3-09	Removal of Utility Location/Mark-Out Paint									
Other-User Defined	BMP Description:									
Section 4 Erosion Control and Soil Stabilization										
Choose from one or more of the following BMP options when applicable:										
BMP-4-01	Preservation of Existing Vegetation									
BMP-4-02	Temporary Soil Stabilization									
BMP-4-03	Hydraulic Mulch									
BMP-4-04	Hydroseeding									
BMP-4-05	Soil Binders									
BMP-4-06	Straw Mulch									
BMP-4-07	Geotextiles, Plastic Covers and Erosion Control Blankets/Mats									
BMP-4-08	Dust (Wind Erosion) Control									
Other-User Defined	BMP Description:									

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BMP DETAILS

This Section provides details for the selection and implementation of BMPs for the most common utility construction activities. Once the BMP objectives are defined, it is necessary to identify the category or categories of BMPs that are best suited to meet each objective. A category is a grouping of BMPs related in how they prevent pollution. The four categories are:

- Section 1 – Sediment Controls
- Section 2 – Waste Management and Material Controls
- Section 3 – Non-Storm Water Discharge Controls
- Section 4 – Erosion Control and Soil Stabilization

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BMP DETAILS



Section 1 – Sediment Controls

Sediment particles (soil/dust) from utility activities can be transported to a different location by wind or water flow. Once these particles have become detached, they are considered a pollutant. Sediment Controls include any method that traps the soil particles after they have been detached and moved by wind or water. Sediment Controls are usually passive systems that rely on filtering or settling the particles out of the water or wind that is transporting them. The sediment that has accumulated by the BMPs can be disposed of as excess soil on the construction site. Sediment Controls presented in this Manual include the following:

- BMP 1-01 Scheduling
- BMP 1-02 Silt Fence
- BMP 1 03 Fiber Rolls
- BMP 1-04 Gravel Bag Berm
- BMP 1-05 Sand bag Barrier
- BMP 1-06 Storm Drain Inlet Protection
- BMP 1-07 Tracking Controls
- BMP 1-08 Stockpile Management

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When

Scheduling must be considered for applicable projects year-round.

How

Use the following measures as applicable:

- Consider scheduling major soil disturbing activities or activities near environmentally sensitive areas (e.g., adjacent to water bodies) during the non-rainy season.
- Monitor the weather forecast for seasonable and unseasonable rain events. Weather information is available from the following sources:
  - San Diego: www.wrh.noaa.gov/sandiego/index.shtml or (619) 289-1212
  - Los Angeles/Oxnard: www.nwsla.noaa.gov or (805) 988-6610
  - AccuWeather: www.accuweather.com
- Always be prepared to deploy erosion and sediment control and soil stabilization BMPs. Off site sediment discharges can occur during the non-rainy season because of unseasonable rainfall, wind, non-storm water discharges, and vehicle tracking and must be prevented.

PLUS, DURING THE RAINY SEASON (October 1–May 1, Desert regions differ August 1- May 30)

- Sequence work to minimize soil-disturbing activities during forecasted rain events.
- Limit disturbed soil area to the amount of acreage that can be protected prior to a forecasted rain event.
- Stabilize disturbed soil areas as soon as practical, and, at a minimum, prior to a forecasted rain event.
- Protect environmentally sensitive areas, such as drainage channels, streams, and natural watercourses.
- When rainfall is forecast, adjust the construction schedule to implement soil stabilization and sediment controls on all disturbed areas prior to the onset of rain.

Maintenance and Inspection

- Review applicable scheduling and sequencing of construction activities throughout the project to minimize the amount or time that soil is exposed and the total area of exposed soil.
- Inspect erosion and sediment controls prior and after each storm event, and routinely throughout the rainy season (to be consistent with all the other BMPs).

Pictures



When

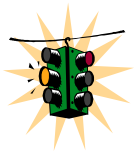
Silt fences are temporary linear sediment barriers made of permeable fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff. Silt fences allow sediment to settle from runoff before water leaves the construction site.

Silt fences are placed:

- Below the toe of exposed and erodible slopes.
- Down-slope of exposed soil areas.
- Around temporary stockpiles.
- Along streams and channels.
- Along the perimeter of a project.

How

- Construct silt fences with a setback of at least 3 feet from the toe of a slope in areas suitable for temporary ponding or deposition of sediment. Where a 3-foot setback is not practicable, construct as far from the toe of the slope as practicable.
- Generally, silt fences shall be used in conjunction with soil stabilization source controls up slope to provide effective control, particularly for slopes adjacent to water bodies or Environmentally Sensitive Areas.
- Construct the length of each reach (length of fence) so that the change in base elevation along the reach does not exceed 1/3 the height of the barrier; each reach should not exceed 500 feet. The last 6 feet of the reach should be turned upslope.
- The maximum length of slope draining to the silt fence should be 200 ft or less.
- Excavate a trench to place the bottom of the silt fence into that is not wider or deeper than necessary.
- Key-in, or bury the bottom of silt fence fabric in trench and tamp into place. If it is not feasible to trench along the slope contour, use sand bags or backfilling to key in the bottom of the fabric.
- Install fence post at least 12 inches below grade on down slope side of trench.



- **Silt fences should not be considered for installation below slopes steeper than 1:1 (vertical : horizontal) or that contain a high number of rocks or loose dirt clods.**

Maintenance and Inspection

- Repair or replace split, torn, slumping, undercut or weathered fabric.
- Inspect silt fences prior and after each storm event, and routinely throughout the rainy season.
- Remove accumulated sediment when it reaches one third (1/3) of the barrier height. Removed sediment shall be incorporated in the project at appropriate locations or disposed of at an SCG/SDG&E-approved site
- Silt fences that are damaged and become unsuitable for the intended purpose shall be removed and disposed of and replaced with new silt fence barriers.
- Remove silt fence when no longer needed. Fill and compact post-holes and anchorage trench, remove sediment accumulation, and grade fence alignment to blend with adjacent ground.

Pictures



Silt fence installed at the toe of an erodible slope. Note use is combined with fiber rolls and serves as perimeter control.



When

A fiber roll consists of straw, flax or other similar materials that are rolled and bound into a tight roll that is generally placed on the face of slopes at regular intervals to intercept runoff, reduce flow velocity, release the runoff as sheet flow and provide the removal of sediment.

- May be used along the top, face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- Fiber rolls may be used as check dams.
- Fiber Rolls can also be used where flows are moderately concentrated, such as ditches, swales, and storm drain inlets (Storm Drain Inlet Protection to divert and/or detain flows.).
- Fiber rolls are appropriate for perimeter site control or along streams, channels, storm drain inlets, or around stockpiles to intercept sediment laden storm water and non-storm water runoff.

How

Installation

- Locate fiber rolls on level contours spaced 8 to 20 feet apart along the face of the slope.
- Its best to stake fiber rolls into a 2 to 4 inch deep trench.
- Drive stakes into fiber rolls at a minimum of 4-foot intervals
- If more then one fiber roll is placed in a row, fiber rolls should be butted together and not overlapped.

Removal

- If used on slopes, fiber rolls are typically left in place.
- If used as Storm Drain Inlet Protection, stockpile control, or other temporary control measures, the fiber rolls should be removed at the completion of the construction project.
- If fiber rolls are removed, collect and dispose of fiber roll and sediment accumulation as appropriate. Fill and compact holes, trenches, depressions, or any other ground disturbance to blend with adjacent ground.

Maintenance and Inspection

- Repair or replace spilt, torn, unraveling, or slumping fiber rolls.
- Inspect fiber rolls if rain is forecasted, perform maintenance as needed.
- Inspect fiber rolls prior and after each storm event, and routinely throughout the rainy season.

Pictures



Fiber rolls as perimeter control



Fiber roll installation on the face of a slope.



When

A gravel bag berm consists of a single row of gravel bags that are installed end-to-end to form a barrier across a slope to intercept runoff, reduce its flow velocity, release the runoff as sheet flow and provide some sediment removal. Gravel bags can also be used where flows are moderately concentrated, such as ditches, swales, and storm drain inlets (Storm Drain Inlet Protection to divert and/or detain flows). Gravel bag berms are appropriate for perimeter site control or along streams, channels, storm drain inlets, or around stockpiles to intercept sediment laden storm water and non-storm water runoff. Use gravel bag berms:

- Where it is desirable to filter sediment in runoff. Note that gravel bag berms are generally more permeable than sand bags. Sand bag barriers should be used in cases where it is desirable to block and pond flows (e.g., for containment of non-storm water flows).
- Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- On a project-by-project basis to maximize effectiveness.
- Gravel bags may be implemented with other BMPs to maximize sediment containment.

How

- When used as a linear control for sediment removal:
  - Install along a level contour.
  - Turn ends of gravel bag row up slope to prevent flow around the ends.
  - Generally, gravel bag barriers are used in conjunction with temporary soil stabilization controls up slope to provide effective control.
- When used for concentrated flows:
  - Stack gravel bags to required height. When the height requires 3 rows or more, use a pyramid approach.
  - Upper rows of gravel bags shall overlap joints in lower rows.
- Construct gravel bag barriers with a setback of at least 3 feet from the toe of a slope. Where a 3-foot setback is not practicable, construct as far from the toe of the slope as practicable.

Maintenance and Inspection

- Inspect gravel bag berms prior and after each storm event, and routinely throughout the rainy season.
- Reshape or replace gravel bags as needed.
- Repair washouts or other damages as needed.
- Inspect gravel bag berms for sediment accumulations and remove sediments when accumulation reaches one-third of the berm height. Removed sediment shall be incorporated in the project at appropriate locations or disposed of at an SCG/SDG&E-approved site.
- Remove gravel bag berms when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilize the area. Removed sediment shall be incorporated in the project at appropriate locations or disposed of at an SCG/SDG&E-approved site.

Pictures



Gravel bags and fiber rolls used as a perimeter sediment control system.



Gravel bags used as perimeter control.



When

A sand bag barrier is a temporary linear sediment barrier consisting of stacked sand bags, designed to intercept and slow sediment-laden storm water and non-storm water runoff. Sand bag barriers allow sediment to settle from runoff before water leaves the construction site.

- Sand bags can be used where flows are moderately concentrated, such as ditches, swales, and storm drain inlets to divert and/or detain flows. See BMP on Storm Drain Inlet Protection.
- To divert or direct flow away from disturbed slopes or create a temporary sediment basin.
- During construction activities in streambeds when the contributing drainage area is 1 to 5 acres.
- To capture and detain non-storm water flows until proper cleaning operations occur.
- When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.
- To temporarily close or continue broken, damaged or incomplete curbs.

Sand bag barriers are used:

- Where it is desirable to block and pond flow (e.g., for containment of non-storm water flows). Use caution when using sand bag barriers in traffic areas or other areas where potential flooding is not desirable.
- Along the perimeter of a site, vehicle and equipment fueling and maintenance areas, chemical storage areas, or stockpiles.
- Below the toe or down slope of exposed and erodible slopes.
- Parallel to streams, channels, and roadways.
- Across channels to serve as a barrier for utility trenches or provide a temporary channel crossing for construction equipment, or to reduce stream impacts.

How

- When used as a linear control for sediment removal:
  - Install along a level contour.
  - Turn ends of sand bag row up slope to prevent flow around the ends.
  - Generally, sand bag barriers shall be used in conjunction with temporary soil stabilization controls up slope to provide effective control.
- When used for concentrated flows:
  - Stack sand bags to required height. When the required height is three rows or more, use a pyramid approach. Upper rows of sand bags shall overlap joints in lower rows.
  - Construct sand bag barriers with a setback of at least 3 feet from the toe of a slope. Where a 3-foot setback is not practicable, construct as far from the toe of the slope as practicable.

Maintenance and Inspection

- Inspect sand bag barriers prior and after each storm event, and routinely throughout the rainy season.
- Repair washouts or other damages as needed, or as directed by the projects Environmental Representative.
- Inspect sand bag barriers for sediment accumulations and remove sediments when accumulation reaches one-third the barrier height.
- Remove sand bags when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilized the area. Incorporate removed sediment at appropriate project locations or dispose of at an SCG/SDG&E-approved site.

Pictures



Sand bags used as perimeter control.



When

A device used at storm drain inlets to protect against the discharge of sediment-laden storm water and non-storm water runoff from construction activities. The device develops a pond behind it giving the sediment time to settle out before discharge to the storm drain. Do not construct such that runoff will result in:

- Ponding into road traffic or onto erodible surfaces or slopes, or
- Overflowing onto the sidewalk

This BMP is required on all construction projects where sediment laden surface runoff may enter a storm drain inlet and watercourses.

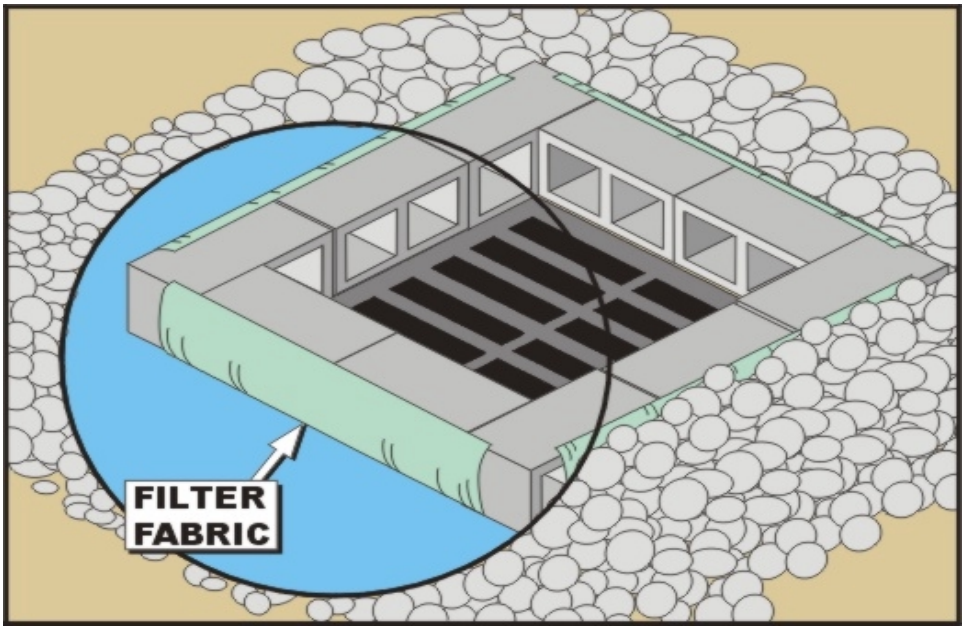
How

- Identify downstream storm drain inlets that have the potential to runoff from construction activities.
- Where a storm drain inlet is on or at the bottom of a slope, a series of small check dams (i.e., gravel bags) constructed at intervals along the slope may be required to slow the runoff.
- Select appropriate protection and construct inlet protection based on the configuration of inlets at the site.

Maintenance and Inspection

- Inspect inlet protection devices prior and after storm event, and routinely throughout the rainy season.
- Remove inlet protection devices at the end of the construction period, or when the inlet can no longer be impacted by the project.
- During inspections:
  - Inspect bags, silt fence, or filter fabric for holes, gashes, and snags.
  - Check gravel bags for proper arrangement and displacement; and
  - Remove the sediment behind the barrier when it reaches one-third the height of the barrier. Removed sediment should be incorporated in the project or disposed of at an approved Utility disposal site.

Pictures



Block and gravel-type inlet protection.



Inlet protection that blocks flow is good for preventing non-storm water discharges from entering the drain.

Pictures (continued)



Gravel bag inlet protection.



Inlet protection using fiber rolls and filter fabric.



When

Tracking controls reduce offsite tracking of sediment and other pollutants by providing a stabilized entrance at defined construction site entrances and exits and/or providing methods to clean-up sediment or other materials to prevent them from entering a storm drain by sweeping or vacuuming.

- Stabilize entrances should be implemented on a project-by-project basis in addition to other BMPs.
- Sweeping or vacuuming should be implemented when sediment is tracked from the project site onto public or private paved roads, typically at points of site exit.
- Use stabilized entrances and/or sweeping at construction sites:
  - where dirt or mud is tracked onto public roads
  - adjacent to water bodies
  - where poor soils are encountered, such as soils containing clay.
  - where dust is a problem during dry weather conditions.

How

Stabilized Construction Entrances

- Limit the points of entrance/exit to the construction site by designating combination or single purpose entrances and exits. Require all employees, subcontractors and others to use them. Limit speed of vehicles to control dust.
- Grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Route runoff from stabilized entrances/exits through a sediment-trapping device before discharge.
- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.
- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions.
- Use of constructed or constructed/manufactured steel plates with ribs for entrance/exit access is allowed.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 inches deep, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 3 inches but smaller than 6 inches shall be used.

Street Sweeping and Vacuuming

- Inspect potential sediment tracking locations routinely.
- Visible sediment tracking should be swept or vacuumed as needed. Manual sweeping is appropriate for small jobs.
- Manual sweeping is appropriate for small projects. For larger projects, it is preferred to use sweeping methods that collect removed sediment and material.

If not mixed with debris or trash, incorporate the removed sediment back into the project or depose of it at an approved disposal site.

Maintenance and Inspection

Stabilized Construction Entrance

- Inspect routinely for damage and assess effectiveness. Repair if access is clogged with sediment.
- Where tracking has occurred on roadways sweeping should be conducted the same day. Preferably water should not be used to wash sediment off the streets. If water is used, it should be captured preventing sediment-laden water from running off the site.
- Keep all temporary roadway ditches clear.

Street Sweeping and Vacuuming

Inspect inlet and outlet access points routinely and sweep tracked sediment as needed.

Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.

- After sweeping is finished, properly dispose of sweeper wastes.

Pictures



Manufactured metal plates knock dirt off vehicles before exiting a site.

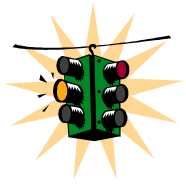
When

Use this BMP when projects require stockpiled soil and paving materials. The stockpile management practices used differ based on forecasted weather or terrain.

- Protection of stockpiles must be implemented whenever there is a potential for transport of materials by a water source (forecast precipitation or any non-storm water runoff).

How

- One or more of the following options may be used to manage stockpiles and prevent stockpile erosion and sediment discharges for stormwater and non-storm water runoff/run-on.
  - Stockpile may be returned to the excavation if precipitation is forecast.
  - Protect stockpiles from stormwater run-on using a temporary perimeter sediment barrier such as berms, silt fences, fiber rolls, covers, sand/gravel bags, or straw bale barriers, as appropriate.
  - Stockpiles may be hauled off or temporarily stored in a protected location off site.
- Keep stockpiles organized and surrounding areas clean.
- Protect storm drain inlets, watercourses, and waterbodies from stockpiles, as appropriate.
- Implement dust control practices as appropriate on all stockpiled material.



- **Stockpiles should be covered, stabilized, or protected with a perimeter sediment barrier prior to the onset of precipitation.**

Maintenance and Inspection

Repair and/or replace covers, and perimeter containment structures as needed.

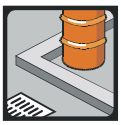
Pictures



Stockpile covered with plastic and secured with large rocks.



Silt fence used for stockpile perimeter control.



Section 2 – Waste Management and Material Controls

Federal, state and local laws, regulations, ordinances and permits prohibit the discharge of contaminated stormwater to storm drains and surface waters. Transport of sediment, and other pollutants, such as litter, paint, solvents, fuel, lubricants and demolition wastes, can be carried away from a construction site in stormwater. Therefore, BMPs are to be used for those construction activities that could cause pollution to ensure that pollutants are properly managed and are not discharged to storm drains and surface waters.

Waste Management and Materials Controls are source control BMPs that reduce or prevent contact between wastes and/or materials and storm water. Waste Management and Materials Controls presented in this Manual include the following:

- BMP 2-01 Material Delivery and Storage
- BMP 2-02 Material Use
- BMP 2-03 Spill Control
- BMP 2-04 Solid Waste Management
- BMP 2-05 Hazardous Materials/Waste Management
- BMP 2-06 Contaminated Soil Management
- BMP 2-07 Sanitary/Septic Waste Management
- BMP 2-08 Liquid Waste Management

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When

If it is necessary to store materials at a construction site. This BMP does not apply to materials and supplies stored on trucks that are driven on site and off site daily.

How

Use the following measures as appropriate:

- Only store the minimum amount of material that is needed for the job.
- Locate storage areas away from storm drain inlets, drainage systems, and watercourses to prevent storm water run-on from reaching the materials.
- If practical, store materials in enclosed storage containers such as cargo containers.
- Store materials on impervious surfaces or use plastic groundcovers to prevent any spills or leakage from contaminating the ground.
- For known hazardous materials, keep materials covered using plastic of other waterproof materials.
- If necessary provide secondary containment systems around material storage areas to prevent contaminated run-off/run-on from leaving storage area(s).
- Keep adequate supply of spill kit materials nearby.
- Ensure that qualified personnel are available when hazardous materials are delivered to ensure proper delivery and storage in designated area.
- When storage area is no longer needed, return it to original condition.
- Bagged materials such as cold patch, concrete mix, and other materials with the potential to pollute runoff should be placed on pallets and under cover.

Maintenance and Inspection

Repair or replace covers, containment structures, or perimeter controls as needed to ensure proper functioning. Perform routine inspections of designated delivery and storage areas.

Pictures



Materials are covered and neatly stored with a curbed area.

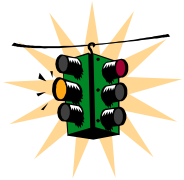
When

Apply this BMP when the following materials are used or prepared on site:

- Pesticides and herbicides.
- Fertilizers and soil amendments.
- Detergents.
- Petroleum products such as fuel, oil, and grease.
- Asphalt and other concrete components.
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds.
- Mastic, pipe wrap, primers, and paint.
- Concrete compounds.
- Welding material.
- Other materials that may be detrimental if released to the environment.

How

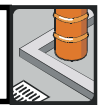
- Reduce or eliminate use of hazardous materials on site when practical. Contact your Environmental Representative for additional information.
- Empty latex paint and paint cans, used brushes, paint rags, absorbent materials, and drop cloths. When these items are thoroughly dry and are no longer hazardous, may be disposed of with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- When possible, mix paint indoors, otherwise use secondary containment structures. Do not clean paintbrushes or rinse paint containers into a street, gutter, storm drain, sanitary sewer or watercourse.
- Dispose of any paint thinners, residue and sludge(s), that cannot be recycled, as hazardous waste. For water-based paint, clean brushes to the extent practical, and rinse into a concrete washout pit or temporary sediment trap. For oil-based paints, clean brushes to the extent practical and filter and reuse thinners and solvents.
- If possible, recycle residual paints, solvents, non-treated lumber, and other materials.



- **Do not over-apply fertilizers, pesticides, and soil amendments. Prepare only the amount needed. Strictly follow the recommended usage instructions.**
- Keep an ample supply of spill clean up material near use areas. Instruct employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall unless sufficient time has been allowed for them to dry or cure.
- Hazardous materials use shall also be managed in accordance with the BMP on "Hazardous Materials/Waste Management."

Maintenance and Inspection

- Spot-check employees and contractors regularly throughout the job's duration to ensure appropriate practices are being employed.



When

This best management practice (BMP) applies to all construction sites at all times. Spill control procedures are implemented anytime chemicals and/or hazardous substances are stored. Substances may include, but are not limited to fuels, lubricants, solvents, fertilizers, pesticides, herbicides, soil binders, coolants, paints, and sewage.

To the extent that work can be accomplished safely, spills of materials or chemicals shall be contained and cleaned up immediately.

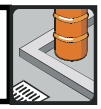
How

Stop the spillage of material if it can be done safely. Clean the contaminated area, and properly dispose of contaminated materials. For all spills notify the project foreman and/or the Environmental Representative. Use the following spill prevention and controls when applicable.

- To the extent that it doesn't compromise clean up activities, spills shall be covered and protected from storm water run-on during rainfall.
- Spills shall not be buried or diluted with wash water.
- Used clean up materials, contaminated materials, and recovered spill material shall be stored and disposed of in accordance with federal, state and local regulations Refer to BMP on "Hazardous Materials/Waste Management").
- Use absorbent materials on spills rather than using water to hose down the spill.
- When water is used for cleaning and decontamination of a spill, the water shall not be allowed to enter storm drain inlets or watercourses, and shall be collected and disposed of properly. Coordinate disposal of these wastes with the Environmental Representative.
- Keep spill cleanup kits in areas where any materials are used and stored.

Maintenance and Inspection

- Perform routine inspections to verify that spill control clean up materials are near material storage, unloading, and use areas.



When

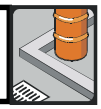
These BMPs should be used on all construction projects that generate solid waste. Solid wastes may include, but are not limited to concrete, cement, asphalt rubble, masonry brick/block, vegetation debris, steel and scrap metals, pipe and electrical cuttings, non-hazardous equipment parts, Styrofoam, general trash and other materials used to transport and package construction materials.

How

- Practice good housekeeping and keep site clean.
- Use “dry” methods for site clean up such as sweeping, vacuuming and hand pick-up.
- Designate a waste storage area on site. If a designated waste storage area is not feasible, remove wastes from the site regularly.
- Prohibit littering by employees, contractors and visitors.
- Trash receptacles should be available on site and/or on construction vehicles.
- Protect wastes from being washed away by rainfall, storm water run-on, or other waters (irrigation, water line breaks, etc.).
- To prevent storm water run-on from contacting stored solid waste (stockpiled materials) use berms, secondary containment, covered dumpsters/roll-offs or other temporary diversion structure or measures.
- For materials with the potential for spills or leaks, stockpile on impervious surfaces or use plastic groundcovers to prevent spills or leaks from infiltrating the ground.
- Do not hose out or clean out dumpsters or containers at the construction site.
- Prevent solid waste and trash from entering and clogging storm drain inlets.
- As practical, incorporate any removed clean sediment and soil back into the project.
- Reference BMP on Stockpile Management.

Maintenance and Inspection

- Collect site trash regularly, especially before rainy or windy conditions.
- Perform routine inspections of site, including storage areas, dumpsters, stockpiles and other areas where trash and debris are collected.
- Close trashcan lids and dumpster covers before rainy or windy conditions.



When

Use this BMP when projects involve the storage and use of hazardous materials, and the generation of waste byproducts, from the following:

- Petroleum products such as oils, fuels, greases, cold mix, and tars
- Glues, adhesives, and solvents
- Herbicides, pesticides, and fertilizers
- Paints, stains, and curing compounds
- Other hazardous or toxic substances

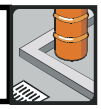
How

Hazardous materials and wastes shall be managed in accordance with the following procedures:

- Minimize the amount of hazardous materials stored at the construction site and the production and generation of hazardous waste at the construction site.
- Cover or containerize and protect from vandalism any hazardous materials and wastes.
- Clearly mark all hazardous materials and wastes. Place hazardous waste containers in secondary containment systems if stored at the construction site.
- Stockpiled cold mix should be placed on and covered with plastic.
- Do not mix waste materials, because this complicates or inhibits disposal and recycling options and can result in dangerous chemical reactions.
- Storm water that collects within secondary containment structures must be inspected prior to being discharged to ensure no pollutants are present. Contaminated storm water must be managed per Utility Environmental Practices (EPs)
- Spills cannot be discharged from a secondary containment system. See BMP on Spill Control.
- Hazardous waste must be segregated from other solid waste and disposed of properly.
- In addition to following this BMP, employees or contractors are responsible for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous waste.

Maintenance and Inspection

- Routinely inspect the covers on hazardous material storage areas for tears or flaws and repair as necessary.
- All secondary containment systems must be able to hold the volume of the largest container in the storage area, plus provide sufficient additional capacity for storm events.
- Perform routine inspections to ensure that no hazardous materials or waste are improperly left exposed to storm water.



When

This contaminated soil management BMP should be used whenever soil contamination is suspect or contaminated soil is encountered. Construction crews should be extra vigilant on projects located in highly urbanized or industrial areas where soil contamination may have occurred because of spills, illicit discharges, and leaks from underground storage tanks.

Contaminated soils may also be encountered during digging and trenching activities on highways and roadways.

How

Contaminated soil wastes should be managed in accordance with the following procedures:

- Identify contaminated soil; look for the following:
  - Soil that is discolored, black, gray, white; or
  - Soil that has an unusual odor, such as, petroleum, acid, alkaline, sewage, solvent, or any other chemical smell.
- If any potentially contaminated soil is detected, discontinue the activity and contact the projects Environmental Representative.
- Contaminated soils must be managed properly per Utility Environmental Practices (EPs).

Maintenance and Inspection

- Perform routine inspections of digging and trenching operations looking for contaminated soils.
- All contaminated soils must be managed as hazardous substances, if applicable, in accordance with applicable federal, state, and local laws.

When

Use this BMP on all construction sites that use temporary or portable sanitary/septic waste systems.

How

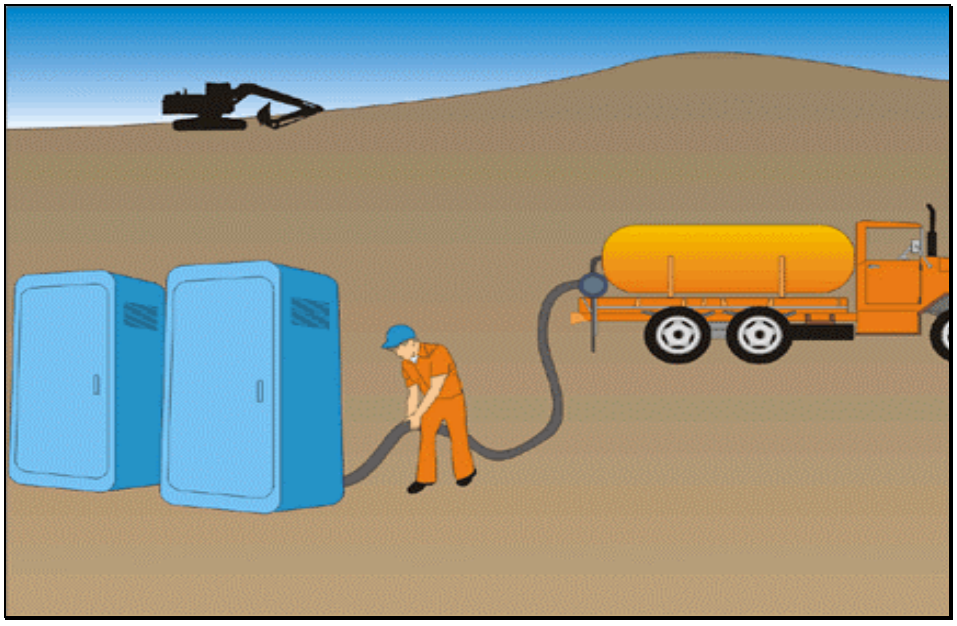
Sanitary/septic wastes shall be managed in accordance with the following procedures:

- Incorporate into regular safety meetings, education of employees, contractors, and suppliers on:
  - potential dangers to humans and the environment from sanitary/septic wastes
  - approved sanitary/septic waste storage and disposal procedures.
- Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation. When subjected to high winds or risk of high winds, temporary sanitary facilities shall be secured to prevent overturning.
- Sanitary wastewater should not be buried or discharged, except to a properly permitted sanitary sewer discharge facility. A permit may be required from the local Sanitation District.
- Use only reputable, licensed sanitary/septic waste haulers.
- Temporary sanitary facility's holding tanks shall be emptied prior to transport.

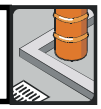
Maintenance and Inspection

- Onsite sanitary/septic waste storage and disposal should be routinely inspected.
- Ensure that sanitary/septic facilities are maintained in good working order routinely serviced by a licensed service.

Pictures



Good septic waste management.

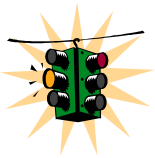


When

- Liquid waste management is applicable to construction projects that generate any of the following non-hazardous byproducts, residuals, or wastes, such as:
  - Drilling slurries and drilling fluids
  - Grease-free and oil-free wastewater and rinse water
  - Dredging spoils
  - Other non-storm water liquid discharges not permitted by separate permits.
- Separate BMPs should also be referenced for the following onsite liquid wastes:
  - Dewatering operations
  - Liquid hazardous wastes, or
  - Concrete slurry residue

How

- Vehicle and equipment cleaning using water is discouraged on site.
- Drilling residue and drilling fluids should be disposed of in accordance with Sempra Energy Utilities procedures at an approved disposal site. Coordinate the disposal of these wastes with your Environmental Representative.
- Wastes generated as part of an operational procedure, such as waterladen dredged material and drilling mud, should be contained and not allowed to flow into drainage channels or receiving waters.
- Contain non-hazardous liquid wastes in a controlled area, such as a lined holding pit, lined sediment basin, roll-off bin, or portable tank.
- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated and any addition volume based on anticipated rainfall.



- **Do not locate containment areas or devices where accidental release of the contained liquid can threaten health or safety, or discharge to watercourses, storm drain system, or to a receiving water.**
- Capture all liquid wastes running off a surface that has the potential to affect the storm drainage system. Examples are: wash water and rinse water from cleaning walls or pavement.
- If the liquid waste is sediment laden, use a sediment trap or capture in a containment device and allow sediment to settle.
- Disposal of liquid wastes are subject to specific laws and regulations, or to requirements of other permits secured for the construction project. Contact your Environmental Representative for further information.

Maintenance and Inspection

- Remove deposited solids from containment areas and containment systems as needed, and at the completion of the project.
- Inspect containment areas and containment systems routinely for damage, and repair as needed.

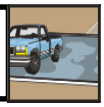


Section 3 – Non-Storm Water Discharge Controls

Non-Storm Water Discharge Controls include general site and operations BMP measures that minimize pollution of water. Non-Storm Water Discharge Controls presented in this Manual include the following:

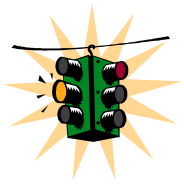
- BMP 3-01 Dewatering Operations
- BMP 3-02 Paving Operations
- BMP 3-03 Vehicle and Equipment Washing
- BMP 3-04 Vehicle and Equipment Fueling
- BMP 3-05 Concrete/Coring/Sawcutting and Drilling Waste Management
- BMP 3-06 Dewatering Utility Substructures and Vaults
- BMP 3-07 Vegetation Management including Mechanical and Chemical Weed Control
- BMP 3-08 Over-Water Protection
- BMP 3-09 Removal of Underground Utility Location/Mark-Out Paint

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When

- This BMP is applicable to trench or excavation dewatering.
- Discharges of non-storm water from a trench or excavation that contain sediments or other pollutants to the sanitary sewer, storm drain systems, creek bed (even if dry), or receiving waters is prohibited. Water from dewatering activities is generally allowed to be discharged if the water does not contain any sediment or other pollutants. Verify with your local jurisdiction.
- Generally, non-contaminated discharges of non-storm water to lands (such as infiltration) are allowed. Some areas may require a permit or other regulatory approval. Verify with your local jurisdiction.



- **This BMP is not applicable to utility vault or sub-structure dewatering. For these applications, refer to the BMP on Dewatering Utility Substructures and Vaults.**
- **This BMP is not applicable if the water is known, or suspected to be, contaminated. Under these conditions, contact your Environmental Representative.**

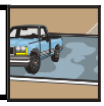
How

Water generated by dewatering activities may be managed in accordance with the following procedures:

- Use water where possible for construction activities such as compaction and dust control. If used for these applications, ensure that the water will infiltrate and not run-off from the land to storm drain systems, to creek beds (even if dry) or to receiving waters.
- If allowed, infiltrate to an appropriate landscaped, vegetated or soil area. Note: Infiltration may be prohibited in accordance with local requirements. See "When" above.
- If water is to be discharged to land for infiltration:
  - The water may contain sediments, but must not be contaminated with other pollutants.
  - The water must not run-off from the land to storm drain systems, to creek beds (even if dry) or other surface waters.
  - Permission may be needed from the property owner on which the infiltration will occur.
- Water from dewatering, that contains only sediment, may be discharged if the sediment is allowed to settle out or the sediment is filtered out first. Alternatively, a vacuum truck may be used to remove the water and haul it to an authorized discharge location.
- If a permit is required, provide temporary onsite storage (Baker tanks, etc.) of water removed from trenches, excavations, etc., until a permit to discharge is obtained.
- If a permit is obtained for discharge to a storm water or sanitary sewer system, conduct all dewatering discharge activities in accordance with permit requirements.

Maintenance and Inspection

- Inspect pumps, hoses and all equipment before use. Monitor dewatering operations to ensure it does not cause offsite discharge or erosion.
- Inspect routinely, when applicable activities are under way.



When

Use this BMP for projects that involve pavement surfacing, resurfacing, removal, or patching applications of the following:

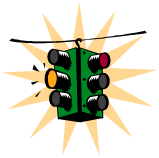
- Cold mix
- Asphalt
- Chip seal, seal coat, tack coat, slurry seal, or fog seal
- Portland cement concrete

For pavement grinding, sawcutting, coring or drilling, refer to BMP Concrete/Coring/ Sawcutting and Drilling Waste Management.

How

Use the following methods as applicable:

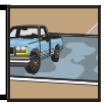
- Protect storm drain inlets near work and downgradient of the area to be paved.
- If onsite mixing is planned then an area must be designed for conducting the mixing. This area should be paved or made impervious (e.g., plastic or wood sheeting) and be located away from storm drain inlets or watercourses.
- Minimize overspray of tackifying emulsions or placement of other paving materials beyond the limits of the area to be paved.
- Use dry methods to clean equipment and conduct cleaning in accordance with the BMP on Vehicle and Equipment Washing.
- Material use and stockpiles to be managed in accordance with BMPs on material Use and Stockpile Management.
- Collect and remove all broken asphalt and concrete, recycle when feasible and dispose of materials in accordance with local, state, and federal requirements.



- **Do not apply asphalt, concrete paving, seal coat, tack coat, slurry seal or fog seal if rain is expected during the application or curing period.**
- **Avoid if possible, transferring, loading, or unloading paving materials near storm drain inlets or watercourses. If not possible, use BMP on Storm Drain Inlet Protection.**

Maintenance and Inspection

- Inspect and maintain equipment and machinery routinely to minimize leaks and drips.
- Inspect inlet protection measures routinely.



When

Use these procedures on all construction sites where vehicle and equipment cleaning is performed. Note that onsite vehicle and equipment washing is not typically performed on utility type construction projects and requires specific approval of a Utility Environmental Representative.

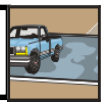
How

Use the following methods as applicable:

- Use "dry" cleaning methods such as wiping down, rather than water washing vehicles or equipment.
- Whenever possible washing should not be conducted at the construction site
- If onsite vehicle washing is authorized by the Environmental Representative, use the following general methods:
  - Vehicle and equipment washing must be located away from storm drain inlets, drainage systems, or watercourses.
  - Place sand bags or another type of berm around storm drain inlets and drainage systems to prevent wash water from entering a storm inlet, drainage system or watercourse.
  - Never discharge wash water to the storm drain system.
  - Use as little water as possible. High-pressure sprayers may use less water than a hose.
  - Use a positive shutoff valve to minimize water usage.

Maintenance and Inspection

Monitor employees and contractors through the duration of the construction project to ensure appropriate practices are being implemented.



When

Use this BMP for projects where onsite fueling of vehicles and equipment, including handheld equipment, is planned.

Vehicle and equipment fueling, except for handheld equipment, is typically not done on the construction site. Onsite fueling of vehicles and equipment may be planned if it is impractical to send vehicles and equipment off site for fueling.

Handheld equipment is treated separately from other equipment. Handheld equipment includes those smaller, manually operated pieces of equipment such as trenchers, mowers, chainsaws, generators, and other equipment that need fueling during regular daily operation.

How

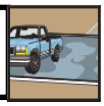
Use the following measures as applicable:

Fueling Vehicles and Handheld Equipment

- If practical, fuel vehicles and equipment off site.
- Mobile fueling equipment is the preferred equipment used for onsite fueling.
- Fuel storage and fueling areas should be located away from storm drain inlets, drainage systems, and watercourses.
- All fueling will be conducted with the fueling operator in attendance at all times regardless if fuel nozzles are equipped with automatic shutoff features.
- Fuel tanks should not be "topped off."
- All fueling operators should have readily available spill containment and cleanup equipment and materials.
- Clean up any spills immediately and properly dispose of contaminated materials.
- Properly store and dispose of rags and absorbent material used to clean up any spilled fuel.
- Mobile fueling trucks and operators must have all necessary permits, licenses and training.

Maintenance and Inspection

- Check to ensure adequate supply of spill cleanup materials are available.
- Perform routine inspections of designated fueling areas.
- Report all spills immediately to the project Supervisor or the Environmental Representative



When

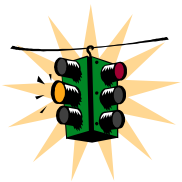
Projects where concrete and asphalt are used or where slurry or pavement/concrete wastes are generated by construction activities, including:

- Sawcutting
- Coring/drilling
- Grinding, re-paving or patching
- Encasing conduit in concrete
- Tower footings

For managing any concrete curing compounds, use the BMP on Hazardous Materials/Hazardous Waste Management. For managing paving operations, use BMP Paving Operations.

How

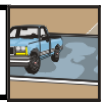
- Install storm drain protection at any down-gradient inlets that may be impacted by the activity. See the BMP on Storm Drain Inlet Protection.
- Minimize the amount of water used during coring/drilling or sawcutting. During wet coring or sawcutting, use shovel or wet vacuum to lift the slurry from the pavement. Additionally, if wet vacuuming is not adequate to capture wastewater from the activity, sand bag barriers or other containment should be used.
- If concrete residue remains after drying, the area should be swept up and residue removed to avoid contact with storm water or entering a storm drain or waterbody via the wind.



- **Do not wash residue or particulate matter into a storm drain inlet or watercourse**.
- The following options should be used for concrete truck chute and/or pump and hose washout:
  - If available, arrange to use an existing concrete washout station. Upon entering site, concrete truck drivers should be instructed about practices being used on site.
  - **Concrete Washouts:** Washout stations can be a plastic lined temporary pit or bermed areas designed with sufficient volume to completely contain all liquid and waste concrete materials plus enough capacity for rainwater. The designated area must be located away from storm drain inlets, or watercourses.
  - **Washout in Trench:** Manually rinsing the concrete truck chute into the trench itself.
  - **Bucket Washout:** Manually rinsing the chute into a wheelbarrow, plastic bucket or pail, and then empty the bucket into the concrete truck barrel or on top of the placed concrete.

Maintenance and Inspection

- Responsible personnel should ensure that all concrete truck drivers are instructed about project practices when the trucks arrive onsite.
- Clean out designated washout areas as needed or at a minimum when the washout is 75 percent full to maintain sufficient capacity throughout the project duration.
- Any designated onsite washout areas must be cleaned out and all debris removed upon project completion. Dispose of concrete waste according to the BMP on Solid Waste Management.
- Inspect routinely, when applicable activities are underway to ensure that concrete washout does not overflow.



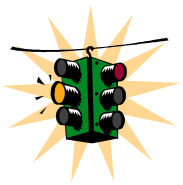
When

This BMP is applicable to utility substructure (vault) dewatering. This BMP does not apply to trench, excavation or other general dewatering associated with construction activities.

How

The discharge of water from dewatering of vaults and substructures to the storm drain is allowed under an existing NPDES permit (General Permit CAG990002, Order No. 2001-11-DWQ). General requirements for discharge under this permit are listed below:

- All dewatering discharges conducted by utility crews, including contractors, shall follow the latest versions of SCG/SDG&E Environmental Practice (EP) on Vault and Substructure Dewatering.
- Discharges to land require prior approval from the landowner.
- If the water to be discharged conforms to the practices within the EP, the discharge is allowed.



- **During discharge, do not allow pollutants (e.g., sediment) to come in contact with the discharge. For example, if there is pre-existing soil in the path of the discharge (i.e., gutter), it must be swept up or avoided before discharging the substructure water.**

Maintenance and Inspection

- Implement applicable provisions of the Environmental Practice.
- Inspect pumps, hoses and equipment before use and routinely when applicable activities are underway.
- Observe dewatering activities to ensure they do not cause erosion or discharge of potential pollutants.

When

Use this BMP whenever vegetation control is used. Vegetation control may consist of manual or mechanical removal of vegetation and/or chemical treatment.

How

General Vegetation Management Procedures:

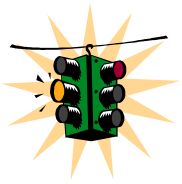
- Do not allow vegetation debris to enter storm drain inlets and watercourses.
- Identify drain inlets and watercourses, both upstream and downstream of the work site(s).
- Pre-plan the work to protect stormwater drainage systems and watercourses from discharge of potential pollutants, maintain equipment in good operating condition.
- Set up the work area to minimize the tracking of material by vehicles and equipment in or out of the work area.

Practice Good Housekeeping at the Work Site(s):

- Litter and debris should be collected and disposed of properly.
- Containers of liquids should be secured with lids until needed.
- Transport collected non-hazardous materials for proper disposal. If the material is a hazardous waste, follow the BMP on Hazardous Materials & Hazardous Waste Management. Contact your Environmental Representative.
- If a leak or spill occurs, protect drainage systems and watercourses from spilled material; follow the BMP on Storm Drain Inlet Protection.

Mechanical Weed Control Procedures

Mechanical weed control is the physical removal of weeds or unwanted vegetation growing around electric utility poles and electric distribution or transmission structures for fire control.

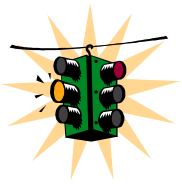


- **Do not stack or leave removed weeds or vegetation or other debris on or near drain inlets or in the storm water drainage system or watercourses.**
- **Do not fuel equipment next to drain inlets or place fuel or oil cans near or in watercourses, the storm drainage system or next to a drain inlet.**
- **Because of fire control requirements, do not leave cut vegetation around structures.**

Chemical Weed Control Procedures

This method of weed and vegetation control uses herbicides to eliminate and prevent weed growth. The purpose is to control vegetation growth year-round as needed for effective fire control.

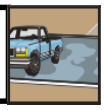
To achieve effective vegetation control through chemical means and protect the environment, application personnel should:



- Use the correct herbicide for the application.
- Consider the seasonal timing of the application as applicable.
- **Do not use chemical vegetation control prior to a forecasted rain event.**

The applicators shall follow the following procedures:

- Only use those herbicides approved by SDG&E/SCG.
- Application of herbicides must conform to the SDG&E/SCG herbicide application protocol in addition to any Contractor owned protocols and label instructions. Contact your Environmental Representative for additional information.

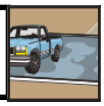


How (continued)

- Apply pesticides only as specified on the "Pesticide Use Recommendation" on the label. The pesticide label is considered the law, and use of an herbicide inconsistent with the label is considered a violation. Follow safety and application methods as specified in the Annual Pesticide Safety Training.
- Follow the herbicide/pesticide application protocol when near storm water drainage system or watercourses.
- Calibrate the spray rig as needed, to ensure accurate application of herbicides.
- Record the use of all herbicides.
- Avoid using overhead irrigation for as long as recommended by the chemical manufacturer after applying pesticides or post-emergents.
- Avoid applying post-emergents prior to a predicted rain event.

Maintenance and Inspection

- Ensure that spraying equipment is maintained to prevent malfunctions.
- Inspect to confirm that mechanical and chemical weed control procedures have not created an erosion problem.



When

Prior to conducting over water activities, confirm the need for permits with appropriate local and state agencies.

This BMP applies to projects where:

- Construction, maintenance or repair activities will be conducted above surface waters. These activities include, but are not limited to, chipping, grinding, scraping, welding/burning, painting, wrapping and coating of pipes and conduits.
- Surface waters (dry or running) include creeks, streams, rivers, lakes and wetlands, bays, estuaries and oceans.

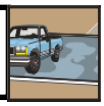
How

Use the following measures as applicable:

- Containment systems must be properly designed and installed prior to the beginning of any operation that may impact a water body to prevent discharge of pollutants to surface waters.
- The work area should be kept clean of all trash and potential pollutants.
- Containment booms should be placed around the area of work as necessary to contain the discharge of potential contaminants such as oil and hydraulic fluid.
- Special attention should be given to existing and forecasted wind and weather conditions to prevent pollutant discharges to surface waters.
- Shrouds should be used to prevent paint overspray, welding slag, and other pollutants from entering surface waters and being dispersed into the air. Shrouding may not be effective during periods of high wind.
- Shrouds should be large enough to adequately enclose or segregate the working area from surface waters. This may include a plywood barrier, visqueen, and scaffolding to help prevent fugitive material from entering surface waters.
- Support structures such as scaffolding shall be used in conjunction with shrouding to withstand potential wind stress.
- Contaminated shrouding material and equipment shall be thoroughly cleaned or disposed of properly.

Maintenance and Inspection

- Inspect the containment systems and shrouds routinely during work activities to ensure their integrity.



When

Use this BMP when utility projects involve mark-out by painting surfaces where underground utilities are located and where paint is required to be removed by local jurisdictions or another authority.

How

Use the following methods and options to remove Utility Mark-Out Paint:

- Use non-toxic, light degradable mark-out paint when possible
- Hydro Pressure wash
- Dry abrasive blast/grinding
- Wet abrasive blast/grinding
- Wet/Dry Vacuum
- Dry Sweep
- Install storm drain inlet protection at adjacent down gradient inlets during wet hydro pressure washing and wet abrasive blasting and grinding.
- Minimize the amount of water used during hydro washing.
- Use shovel or wet vacuum to lift the paint slurry from the pavement or surface.
- If wet vacuuming is not adequate to capture all wastewater from these activities, use additional containment (sand bags, booms, or other containment devices) methods near the work area to prevent the discharge to a storm drain inlet or watercourse.
- If paint residue remains after drying, the area should be swept up and residue removed to avoid contact with storm water.
- If paint residue remains after sweeping, the area can be water washed, as long as the water containing the paint residue is not allowed to enter storm drain inlets or watercourses.
- All waste should be disposed of using the BMPs for Liquid Waste Disposal.

Maintenance and Inspection

- Inspect all containment systems to ensure proper placement prior to starting utility paint removal operations
- Inspect and adjust equipment frequently; and maximize efficiency of the paint removal operations.



Section 4 – Erosion Control and Soil Stabilization

Erosion is the detachment of soil by water or wind. Erosion is a natural process that can be accelerated by construction activities such as grading and trenching. For example, when a site is cleared and grubbed, protective vegetation is removed and the disturbed soil is directly exposed to wind and water. Erosion Controls protect the soil surface and prevent the soil particles from being detached by rainfall or wind. Preservation of Existing Vegetation is an example of an Erosion Control BMP.

Soil Stabilization is a form of erosion control. It protects the exposed soil surface from rain and wind thereby preventing erosion. Hydroseeding is an example of a Soil Stabilization BMP. Erosion Control and Soil Stabilization BMPs in this Manual include:

- BMP 4-01 Preservation of Existing Vegetation
- BMP 4-02 Temporary Soil Stabilization (General)
- BMP 4-03 Hydraulic Mulch
- BMP 4-04 Hydroseeding
- BMP 4-05 Soil Binders
- BMP 4-06 Straw Mulch
- BMP 4-07 Geotextiles, Plastic Covers and Erosion Control Blankets/Mats
- BMP 4-08 Dust (Wind Erosion) Control

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When

This BMP is applicable to projects when:

- There are areas on site where no construction activity is planned or will occur later.
- Identify areas to be preserved in the immediate vicinity of the construction site, and mark as appropriate before clearing and grubbing or other soil disturbance activities begin.
- Areas with vegetation that can be preserved to protect against soil erosion, such as on steep slopes, watercourses, and building sites in wooded areas.
- Areas designated as Environmentally Sensitive Areas (ESAs), or where federal, state, or local government regulations require preservation, such as wetlands, vernal pools, marshes, etc. These areas are typically flagged by a qualified biologist.

How

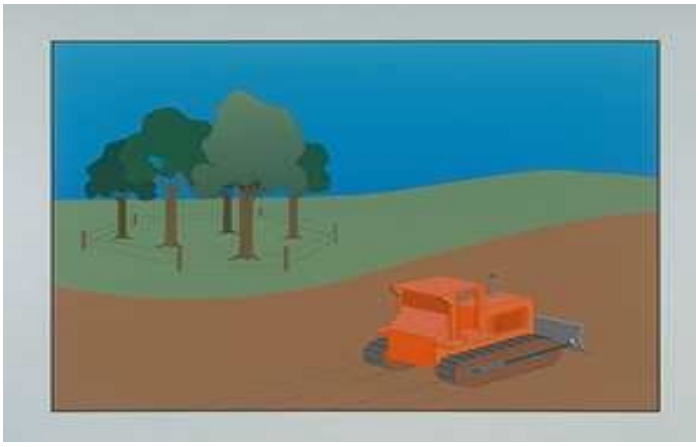
Use the following measures as applicable:

- Preserve existing vegetation whenever possible.
- If necessary, contact the project Environmental Representative for any clarification regarding areas to be preserved.
- Whenever possible minimize disturbed areas by locating temporary roadways to avoid stands of trees and shrubs and follow existing contours to reduce cutting and filling.
- Construction materials, equipment storage and parking areas should be located outside the drip line of any tree to be retained.
- Consider the impact of grade changes to existing vegetation and the root zone.
- Remove any markings, barriers, or fencing after project is completed.

Maintenance and Inspection

- Maintain the clearly marked limits of disturbance during construction as appropriate to preserve vegetation.
- Inspect barriers regularly during construction.

Pictures



Vegetation to be preserved is marked and outside the work area.



When

This BMP is applicable to major projects when steep slopes are disturbed.

- For surface protection methods to prepare or protect the soil surface from the combined erosive effects of wind, rain, and storm water runoff.
- On slopes where the soil has been exposed because of construction activities, one or more Soil Stabilization BMPs may be required to be implemented.

How

- Use one or more of the below temporary soil stabilization practices when applicable as described above:
  - Hydraulic Mulch.
  - Hydro seeding.
  - Soil Binders.
  - Straw Mulch.
  - Geotextiles, Plastic Covers and Erosion Control Blankets/Mats.
- Implement prior to the onset of precipitation.
- Implement BMPs such as fiber rolls or gravel bag berms to break up the slope lengths as follows:
  - On steep slopes, BMPs should be placed on slopes 100 feet and greater at intervals no greater than 50 feet.
  - On very steep slopes, BMPs should be placed on slopes 50 feet and greater at intervals no greater than 25 feet.
- Permanent erosion control shall be applied to areas deemed substantially complete during the project's defined seeding window.
- Refer to individual Soil Stabilization BMPs for specific instructions for use.

Maintenance and Inspection

- Refer to individual temporary soil stabilization BMPs for maintenance and inspection requirements.

Pictures



Applying a tackifier using a trailer mounted pump and hose.



Applying soil stabilization manually in harder to reach areas.



When

- Hydraulic mulch is typically applied to disturbed areas requiring temporary protection until permanent vegetation is established or disturbed areas that must be re-disturbed following an extended period of inactivity.
- Avoid use in areas where the mulch would be incompatible with immediate earthwork activities and would have to be removed.

How

- Prior to application, roughen embankment and fill areas by rolling with a crimping or punching type roller or by track walking. Track walking shall only be used where other methods are impractical.
- Avoid mulch over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation.
- Hydraulic Mulches:
  - Apply as a liquid slurry using a hydraulic application machine (i.e., hydroseeder) at rates of mulch and stabilizing emulsion recommended by the manufacturer. Wood fiber hydraulic mulches are generally short-lived (only last a part of a growing season) and must be applied 24 hrs before rainfall to dry and become effective.
- Hydraulic Matrices:
  - Apply a combination of wood fiber and/or paper fiber mixed with acrylic polymers as binders. Apply as a liquid slurry using a hydraulic application machine (i.e., hydroseeder) at rates recommended by the manufacturer. Hydraulic matrices must be applied 24 hours before rainfall to dry and become effective.
- Bonded Fiber Matrix (BFM)
  - Apply BFM using a hydraulic application machine (mulch and tackifier are pre-mixed in a single bag) in accordance with manufacturers instructions. Do not apply immediately before, during, or after a rainfall.

Maintenance and Inspection

- Maintain an unbroken, temporary mulched ground cover throughout the period of construction when the soils are not being reworked. Inspect before expected rainstorms and repair any damaged ground cover and re-mulch exposed areas of bare soil.
- After any rainfall event, maintain all slopes to prevent erosion.

Pictures



Applying hydraulic mulch.



Close-up of bonded fiber matrix



When

Hydroseeding typically consists of applying a mixture of fiber, seed, fertilizer, and stabilizing emulsion with hydro-mulch equipment, which temporarily protects disturbed soil areas from erosion. It is applied on:

- Disturbed Soil Areas (DSAs) requiring temporary protection until permanent vegetation is established, or
- DSAs that must be redisturbed following an extended period of inactivity.

How

- Avoid use of hydroseeding in areas where the best management practice (BMP) would be incompatible with future earthwork activities and would have to be removed such as:
  - Steep slopes are difficult to protect with temporary seeding.
  - Temporary seeding may not be appropriate in dry periods without supplemental irrigation.
  - Temporary vegetation may have to be removed before permanent vegetation is applied.
  - Temporary vegetation is not appropriate for short-term inactivity.
- Hydroseeding can be accomplished using a multiple-step (with straw mulch) or a one-step process (mixed with hydraulic mulch, hydraulic matrix, or bonded fiber matrix). When the one-step process is used to apply the mixture of fiber, seed, etc., the seed rate shall be increased to compensate for all seed not having direct contact with the soil.
- Prior to application, roughen the slope, fill area, or area to be seeded with the furrows trending along the contours.
- Apply a straw mulch as necessary to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow.
- Follow-up applications shall be made as needed to cover weak spots, and to maintain adequate soil protection.
- Avoid over-spray onto the travel way, sidewalks, drainage channels and existing vegetation.

Maintenance and Inspection

- All seeded areas shall be inspected for failures and re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates. Any temporary revegetation efforts that do not provide adequate cover must be revegetated.
- After any rainfall event, maintain all slopes to prevent erosion.

Pictures



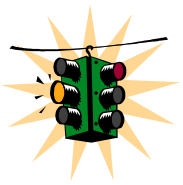
Applying hydroseed.

When

Soil binders are typically applied to disturbed soil areas requiring short-term temporary protection. Because soil binders can often be incorporated into the work, they may be a good choice for areas where grading activities will soon resume.

How

- Selection of soil binders should be approved by the projects Environmental Representative after an evaluation of site-specific factors. Binders have the following limitations:
  - Soil binders generally experience spot failures during heavy rainfall and may need reapplication after a storm and do not hold up to pedestrian or vehicular traffic.
  - Soil binders may not penetrate soil surfaces made up primarily of silt and clay, particularly when compacted.
  - Some soil binders may not perform well with low relative humidity. Under rainy conditions, some agents may become slippery or leach out of the soil.
  - May not cure if low temperatures occur within 24 hours of application.
- Follow manufacturer's recommendations for application procedures and cleaning of equipment after use. Any onsite cleaning must use appropriate BMPs for pollution prevention plans.
- Prior to application, roughen embankment and fill areas. Track walking shall only be used where rolling is impractical.
- Soil binders should not be applied during or immediately before rainfall, as they require a minimum curing time of 24 hours before they are fully effective.



- Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- **Do not apply soil binders to frozen soil, areas with standing water, under freezing conditions, or when the temperature is below 4°C (40°F) during the curing period.**
- More than one treatment is often necessary, although the second treatment may be diluted or have a lower application rate.
- For liquid agents:
  - Crown or slope ground to avoid ponding.
  - Uniformly pre-wet ground according to manufacturer's recommendations.
  - Apply solution under pressure. Overlap solution 150 to 300 mm (6 to 12 in).
  - Allow treated area to cure for the time recommended by the manufacturer; typically, at least 24 hours.
  - Apply second treatment before first treatment becomes ineffective, using 50 percent application rate.
  - In low humidities, reactivate chemicals by re-wetting according to manufacturer's recommendations.

Maintenance and Inspection

- Reapplying the selected soil binder may be needed for proper maintenance. Traffic areas should be inspected routinely.
- After any rainfall event, maintain all slopes to prevent erosion.

When

Straw mulch is used when:

- Temporary soil stabilization surface cover is needed on disturbed areas until soils can be prepared for re-vegetation and permanent vegetation is established.
- In combination with temporary and/or permanent seeding strategies to enhance plant establishment.
- Note, there is a potential for introduction of weed-seed and unwanted plant material with straw.

How

- A tackifier is the preferred method for anchoring straw mulch to the soil on slopes. Tackifiers act to glue the straw fibers together and to the soil surface, and the tackifier shall be selected based on longevity and ability to hold the fibers in place. Soil binders (tackifier) will generally experience spot failures during heavy rainfall events.
- A tackifier is typically applied at a rate of 125 pounds per acre. In windy conditions, the rates are typically 150 pounds per acre.
- Crimping, punch roller-type rollers, or track-walking may also be used to incorporate straw mulch into the soil on slopes. Track walking shall only be used where other methods are impractical.
- Avoid placing straw onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- Straw mulch with tackifier shall not be applied during or immediately before rainfall.
- Apply loose straw at a minimum rate of 4,000 pounds per acre, either by machine using a straw blower or by hand distribution.
- The straw mulch must be evenly distributed on the soil surface.
- Anchor the mulch in place by using a tackifier or by “punching” it into the soil mechanically. “Punching” of straw does not work in sandy soils.
- Methods for holding the straw mulch in place depend on the slope steepness, accessibility, soil conditions and longevity. If the selected method is incorporation of straw mulch into the soil, then do as follows:
  - On small areas, a spade or shovel can be used.
  - On slopes with soils, which are stable enough, and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be “punched” into the ground using a knife-blade roller or a straight bladed coulter, known commercially as a “crimper.”
  - On small areas and/or steep slopes, straw can also be held in place using plastic netting or jute. The netting shall be held in place using 11 gauge wire staples, geotextile pins or wooden stakes (as described in BMP on “Geotextiles, Plastic Covers and Erosion Control Blankets/Mats”).
- Remove straw as necessary prior to permanent seeding or soil stabilization.

Maintenance and Inspection

- The key consideration in maintenance and inspection is that the straw needs to last long enough to achieve erosion control objectives.
- Reapplication of straw mulch and tackifier may be required to maintain effective soil stabilization over disturbed areas and slopes.
- After any rainfall event, maintain all slopes to prevent erosion.

Pictures



Straw mulch.



When

- The following methods are used when disturbed soils may be particularly difficult to stabilize or access, including the following situations:
  - Steep slopes, generally steeper than 1:3 (V:H).
  - Slopes where the erosion hazard is high.
  - Slopes and disturbed soils where mulch must be anchored.
  - Disturbed areas where plants are slow to develop adequate protective cover.
  - Channels with high flows.
  - Channels intended to be vegetated.
  - Slopes adjacent to water bodies of Environmentally Sensitive Areas (ESAs).
- Blankets and mats are generally not suitable for excessively rocky sites, or areas where the final vegetation will be mowed (because staples and netting can catch in mowers).
- Plastic results in 100 percent runoff, therefore, their use is limited to:
  - Covering stockpiles.
  - Covering small graded areas for short periods, such as through an imminent storm event, until alternative measures may be installed.

How

- Proper site preparation is essential to ensure complete contact of the blanket or matting with the soil.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.
- Prepare seedbed by loosening of topsoil.
- Seed the area before blanket installation for erosion control and revegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all check slots and other areas disturbed during installation must be re-seeded. Where soil filling is specified, seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.
- U-shaped wire staples, metal geotextile stake pins or triangular wooden stakes can be used to anchor mats and blankets to the ground surface.
- Wire staples and metal stakes should be driven flush to the soil surface.
- All anchors should be 6 in to 18 in long and have sufficient ground penetration to resist pullout. Longer anchors may be required for loose soils.
- Installation on slopes – Consult the manufacturer's recommendations for installation. In general, these will be as follows:
  - Begin at the top of the slope and anchor the blanket in a 6 in deep by 6 in wide trench. Backfill trench and tamp earth firmly.
  - Unroll blanket downslope in the direction of water flow.
  - Overlap the edges of adjacent parallel rolls 2 in to 3 in and staple every 3 ft.
  - When blankets must be spliced, place blankets end over end (shingle style) with 6 in overlap. Staple through overlapped area, approximately 12 in apart.
  - Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
  - Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples shall be placed down the center and staggered with the staples placed along the edges.
- Blankets and mats must be removed and disposed of prior to application of permanent soil stabilization measures.

Maintenance and Inspection

- Areas treated with temporary soil stabilization should be inspected routinely and before and after significant forecasted storm events. Any failures should be repaired immediately. Areas treated with temporary soil stabilization should be maintained to provide adequate erosion control. Temporary soil stabilization should be reapplied or replaced on exposed soils when greater than 10 percent of the previously treated area becomes exposed or exhibits visible erosion.
- If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel.

Pictures



Several types of Erosion Control Blankets.

When

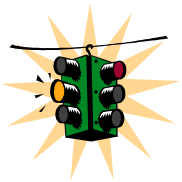
This practice is implemented on exposed soils or materials subject to wind erosion.

How

Use the following measures as applicable:

- Water applied for dust control should be applied evenly and in a manner that does not generate runoff.
- Appropriate methods of applying dust control (covers or water and the means to apply it) should be available for projects with the potential to create dust.
- Dust control must be implemented in accordance with local air quality requirements.
- Dust control methods should be approved by an Environmental Representative.
- Obtain prior approval to use any chemical dust suppressant from the projects Environmental Representative.

(dry or running)



- Non-potable water should not be conveyed in tanks or drainpipes that will be used to convey potable water and there should be no connection between potable and nonpotable supplies. Non-potable tanks, pipes and other conveyances should be marked **"NON-POTABLE WATER – DO NOT DRINK."**
- If reclaimed wastewater is used for dust control, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality Control Board (RWQCB) requirements. Approval for use of reclaimed wastewater must be obtained from the projects Environmental Representative.

Maintenance and Inspection

- Check areas protected to ensure coverage.
- Reapply water or maintain covers, as necessary to maintain their effectiveness.

Pictures



Water being applied for dust control.

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APPENDIX A DEFINITIONS AND ACRONYMS

BMP	Best Management Practice
BASE	Construction and Operations Center (The Gas Company)
C&O Center	Construction and Operations Center (SDG&E)
Caltrans	California Department of Transportation
Discharger	Any person who discharges waste that could affect the quality of California waters.
DSA	Disturbed Soil Area
EP	Environmental Practice
FCD	Formal Communication Document
Non-rainy Season	May 1 to October 1, except for Southern California Desert Area where the non-rainy season ends August 1.
Rainy Season	October 1 through May 1, except for Southern California Desert Area where the rainy season starts on August 1.
RWQCB	Regional Water Quality Control Boards (RWQCB) – nine Water Boards located throughout California that are responsible for enforcing water quality standards within their boundaries.
Runoff	Rainfall or snow melt that is not absorbed by soil, evaporated, or transpired by plants, but finds its way into streams as surface flow.
ROW	Right of Way
SCG	Southern California Gas Company (The Gas Company)
SDG&E	San Diego Gas and Electric Company
SWRCB	State Water Resources Control Board (SWRCB) – The State Board responsible for protecting and preserving water quality and water rights in California.
SEU	Sempra Energy Utilities
SWPPP	Storm Water Pollution Prevention Plan
Watershed	The total land area that contributes water to a river, stream, lake, or other body of water. Synonymous with drainage area, drainage basin.

APPENDIX A DEFINITIONS AND ACRONYMS

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Appendix VII
BMP Information

Post-Construction Water Balance Calculator

Not Applicable

Appendix VIII
REAPS

Rain Event Action Plan

Not Applicable

The Suncrest Substation project is a Risk Level 1, therefore a REAP is not required.

Appendix IX
Site Inspection

Appendix X
Construction Site Monitoring Program (CSMP)

APPENDIX X
CONSTRUCTION SITE MONITORING PROGRAM (CSMP)

1 OVERVIEW

A site specific CSMP is required under the CGP. The purpose of the CSMP is to include all monitoring procedures and instructions, location maps, forms, and checklists. It is the responsibility of the QSP to implement the CSMP. The QSD shall revise the CSMP as necessary to reflect project revisions and whenever there is a change of ownership for all or any portion of the construction site prior to completion or final stabilization.

2 VISUAL MONITORING (INSPECTION) REQUIREMENTS

The visual observations (inspections) described in this Construction Site Monitoring Plan (CSMP) are specific to sampling events and are not equivalent to the Site Inspections described in Section 4.7 of this SWPPP.

A. Visual Monitoring (Inspection) for Qualifying Rain Events (QREs). A QRE is defined as any precipitation of ½ inch or more at the time of discharge. A blank Visual Observation (inspection) for a Qualifying Rain Event form is provided in Appendix I. The QSP must complete these forms during the visual observation and insert a completed copy in Appendix XI.B of this SWPPP. See Section 6.0 for record-keeping requirements.

Requirements for Risk Level 1:

- Visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a QRE. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.
- Observations shall be done only during business hours. Business hours are anytime work is being conducted on the site.
- Record the time, date and rain gauge reading of all QREs.

- **Before** a QRE (i.e., <u>within 2 business days (48 hours)</u>):
    - **Storm Water:**
        - Observe all storm water drainage areas for:
            - Spills, leaks or uncontrolled pollutant sources and implement any needed corrective actions;
            - The presence or absence of:
                - Floating and suspended materials;
                - A sheen on the surface;
                - Discolorations;
                - Turbidity;

- Odors; and
- Sources of any observed pollutants.

- **BMPs:**
  - Observe all BMPs for proper implementation in accordance with the SWPPP and implement appropriate corrective actions;
  - Observe any storm water storage and containment areas:
    - For leaks and to ensure maintenance of adequate freeboard;
    - The presence or absence of:
      - Floating and suspended materials;
      - A sheen on the surface;
      - Discolorations;
      - Turbidity;
      - Odors; and
      - Sources of any observed pollutants.

- **After** a QRE (Within 2 business days):
  - **BMPs:**
    - Observe whether BMPs were adequately designed, implemented, and effective; and
    - Identify additional BMPs and revise the SWPPP accordingly.

B. Visual Monitoring (Inspection) for Non-Storm Water Discharges

A blank form is provided in Appendix XI.A. The QSP must complete these forms during the visual observation and insert a completed copy in Appendix XI.B.

Requirements for Risk Level 1:

Visually observe (inspect) each drainage area for:

- The presence of (or indications of prior) unauthorized and authorized non-storm water discharges; and
- Their sources.

Shall conduct one visual observation (inspection) quarterly in each of the following periods:

- January- March;
- April-June;
- July-September; and
- October-December.

Visual observation (inspections) are only required during daylight hours (sunrise to sunset).

Shall ensure that visual observations (inspections) document the:

- Presence or evidence of any non-stormwater discharge (authorized or unauthorized);
- Pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.); and
- Source of the pollutants.

Shall maintain on-site records indicating the response taken to:

- Eliminate unauthorized non-storm water discharges; and
- Reduce or prevent pollutants from contacting non-storm water discharges.

- See Section 6.0 for additional record-keeping requirements.

2.1 Exemptions for Visual Observation and Sample Collection

Visual observations (inspections) and sample collection are not required under the following conditions:

- During dangerous weather conditions such as flooding and electrical storms.
- Outside of scheduled site business hours.

If one of these conditions occurs, document why the sampling or observations did not occur in the SWPPP and include the information in the Annual Report. A blank Form has been provided in Appendix I Attachment I.A. Keep a copy of the completed form in Attachment XI.B.

3 NON-VISIBLE POLLUTANT MONITORING REQUIREMENTS

Requirements for Risk Level 1:

- Collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.
- Ensure that water samples are large enough to characterize the site conditions.
- Collect samples at all discharge locations that can be safely accessed.
- Collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.
- Analyze samples for all non-visible pollutant parameters – parameters indicating the presence of pollutants identified in the pollutant source assessment located in Section 3.1 below.
- Collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.

- Compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.
- Shall keep all field /or analytical data in the SWPPP document. Sampling Event Worksheet (Blank Form in Appendix XI.A / Completed Form in Appendix XI.D)

1. Pollutant Source Assessment

a. Historical Pollutants

Prior to commencement of construction at this project, the site was undisturbed land.. Based on a review of the Environmental Impact Report, the following existing pollutants will be sampled:

No existing pollutants were found to be on site. Therefore, no known pollutants will be sampled for.

b. Potential pollutant sources

A list of potential pollutants is located in Appendix V. The list of potential pollutants generated includes all non-visible pollutants that are known or should be known to occur on the construction site.

Based on the sources of pollutants identified above, the following indicator parameters will be analyzed to determine if pollutants are anticipated to be conveyed from the site by storm water:

- Nitrates
- Oil and Grease

4 STORM WATER DISCHARGE WATER QUALITY SAMPLING LOCATIONS

Sample only during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.

Samples shall be collected at all discharge locations that can be safely accessed.

A. Effluent Sampling Locations:

To determine the effluent sampling locations, the following procedures must be conducted:

- Review a Drainage Map or any other exhibit that provide drainage patterns.
- Conduct a visual observation to determine and evaluate the following with

respect to discharge locations:

- Drainage areas
- Run-on (control) from surrounding areas and if there is reason to believe run-on may contribute to an exceedance of NALs or NELs.
- Location of non-storm water and/or authorized non-storm water discharges

This section identifies storm water sampling locations for effluent discharges. The purpose of sampling storm water discharges is to characterize discharges associated with construction activity from the entire project disturbed area.

Sampling locations for effluent samples at all discharge points where storm water is discharged off-site include the following:

There are 3 sampling locations for site runoff from the Suncrest Substation. There is 1 sample to be monitored as the control sample location. The sampling locations are described below.

The control sampling location is located on the upstream side of the project site and will be taken from within the brow ditch located along the south side of the entry roadway into the substation where run on is expected. The sampling locations for site runoff is located on the downstream side of the project site and will be taken at the inlets immediately upstream of the proposed Hydrodynamic Separator (CDS) unit locations.

There are also 3 sampling locations along the access road. These sampling locations are described below.

The outfall pipe at the culvert crossing located approximately 0.8 miles west of the intersection of Japatul Valley Road and Bell Bluff Truck Trail, the outfall pipe at the culvert crossing located approximately 1.3 miles west of the intersection of Japatul Valley Road and Bell Bluff Truck Trail, and the outfall pipe at the western most culvert crossing located approximately 2.0 miles west of the intersection of Japatul Valley Road and Bell Bluff Truck Trail.

The monitoring locations are shown on the Site Map in Appendix III. The sample locations have been identified for the site based on the drainage map for final build out conditions for the site. During the interim condition, the QSP will be responsible to identify the locations where storm water runoff exits the site, and identify the locations on the exhibit as site runoff monitoring locations.

5 STORM WATER SAMPLE COLLECTION AND HANDLING INSTRUCTIONS

Should there be a breach, leak or spillage that requires sampling, as discussed in Section 3, ensure that water samples are large enough to characterize the site conditions. A

sample kit should be available on site in case of a need to sample. The sample kit should include:

- Ice chest
- Blue ice
- Rubber Gloves -3 to 4 pair
- Sample Bottles (provided by laboratory)
- Sharpie
- Chain of Custody Form
- Scoop

Sample bottles should be:

- Filled to top
- Do not pour between containers
- Label all bottles before collecting sample – use sharpie
- Store chilled (cooler or refrigerator)
- Secure cap
- Keep upright

Field Analysis

Analyses for pH and turbidity may be performed in the field using field meters. Field meters will be calibrated, maintained, and operated by trained staff according to the manufacturer's specifications, and calibration records will be stored in Appendix XI.D.

Laboratory Analysis

An analytical laboratory(ies) for sample analyses is identified in Appendix XI.D of this CSMP.

The laboratory will provide properly cleaned and preserved (if applicable) sampling containers (bottles) for the samples, and labels on the sample bottles. The sample bottle labels will identify the analysis to be performed and any preservative contained in the bottles, and provide room for recording the sample location and time and date of collection. The laboratory will also provide chain-of-custody forms. Example Chain of Custody form is located in Appendix XI.E.

Ensure that the testing laboratories will receive samples the same day or within 48 hours of the physical sampling (unless otherwise required by the laboratory), and shall use only the sample containers provided by the laboratory to collect and store samples.

The LRP shall designate and train personnel to collect, maintain, and ship samples in accordance with the Surface Water Ambient Monitoring Program's (SWAMP) 2008 Quality Assurance Program Plan (QAPrP). See footnote 6 on page 15 of Attachment E of the CGP for additional information regarding SWAMP and QAPrP.

The following table provides information for constituents to be monitored for non-visible parameters.

Analyte	EPA Analytical Method Number	Minimum Sample Volume[3]	Sampling Container	Preservative[4]	Holding Time
Nitrate as Nitrogen	EPA 352.1 or 300.0 or SM 4110 B or SM4500-NO[5]	25 mL	Polypropylene or glass	None	48 hours
Oil and Grease	EPA 1664 A	1 L	Amber glass	HCl or H_2SO_4 to pH < 2	28 days

[3]Minimum sample volume recommended. Specific volume requirements will vary by laboratory and must be verified with the laboratory when bottles are ordered.

[4]Do not pre-rinse or overfill sample containers that contain preservative.

[5]All samples must be kept chilled to 4°C (keep samples on ice for delivery to analytical laboratory)

6 ANALYTICAL AND MONITORING METHODS

If the any upgrades of BMPs occur, the SWPPP will be revised accordingly by the QSD and a record of the upgrade will be kept in Appendix XI.B.

A. Effluent Sampling Methods:

Refer to the table in Section 5 above for test methods, detection limits, and reporting units.

This project is a Risk Level 1 project, therefore effluent monitoring is not applicable.

B. Non-Visible Pollutants

The Suncrest Substation project is located in the Loveland Hydrologic Subarea of Hydrologic Unit basin number 909.00. The Water Quality Control Plan for the 9 Region ("Basin Plan") provides water quality objectives for some of the analytes that will be monitored. While these do not constitute a discharge standard or limit, these water quality objectives will be used as decision making benchmark standards. Where such standards are not available through the Basin Plan, benchmark standards set forth by other agencies will be used for decision making purposes.

The table below lists the benchmarks that will be used.

Benchmark Criteria for Decision Making		
Analyte	Benchmark Concentration	Reference
Nitrate	0.68 mg/L	USEPA
Oil and Grease	15 mg/L	USEPA*

*United States Environmental Protection Agency Multi-Sector Industrial Permit

- Bioassessment

At the time this SWPPP was developed, the project was greater than 30 acres but is not a Risk Level 3 project and does not directly discharge into the receiving waters.

Since the project is not a Risk Level 3 project, no bioassessment monitoring is required.

7 RECORDS

Risk Level 1 dischargers shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Risk Level 1 dischargers shall retain all records on-site while construction is ongoing.

Appendix XI
CSMP Attachments

SDGE
A Sempra Energy utility

CHAIN OF CUSTODY/SAMPLE SUBMITTAL FORM

ENVIRONMENTAL ANALYSIS LABORATORY

6555 NANCY RIDGE DRIVE, SUITE 300, SAN DIEGO, CA 92121-3221
(858) 503-5371 FAX: (858) 503-5398

LAB NO.

WORK ID.	CLIENT NAME	CLIENT CODE
SAMPLED BY (Print & Signature)	CLIENT'S PHONE	PROJECT CODE
CLIENT'S ADDRESS	NUMBER OF CONTAINERS	DATE DUE

SAMPLE ID	DATE	TIME	SAMPLE TYPE	SAMPLE CONTAINER	PRESERVATION	ANALYSIS NEEDED	TEST CODE(S)
COMMENTS							

RELEASING	DATE	TIME	ACCEPTING	DATE	TIME
RELEASING	DATE	TIME	ACCEPTING	DATE	TIME

Shaded areas for Lab use only

DISTRIBUTION: WHITE – LAB YELLOW – LAB REPORT PINK – LOG GOLDENROD – CUSTOMER COPY

Appendix XII
Permit Registration Documents

State Water Resources Control Board

NOTICE OF INTENT

TO COMPLY WITH THE TERMS OF THE
GENERAL PERMIT TO DISCHARGE STORM WATER
ASSOCIATED WITH CONSTRUCTION ACTIVITY (WQ ORDER No. 99-08-DWQ)

I. NOI STATUS (SEE INSTRUCTIONS)

MARK ONLY ONE ITEM 1. ☒ New Construction 2. ☐ Change of Information for WDID#

II. PROPERTY OWNER

Name: San Diego Gas & Electric		Contact Person: Linda Collins	
Mailing Address: 8315 Century Park Court, CP21E		Title: Principal Environmental Specialist	
City: San Diego	State: CA	Zip: 92123	Phone: Office: (858) 650-4064 24 Hour (619) 987-2437

Owner Type (*check one*) 1.[ ] Private Individual 2. [X] Business 3. [ ] Municipal 4. [ ] State 5.[ ] Federal 6.[ ] Other

III. DEVELOPER/CONTRACTOR INFORMATION

Developer/Contractor: San Diego Gas & Electric		Contact Person: Linda Collins	
Mailing Address: 8315 Century Park Court, CP21E		Title: Principal Environmental Specialist	
City: San Diego	State: CA	Zip: 92123	Phone: Office: (858) 650-4064 24 Hour (619) 987-2437

IV. CONSTRUCTION PROJECT INFORMATION

Site/Project Name: Sunrise Powerlink – Suncrest Substation		Site Contact Person: Linda Collins and other(s) to be determined	
Physical Address/Location: Approx. 3 miles west of Japatul Valley road and immediately south of Bell Bluff Truck Trail	Latitude: 32°48'31"	Longitude: 116°40'59"	County: San Diego
City (or nearest City): Alpine	Zip: 91901	Site Phone Number: N/A	Emergency Phone Number: (619) 987-2437

A. Total size of construction site area: 82 Acres

B. Total area to be disturbed: 78 Acres (% of total 95)

C. Percent of site imperviousness (including rooftops):
Before Construction: 32 %
After Construction: 32 %

D. Tract Number(s): N/A , _____

E. Mile Post Marker: N/A

F. Is the construction site part of a larger common plan of development or sale? ☒ YES ☐ NO

G. Name of plan or development: Sunrise Powerlink

H. Construction commencement date: 6/01/10

I. % of site to be mass graded: 95

J. Projected construction dates:
Complete grading: 6/01/12 Complete project: 6/15/13

K. Type of Construction (Check all that apply):

1. ☐ Residential 2. ☐ Commercial 3. ☐ Industrial 4. ☐ Reconstruction 5. ☐ Transportation

6. ☒ Utility Description: 500kV substation and associated access roads to the substation for the Sunrise Powerlink Project 7. ☐ Other (Please List):

V. BILLING INFORMATION

SEND BILL TO: ☒ OWNER (as in II. above)	Name: San Diego Gas & Electric	Contact Person: Linda Collins	
☐ DEVELOPER (as in III. above)	Mailing Address: 8315 Century Park Court, CP21E	Phone/Fax: Phone: (858) 650-4064 Fax: (619) 987-2437	
☐ OTHER (enter information at right)	City: San Diego	State: CA	Zip: 92123

VI. REGULATORY STATUS

A. Has a local agency approved a required erosion/sediment control plan? ☐ YES ☒ NO

Does the erosion/sediment control plan address construction activities such as infrastructure and structures? ☐ YES ☐ NO

Name of local agency: Phone: ( ) --

B. Is this project or any part thereof, subject to conditions imposed under a CWA Section 404 permit of 401 Water Quality Certification? ☐ YES ☒ NO

If yes, provide details: _____

VII. RECEIVING WATER INFORMATION

A. Does the storm water runoff from the construction site discharge to (Check all that apply):

1. ☒ **Indirectly to waters of the U.S.**
2. ☐ **Storm drain system - Enter owner's name:** _____
3. ☐ **Directly to waters of U.S. (e.g., river, lake, creek, stream, bay, ocean, etc.)**

Name of receiving water: (river, lake, creek, stream, bay, ocean): Peterson Creek which drains to the Sweetwater River and eventually to the Loveland Reservoir

VIII. IMPLEMENTATION OF NPDES PERMIT REQUIREMENTS

A. STORM WATER POLLUTION PREVENTION PLAN (SWPPP) (check one)

☐ A SWPPP has been prepared for this facility and is available for review: Date Prepared: ____/____/____ Date Amended: ____/____/____

☒ A SWPPP will be prepared and ready for review by (enter date): 6/01/10

☐ A tentative schedule has been included in the SWPPP for activities such as grading, street construction, home construction, etc.

B. MONITORING PROGRAM

☒ A monitoring and maintenance schedule has been developed that includes inspection of the construction BMPs before anticipated storm events and after actual storm events and is available for review.

If checked above: A qualified person has been assigned responsibility for pre-storm and post-storm BMP inspections to identify effectiveness and necessary repairs or design changes ☒ YES ☐ NO

Name: Linda Collins and other(s) to be determined Phone: (858) 650-4064

C. PERMIT COMPLIANCE RESPONSIBILITY

A qualified person has been assigned responsibility to ensure full compliance with the Permit, and to implement all elements of the Storm Water Pollution Prevention Plan including:

1. Preparing an annual compliance evaluation ☒ YES ☐ NO

Name: Linda Collins and other(s) to be determined Phone: (858) 650-4064

2. Eliminating all unauthorized discharges ☒ YES ☐ NO

IX. VICINITY MAP AND FEE (must show site location in relation to nearest named streets, intersections, etc.)

Have you included a vicinity map with this submittal? ☒ YES ☐ NO

Have you included payment of the annual fee with this submittal? ☒ YES ☐ NO

X. CERTIFICATIONS

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment. In addition, I certify that the provisions of the permit, including the development and implementation of a Storm Water Pollution Prevention Plan and a Monitoring Program Plan will be complied with."

Printed Name: Robert C. Jackson

Signature: _____ **Date:** 02/10/2010

Title: General Manager & Director – Construction and Engineering Sunrise

SDGE
A Sempra Energy utility®

Patrick Lee
Vice President
Sunrise Powerlink Project

San Diego Gas & Electric
8330 Century Park Court, CP33A
San Diego, CA 92123-1530

Tel: 858.650.6101
Fax: 858.650.6106
Patrick.lee@semprautilities.com

TO: Distribution **DATE:** June 24, 2010

FROM: Patrick Lee

SUBJECT: **State Water Resources Control Board**
Construction Storm Water General Permit (Order 2009-0009)
Authorized Signatories for
San Diego Gas & Electric's Sunrise Power Link Project

I am a Legally Responsible Person pursuant to State Water Resources Control Board Order No. 2009-0009-DWQ (NPDES General Permit No. CAS000002 – General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities or "General Permit"). This letter is to acknowledge the persons listed below are authorized as Approved Signatories under this permit:

- Robert Jackson
- Jonathan Woldemariam

A copy of this authorization shall be retained with each Storm Water Pollution Prevention Plan prepared pursuant to this authorization.

Distribution: Robert Jackson; Jonathan Woldemariam, Alan Colton, Don Haines, Linda Collins, Amethyst Cruspero, Fred Jacobsen

Linda S. Adams
Secretary for Environmental Protection

State Water Resources Control Board

Division of Water Quality
1001 I Street Sacramento, California 95814 (866) 563 3107
Mailing Address: P.O. Box 1977 Sacramento, California 95812-1977
FAX (916) 341-5543 Internet Address: http://www.waterboards.ca.gov
Email Address: stormwater@waterboards.ca.gov

Arnold Schwarzenegger
Governor

Approved Date: 03/03/2010

Linda Collins
San Diego Gas & Electric
8315 Century Park Ct CP 21E
San Diego CA 92123

RECEIPT OF YOUR NOTICE OF INTENT (NOI)

The State Water Resources Control Board (State Water Board) has received and processed your NOI to comply with the terms of the General Permit to Discharger Storm Water Associated with Construction Activity. Accordingly, you are required to comply with the permit requirements.

The Waste Discharger Identification (WDID) number is: **9 37C357500** . Please use this number in any future communication regarding this permit.

	SITE DESCRIPTION
OWNER:	San Diego Gas & Electric
DEVELOPER:	San Diego Gas & Electric
SITE INFORMATION:	Sunrise Powerlink Suncrest Station Approx .3 Miles W of Japatul Valley Rd S Bell Bluff Truck T Alpine
TOTAL DISTURBED ACRES:	78
START DATE:	06/01/2010
COMPLETION DATE:	06/15/2013
COUNTY:	San Diego

When the Owner changes , a new NOI, site map, and fee must be submitted by the new Owner. As the previous owner, you are required to submit a Notice of Termination (NOT) to the local Regional Water Board stating you no longer own or operate the Site and coverage under the General Permit is not required. Unless notified, you will continue and are responsible to pay the annual fee invoiced each January.

If you have any questions regarding permit requirements, please contact your Regional Water Board at 858-467-2952 . Please visit the storm water web site at http://www.waterboards.ca.gov/water_issues/programs/stormwater/ to obtain an NOT and other storm water related information and forms.

Sincerely,

Storm Water Section
Division of Water Quality

ORIGINAL - MAKE COPIES

CERTIFICATION FORM
(Store Completed Forms in Appendix XII)

Project Name: Suncrest Substation

WDID Number: 9 37C357500

This certification is for (check appropriate box):

The QSD will complete this box and, once signed by the approved signatory, insert the signed certification form in the appropriate Appendix.

- ☐ Amendment to SWPPP (Appendix XVI)
- ☒ PRDs (Appendix XII)
- ☐ NOT (Appendix XII)
- ☐ Other _____

Any person signing documents under Section IV.I of the CGP shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Robert C. Jackson
Name of LRP *

Gen Mgr + Dir Constrn Engrg
Title

San Diego Gas + Electric
Company

(858) 654-6451
Telephone Number

Signature

6-16-2010
Date

*or approved signatory.

Risk Assessment

Not Applicable

Construction for this project will begin under the existing permit 99-08DWQ. On July 1, 2010 the 99-08 DWQ permit expires and is replaced by the 2009-0009-DWQ Permit. According to this new permit, the project will be grandfathered into the assignment of Risk Level 1. Therefore, this project is not subject to the risk assessment requirements. If this project is still active after September 2, 2011, risk assessment will be performed.

Appendix XIII
Responsible Parties

Appendix XIII
List of Responsible Parties

PROJECT: Suncrest Substation **WDID NUMBER:** 9 37C357500

☐ *LEGALLY RESPONSIBLE PART (LRP)*	☐ *THE LRP's APPROVED SIGNATORY*
AREA OF RESPONSIBILITY:	
NAME	**TITLE:**
COMPANY NAME:	
ADDRESS	
CITY	**STATE** **ZIP**
TELEPHONE	
EMERGENCY TELEPHONE	
FAX	
E-MAIL	

QUALIFIED SWPPP DEVELOPER (QSD):RESPONSIBLE FOR PREPARING THE SWPPP:	
NAME Sharon Humphreys, PE	**TITLE:** *Senior Project Manager*
COMPANY NAME: Bureau Veritas	
ADDRESS 11590 West Bernardo Drive, Suite 100	
CITY *San Diego*	**STATE** *CA* **ZIP** *92127*
TELEPHONE 858-207-5091	
EMERGENCY TELEPHONE 858-776-9402	
FAX 858-451-2846	
E-MAIL Sharon.humphreys@us.bureauveritas.com	

ADDITIONAL QSD:	
AREA OF RESPONSIBILITY:	Preparation of the SWPPP
NAME Tracy Beach, PE	**TITLE:** *Civil Engineer*
COMPANY NAME: Bureau Veritas	
ADDRESS 11590 West Bernardo Drive, Suite 100	
CITY *San Diego*	**STATE** *CA* **ZIP** *92127*
TELEPHONE 858-207-5091	
EMERGENCY TELEPHONE 858-663-1887	
FAX 858-451-2846	
E-MAIL Tracy.beach@us.bureauveritas.com	
START DATE	**END DATE**

QUALIFIED SWPPP PRACTITIONER (QSP):					
AREA OF RESPONSIBILITY:					
NAME		**TITLE:**			
COMPANY NAME:					
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

ADDITIONAL QSP:					
AREA OF RESPONSIBILITY:					
NAME		**TITLE:**			
COMPANY NAME:					
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

SPILL RESPONSE PERSONNEL					
NAME		**TITLE:**			
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

SPILL RESPONSE PERSONNEL					
NAME		**TITLE:**			
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

SPILL RESPONSE PERSONNEL					
NAME		**TITLE:**			
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

SPILL RESPONSE PERSONNEL					
NAME		**TITLE:**			
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

STORM WATER SAMPLING AGENT:					
CONTACT PERSON		**TITLE:**			
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

STORM WATER SAMPLING AGENT:					
CONTACT PERSON		**TITLE:**			
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

STORM WATER SAMPLING AGENT:					
CONTACT PERSON		**TITLE:**			
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

STORM WATER SAMPLING AGENT:					
CONTACT PERSON		**TITLE:**			
ADDRESS					
CITY		**STATE**		**ZIP**	
TELEPHONE					
EMERGENCY TELEPHONE					
FAX					
E-MAIL					
START DATE		**END DATE**			

REGIONAL BOARD CONTACT INFORMATION		*RQWQB NAME:*	
CONTACT PERSON		**TITLE:**	
ADDRESS			
CITY		**STATE**	**ZIP**
TELEPHONE			
EMERGENCY TELEPHONE			
FAX			
E-MAIL			

LOCAL STORM WATER MANAGEMENT AGENCY		*AGENCY NAME:*	
CONTACT PERSON		**TITLE:**	
ADDRESS			
CITY		**STATE**	**ZIP**
TELEPHONE			
EMERGENCY TELEPHONE			
FAX			
E-MAIL			

☐ *CONTRACTOR* ☐ *SUBCONTRACTOR* ☐ *INDIVIDUAL DIRECTED BY QSP* ☐ *OTHER*

PLEASE CHECK APPROPRIATE BOX ABOVE. IF "OTHER", PLEASE INDICATE:

COMPANY NAME _____

CONTACT PERSON _____ **TITLE:** _____

ADDRESS _____

CITY _____ **STATE** _____ **ZIP** _____

TELEPHONE _____

EMERGENCY TELEPHONE _____

FAX _____

E-MAIL _____

START DATE _____ **END DATE** _____

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EMERGENCY TELEPHONE			
FAX			
E-MAIL			
START DATE		**END DATE**	

Appendix XIV
Inspection Checklists

Appendix XV
Training Documentation

SWPPP Preparer's Training Log

Name of Person Attending Training Workshop	Date of Training Workshop	Title of Training Workshop	Location of Training Workshop
Tracy Beach	November 6, 8 & 13, 2007	Construction Storm Water Compliance and Storm Water Pollution Prevention Plan Training Seminar by the San Diego Building Industry Association (BIA)	San Diego, CA
Tracy Beach	November 19, 2007	San Diego Regional Stormwater Copermittees-Interim Hydromodification Plan/SUSMP Workshop for County of San Diego	San Diego, CA
Tracy Beach	February 28, 2008	National City SUSMP Workshop	National City, CA
Tracy Beach	March 25, 2008	Low Impact Development (LID) Seminar by Filterra Speaker Larry Coffman	Bonita, CA
Tracy Beach	April 22, 2008	Watershed-Friendly "Low Impact Development" Site Design & Permeable Pavements for Stormwater Management	Newport Beach, CA
Tracy Beach	February 25, 2010	Understanding the New State Water Board General Construction Permit Presented by Gerald R. Montgomery, Senior Manager, Interwest	San Diego, CA
Tracy Beach	March 3, 2010	San Diego County Model Standard Urban Stormwater Mitigation Plan (SUSMP) Seminar	San Diego, CA
Tracy Beach	April 8, 2010	Statewide Construction General Permit Overview Workshop by the SWRCB	Carlsbad, CA

I, Tracy Beach, certify that I am a Qualified Storm Water Pollution Prevention Plan (SWPPP) Developer. I have completed one or more of the following qualifying conditions (check all that apply):

- [x] A California registered professional civil engineer;
- [ ] A California registered professional geologist or engineering geologist;
- [ ] A California registered landscape architect;
- [ ] A professional hydrologist registered through the American Institute of Hydrology;
- [ ] A Certified Professional in Erosion and Sediment Control (CPESC) TM registered through Enviro Cert International, Inc.;
- [ ] A Certified Professional in Storm Water Quality (CPSWQ) TM registered through Enviro Cert International, Inc.; or
- [ ] A professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies (NICET).

Signature: TJ Bz

Print Name: Tracy Beach

Date: 7/22/10

Affix Certificate Number and/or Seal here:

Certificate Number C 73756

Seal:



Appendix XVI
Amendment Log

Appendix XVII
Reports

Appendix XVIII
Secondary Containment and Spill Kit Inventory

Appendix XIX
Other SWPPP Exhibits



Easterly hilltop



Easterly hillside



Existing pad roads



Westerly hillside



Access road



Access road



Access road

Appendix XX
Active Treatment Systems

Active Treatment System (ATS)

Not Applicable

Appendix XXI
Bioassessment

Bioassessment

Not Applicable

Appendix XXII
Glossary / Acronyms

Glossary and Acronym List are taken from the SWRCB Order No.2009-0009-DWQ NPDES General Permit

APPENDIX 5:
Glossary

Active Areas of Construction
All areas subject to land surface disturbance activities related to the project including, but not limited to, project staging areas, immediate access areas and storage areas. All previously active areas are still considered active areas until final stabilization is complete. [The construction activity Phases used in this General Permit are the Preliminary Phase, Grading and Land Development Phase, Streets and Utilities Phase, and the Vertical Construction Phase.]

Active Treatment System (ATS)
A treatment system that employs chemical coagulation, chemical flocculation, or electrocoagulation to aid in the reduction of turbidity caused by fine suspended sediment.

Acute Toxicity Test
A chemical stimulus severe enough to rapidly induce a negative effect; in aquatic toxicity tests, an effect observed within 96 hours or less is considered acute.

Air Deposition
Airborne particulates from construction activities. .

Approved Signatory
A person who has legal authority to sign, certify, and electronically submit Permit Registration Documents and Notices of Termination on behalf of the Legally Responsible Person.

Beneficial Uses
As defined in the California Water Code, beneficial uses of the waters of the state that may be protected against quality degradation include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.

Best Available Technology Economically Achievable (BAT)
As defined by USEPA, BAT is a technology-based standard established by the Clean Water Act (CWA) as the most appropriate means available on a national basis for controlling the direct discharge of toxic and nonconventional pollutants to navigable waters. The BAT effluent limitations guidelines, in general, represent the best existing performance of treatment technologies that are economically achievable within an industrial point source category or subcategory.

Best Conventional Pollutant Control Technology (BCT)

As defined by USEPA, BCT is a technology-based standard for the discharge from existing industrial point sources of conventional pollutants including biochemical oxygen demand (BOD), total suspended sediment (TSS), fecal coliform, pH, oil and grease.

Best Professional Judgment (BPJ)
The method used by permit writers to develop technology-based NPDES permit conditions on a case-by-case basis using all reasonably available and relevant data.

Best Management Practices (BMPs)
BMPs are scheduling of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants. BMPs also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Chain of Custody (COC)
Form used to track sample handling as samples progress from sample collection to the analytical laboratory. The COC is then used to track the resulting analytical data from the laboratory to the client. COC forms can be obtained from an analytical laboratory upon request.

Coagulation
The clumping of particles in a discharge to settle out impurities, often induced by chemicals such as lime, alum, and iron salts.

Common Plan of Development
Generally a contiguous area where multiple, distinct construction activities may be taking place at different times under one plan. A plan is generally defined as any piece of documentation or physical demarcation that indicates that construction activities may occur on a common plot. Such documentation could consist of a tract map, parcel map, demolition plans, grading plans or contract documents. Any of these documents could delineate the boundaries of a common plan area. However, broad planning documents, such as land use master plans, conceptual master plans, or broad-based CEQA or NEPA documents that identify potential projects for an agency or facility are not considered common plans of development.

Daily Average Discharge
The discharge of a pollutant measured during any 24-hour period that reasonably represents a calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged during the day. For pollutants with limitations expressed in other units of measurement (e.g., concentration) the daily discharge is calculated as the average measurement of the pollutant

throughout the day (40 CFR 122.2). In the case of pH, the pH must first be converted from a log scale.

Debris
Litter, rubble, discarded refuse, and remains of destroyed inorganic anthropogenic waste.

Direct Discharge
A discharge that is routed directly to waters of the United States by means of a pipe, channel, or ditch (including a municipal storm sewer system), or through surface runoff.

Discharger
The Legally Responsible Person (see definition) or entity subject to this General Permit.

Dose Rate (for ATS)
In exposure assessment, dose (e.g. of a chemical) per time unit (e.g. mg/day), sometimes also called dosage.

Drainage Area
The area of land that drains water, sediment, pollutants, and dissolved materials to a common outlet.

Effluent
Any discharge of water by a discharger either to the receiving water or beyond the property boundary controlled by the discharger.

Effluent Limitation
Any numeric or narrative restriction imposed on quantities, discharge rates, and concentrations of pollutants which are discharged from point sources into waters of the United States, the waters of the contiguous zone, or the ocean.

Erosion
The process, by which soil particles are detached and transported by the actions of wind, water, or gravity.

Erosion Control BMPs
Vegetation, such as grasses and wildflowers, and other materials, such as straw, fiber, stabilizing emulsion, protective blankets, etc., placed to stabilize areas of disturbed soils, reduce loss of soil due to the action of water or wind, and prevent water pollution.

Field Measurements
Testing procedures performed in the field with portable field-testing kits or meters.

Final Stabilization
All soil disturbing activities at each individual parcel within the site have been completed in a manner consistent with the requirements in this General Permit.

First Order Stream
Stream with no tributaries.

Flocculants
Substances that interact with suspended particles and bind them together to form flocs.

Good Housekeeping BMPs
BMPs designed to reduce or eliminate the addition of pollutants to construction site runoff through analysis of pollutant sources, implementation of proper handling/disposal practices, employee education, and other actions.

Grading Phase (part of the Grading and Land Development Phase)
Includes reconfiguring the topography and slope including; alluvium removals; canyon cleanouts; rock undercuts; keyway excavations; land form grading; and stockpiling of select material for capping operations.

Hydromodification
Hydromodification is the alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources. Hydromodification can cause excessive erosion and/or sedimentation rates, causing excessive turbidity, channel aggradation and/or degradation.

Identified Organisms
Organisms within a sub-sample that is specifically identified and counted.

Inactive Areas of Construction
Areas of construction activity that are not active and those that have been active and are not scheduled to be re-disturbed for at least 14 days.

Index Period
The period of time during which bioassessment samples must be collected to produce results suitable for assessing the biological integrity of streams and rivers. Instream communities naturally vary over the course of a year,and sampling during the index period ensures that samples are collected during a time frame when communities are stable so that year-to-year consistency is obtained. The index period approach provides a cost-effective alternative to year-round sampling. Furthermore, sampling within the appropriate index period will yield results that are comparable to the assessment thresholds or criteria for a given region, which are established for the same index period. Because index

periods differ for different parts of the state, it is essential to know the index period for your area.

K Factor
The soil erodibility factor used in the Revised Universal Soil Loss Equation (RUSLE). It represents the combination of detachability of the soil, runoff potential of the soil, and the transportability of the sediment eroded from the soil.

Legally Responsible Person
The person who possesses the title of the land or the leasehold interest of a mineral estate upon which the construction activities will occur for the regulated site. For linear underground/overhead projects, it is in the person in charge of the utility company, municipality, or other public or private company or agency that owns or operates the LUP.

Likely Precipitation Event
Any weather pattern that is forecasted to have a 50% or greater chance of producing precipitation in the project area. The discharger shall obtain likely precipitation forecast information from the National Weather Service Forecast Office (e.g., by entering the zip code of the project's location at http://www.srh.noaa.gov/forecast).

Maximum Allowable Threshold Concentration (MATC)
The allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity testing conducted by an independent, third-party laboratory. A typical MATC would be:

The MATC is equal to the geometric mean of the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.

Natural Channel Evolution
The physical trend in channel adjustments following a disturbance that causes the river to have more energy and degrade or aggrade more sediment. Channels have been observed to pass through 5 to 9 evolution types. Once they pass though the suite of evolution stages, they will rest in a new state of equilibrium.

Non-Storm Water Discharges
Discharges are discharges that do not originate from precipitation events. They can include, but are not limited to, discharges of process water, air conditioner condensate, non-contact cooling water, vehicle wash water, sanitary wastes, concrete washout water, paint wash water, irrigation water, or pipe testing water.

Non-Visible Pollutants

Pollutants associated with a specific site or activity that can have a negative impact on water quality, but cannot be seen though observation (ex: chlorine). Such pollutants being discharged are not authorized.

Numeric Action Level (NAL)
Level is used as a warning to evaluate if best management practices are effective and take necessary corrective actions. Not an effluent limit.

Original Sample Material
The material (i.e., macroinvertebrates, organic material, gravel, etc.) remaining after the subsample has been removed for identification.

pH
Unit universally used to express the intensity of the acid or alkaline condition of a water sample. The pH of natural waters tends to range between 6 and 9, with neutral being 7. Extremes of pH can have deleterious effects on aquatic systems.

Post-Construction BMPs
Structural and non-structural controls which detain, retain, or filter the release of pollutants to receiving waters after final stabilization is attained.

Preliminary Phase (Pre-Construction Phase - Part of the Grading and Land Development Phase)
Construction stage including rough grading and/or disking, clearing and grubbing operations, or any soil disturbance prior to mass grading.

Project

Qualified SWPPP Developer
Individual who is authorized to develop and revise SWPPPs.

Qualified SWPPP Practitioner
Individual assigned responsibility for non-storm water and storm water visual observations, sampling and analysis, and responsibility to ensure full compliance with the permit and implementation of all elements of the SWPPP, including the preparation of the annual compliance evaluation and the elimination of all unauthorized discharges.

Qualifying Rain Event
Any event that produces 0.5 inches or more precipitation with a 48 hour or greater period between rain events.

R Factor
Erosivity factor used in the Revised Universal Soil Loss Equation (RUSLE). The R factor represents the erosivity of the climate at a particular location. An

average annual value of R is determined from historical weather records using erosivity values determined for individual storms. The erosivity of an individual storm is computed as the product of the storm's total energy, which is closely related to storm amount, and the storm's maximum 30-minute intensity.

Rain Event Action Plan (REAP)
Written document, specific for each rain event, that when implemented is designed to protect all exposed portions of the site within 48 hours of any likely precipitation event.

Remaining Sub sampled Material
The material (e.g., organic material, gravel, etc.) that remains after the organisms to be identified have been removed from the subsample for identification. (Generally, no macroinvertebrates are present in the remaining subsampled material, but the sample needs to be checked and verified using a complete Quality Assurance (QA) plan)

Routine Maintenance
Activities intended to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

Runoff Control BMPs
Measures used to divert runon from offsite and runoff within the site.

Run-on
Discharges that originate offsite and flow onto the property of a separate project site.

Revised Universal Soil Loss Equation (RUSLE)
Empirical model that calculates average annual soil loss as a function of rainfall and runoff erosivity, soil erodibility, topography, erosion controls, and sediment controls.

Sampling and Analysis Plan
Document that describes how the samples will be collected, under what conditions, where and when the samples will be collected, what the sample will be tested for, what test methods and detection limits will be used, and what methods/procedures will be maintained to ensure the integrity of the sample during collection, storage, shipping and testing (i.e., quality assurance/quality control protocols).

Sediment
Solid particulate matter, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Sedimentation
Process of deposition of suspended matter carried by water, wastewater, or other liquids, by gravity. It is usually accomplished by reducing the velocity of the liquid below the point at which it can transport the suspended material.

Sediment Control BMPs
Practices that trap soil particles after they have been eroded by rain, flowing water, or wind. They include those practices that intercept and slow or detain the flow of storm water to allow sediment to settle and be trapped (e.g., silt fence, sediment basin, fiber rolls, etc.).

Settleable Solids (SS)
Solid material that can be settled within a water column during a specified time frame. It is typically tested by placing a water sample into an Imhoff settling cone and then allowing the solids to settle by gravity for a given length of time. Results are reported either as a volume (mL/L) or a mass (mg/L) concentration.

Sheet Flow
Flow of water that occurs overland in areas where there are no defined channels where the water spreads out over a large area at a uniform depth.

Site

Soil Amendment
Any material that is added to the soil to change its chemical properties, engineering properties, or erosion resistance that could become mobilized by storm water.

Streets and Utilities Phase
Construction stage including excavation and street paving, lot grading, curbs, gutters and sidewalks, public utilities, public water facilities including fire hydrants, public sanitary sewer systems, storm sewer system and/or other drainage improvements.

Structural Controls
Any structural facility designed and constructed to mitigate the adverse impacts of storm water and urban runoff pollution

Suspended Sediment Concentration (SSC)
The measure of the concentration of suspended solid material in a water sample by measuring the dry weight of all of the solid material from a known volume of a collected water sample. Results are reported in mg/L.

Total Suspended Solids (TSS)
The measure of the suspended solids in a water sample includes inorganic substances, such as soil particles and organic substances, such as algae,

aquatic plant/animal waste, particles related to industrial/sewage waste, etc. The TSS test measures the concentration of suspended solids in water by measuring the dry weight of a solid material contained in a known volume of a sub-sample of a collected water sample. Results are reported in mg/L.

Toxicity
The adverse response(s) of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies.

Turbidity
The cloudiness of water quantified by the degree to which light traveling through a water column is scattered by the suspended organic and inorganic particles it contains. The turbidity test is reported in Nephelometric Turbidity Units (NTU) or Jackson Turbidity Units (JTU).

Vertical Construction Phase
The Build out of structures from foundations to roofing, including rough landscaping.

Waters of the United States
Generally refers to surface waters, as defined by the federal Environmental Protection Agency in 40 C.F.R. § 122.2.[1]

Water Quality Objectives (WQO)
Water quality objectives are defined in the California Water Code as limits or levels of water quality constituents or characteristics, which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area.

[1] The application of the definition of "waters of the United States" may be difficult to determine; there are currently several judicial decisions that create some confusion. If a landowner is unsure whether the discharge must be covered by this General Permit, the landowner may wish to seek legal advice.

APPENDIX 6:
Acronym List

ASBS	Areas of Special Biological Significance
ASTM	American Society of Testing and Materials; Standard Test Method for Particle-Size Analysis of Soils
ATS	Active Treatment System
BASMAA	Bay Area Storm water Management Agencies Association
BAT	Best Available Technology Economically Achievable
BCT	Best Conventional Pollutant Control Technology
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
BPJ	Best Professional Judgment
CAFO	Confined Animal Feeding Operation
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGP	NPDES General Permit for Storm Water Discharges Associated with Construction Activities
CIWQS	California Integrated Water Quality System
CKD	Cement Kiln Dust
COC	Chain of Custody
CPESC	Certified Professional in Erosion and Sediment Control
CPSWQ	Certified Professional in Storm Water Quality
CSMP	Construction Site Monitoring Program
CTB	Cement Treated Base
CTR	California Toxics Rule
CWA	Clean Water Act
CWC	California Water Code
CWP	Center for Watershed Protection
DADMAC	Diallyldimethyl-ammonium chloride
DDNR	Delaware Department of Natural Resources
DFG	Department of Fish and Game
DHS	Department of Health Services
DWQ	Division of Water Quality
EC	Electrical Conductivity
ELAP	Environmental Laboratory Accreditation Program
EPA	Environmental Protection Agency
ESA	Environmentally Sensitive Area
ESC	Erosion and Sediment Control
HSPF	Hydrologic Simulation Program Fortran
JTU	Jackson Turbidity Units
LID	Low Impact Development
LOEC	Lowest Observed Effect Concentration
LRP	Legally Responsible Person
LUP	Linear Underground/Overhead Projects

MATC	Maximum Allowable Threshold Concentration
MDL	Method Detection Limits
MRR	Monitoring and Reporting Requirements
MS4	Municipal Separate Storm Sewer System
MUSLE	Modified Universal Soil Loss Equation
NAL	Numeric Action Level
NEL	Numeric Effluent Limitation
NICET	National Institute for Certification in Engineering Technologies
NOAA	National Oceanic and Atmospheric Administration
NOEC	No Observed Effect Concentration
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NTR	National Toxics Rule
NTU	Nephelometric Turbidity Units
O&M	Operation and Maintenance
PAC	Polyaluminum chloride
PAM	Polyacrylamide
PASS	Polyaluminum chloride Silica/sulfate
POC	Pollutants of Concern
PoP	Probability of Precipitation
POTW	Publicly Owned Treatment Works
PRDs	Permit Registration Documents
PWS	Planning Watershed
QAMP	Quality Assurance Management Plan
QA/QC	Quality Assurance/Quality Control
REAP	Rain Event Action Plan
Regional Board	Regional Water Quality Control Board
ROWD	Report of Waste Discharge
RUSLE	Revised Universal Soil Loss Equation
RW	Receiving Water
SMARTS	Storm water Multi Application Reporting and Tracking System
SS	Settleable Solids
SSC	Suspended Sediment Concentration
SUSMP	Standard Urban Storm Water Mitigation Plan
SW	Storm Water
SWARM	Storm Water Annual Report Module
SWAMP	Surface Water Ambient Monitoring Program
SWMM	Storm Water Management Model
SWMP	Storm Water Management Program
SWPPP	Storm Water Pollution Prevention Plan
TC	Treatment Control
TDS	Total Dissolved Solids

TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
USACOE	U.S. Army Corps of Engineers
USC	United States Code
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WDID	Waste Discharge Identification Number
WDR	Waste Discharge Requirements
WLA	Waste Load Allocation
WET	Whole Effluent Toxicity
WRCC	Western Regional Climate Center
WQBEL	Water Quality Based Effluent Limitation
WQO	Water Quality Objective
WQS	Water Quality Standard



SAN DIEGO GAS & ELECTRIC
SUNCREST SUBSTATION
DRAINAGE STUDY

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March 30, 2010

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1. INTRODUCTION

1.1 Purpose of Study

This study has been prepared in order to provide hydrologic and hydraulic analyses in support of Grading and Improvement plans for the proposed Suncrest Substation for San Diego Gas & Electric Company (SDGE). The proposed site development is for substation pad and access road. This study shows surrounding detail and onsite drainage patterns.

A hydrologic model was developed using industry-standard engineering practices. First, watershed boundaries, points of flow concentrations and land uses were established. The data was then entered into hydrologic modeling software for calculations of the 100-year, 6-hour peak storm flows. Finally, a hydrology exhibit was prepared to illustrate the modeling procedure and hydrologic characteristics of the existing and proposed conditions.

Hydraulic calculations were performed to size the proposed storm drain collection systems, brow ditches, and detention basins.

1.2 Scope

This study involves the hydrologic and hydraulic analysis of the proposed substation pad and access road and existing run-on flow areas. Storm drain pipes, brow ditches, and detention basins within the project limits have been sized to convey the 100-year design flows. This study should be used to evaluate pre- and post-development hydrologic conditions as well as post-development hydraulic design.

2. DESCRIPTION OF WATERSHED

2.1 Area Characteristics

The existing site is a large undeveloped parcel and is located approximately six miles east of the unincorporated community of Alpine within San Diego County, California. The site is located approximately 3 miles west of Japatul Valley Road and immediately south of Bell Bluff Truck Trail. The existing site is located north of the Cleveland National Forest and is comprised of undisturbed mountainous terrain with native vegetation. Runoff flows overland from the north to the south, then shifts towards the southwest as it crosses the proposed substation pad. The proposed site eventually drains to Peterson Creek, which drains into the Sweetwater River, which then drains into the Loveland Reservoir.

2.2 Soil Type

The soil classification used in this analysis is Type “D”. The San Diego County Hydrology Manual recommends that soil type “D” be assumed for all urban areas when determining runoff coefficients. Type “D” describes soils having very slow infiltration rates when thoroughly wet. Type “D” soils are characterized as severely erodible; requiring protective measures prior to and during soil disturbances.

2.3 Land Uses

The existing land use is undeveloped. The proposed site will consist of asphalt pavement for the access road, decomposed granite (Class II Base) for the substation pad, and landscaping surrounding much of the substation pad.

3. METHODOLOGY

3.1 Modified Rational Method

Per the San Diego County Hydrology Manual (dated June 2003) for watersheds less than one square mile with stream junctions, we used the modified rational formula, as excerpted below. Applicable tables and charts for this method can be found in Appendix A of this report. Calculations were prepared using AES software. The calculations are included in Appendix B.

From the Hydrology Manual, this method is as follows:

Q = CIA, where:

Q is the discharge in cubic feet per second (cfs)

C is a runoff coefficient, proportion of the rainfall that runs off the surface (no units).

I is the average rainfall intensity in inches per hour for a storm duration equal to the time of concentration (Tc) of the contributing drainage area.

A is the drainage area in acres tributary to the design point.

Runoff Coefficient, C

For existing conditions, the San Diego County Hydrology Manual was initially used. We chose the Permanent Open Space runoff coefficient within soil Type "D" (see section 2.2 for soil type discussion). Under this assumption, the runoff coefficient is 0.35 (see Appendix A).

For proposed conditions, runoff coefficient (C) values were chosen as follows: 0.45 for the substation pad (Class II Base), 0.40 for graded slopes, 0.95 for paved areas, and 0.35 for undisturbed areas. Weighted C values were calculated for the proposed improvement areas by the following equation: C = 0.45 x (% substation pad) + 0.40 x (% graded slope) + 0.95 x (% pavement) + 0.35 x (% undisturbed). See Appendix B for calculations.

Time of Concentration, Tc

The time of concentration is the time required for runoff to flow from the most remote part of the watershed to the outlet point under consideration.

Methods of calculation differ for natural watersheds (non-urbanized) and for urban drainage systems.

a) Natural watersheds: Obtain T_c from the natural watershed nomograph.

b) Urban drainage systems: In the case of urban drainage systems, the time of concentration at any point within the drainage area is given by:

$T_c = T_i + T_f$ where

T_i is the inlet time or the time required for the storm water to flow to the first inlet in the system. It is the sum of time in overland flow across lots and in the street gutter.

T_f is the travel time or the time required for the storm water to flow in the storm drain from the most upstream inlet to the point in question.

Travel Time, T_f, is computed by dividing the length of storm drain by the computed flow velocity. Since the velocity normally changes at each inlet because of changes in flow rate or slope, total travel time must be computed as the sum of the travel times for each section of the storm drain.

The overland flow component of inlet time, T_i, may be estimated by the use of the Urban Areas Overland Time of Flow Curves.

Rainfall Intensity, I

Using the computed time of concentration and 6-hour precipitation, the rainfall intensity can be obtained from the Intensity - Duration Chart (see Appendix A).

The rational method calculations were performed using Advanced Engineering Software (AES) RATSCx 2008 program, version 15.0. The model output is provided in Appendix B of this report. The model was developed from the drainage boundaries and points of storm flow concentration shown on the Hydrology Maps (Appendix C). These were determined using the grading/improvement plans and two-foot contour data.

3.2 Storm Frequency

Per the requirements of the San Diego County Hydrology Manual, this study used the 100-year frequency storm. The 100-year, six-hour rainfall amount of 3.6 inches was selected from the rainfall isopluvial map shown in Appendix A.

3.3 Access Road Hydrology – Alternate Methodology

The access road to the substation pad will have several culvert crossings constructed to convey runoff under the road from north to south to keep the natural drainage course. In an effort to be more efficient, Nolte used an alternate methodology to determine the 100-year flows for sizing the proposed culvert crossings. Nolte delineated the overall drainage basins discharging to each culvert. The basins were grouped together by relative size and slope. Then, a few select basins from each group were delineated and flows calculated using the Modified Rational Method described above. The results indicated a cfs per acre ranging from 1.8 to 2.0. Depending on the drainage basin group, Nolte applied the cfs/acre ratio to the other basins that contribute runoff to the proposed access road. These flows were used to size the culvert crossings.

4. SUMMARY

4.1 Substation Hydrology Results

Existing Conditions

The proposed Suncrest substation is located approximately six miles east of the unincorporated community of Alpine within San Diego County, California and impacts four undeveloped drainage basins. Basin 100 has a contributing area of 57.5 acres, Basin 200 has a contributing area of 89.1 acres, Basin 300 is 43.7 acres and Basin 400 is 6.0 acres. All four basins have natural drainage channels which drain in the southwest direction.

Proposed Conditions

Basin 100 is located on the north side of the proposed substation. Runoff from the proposed grading and the proposed access road within Basin 100 is routed through a series of storm drain pipes which is ultimately captured by a detention basin within Basin 100. The runoff from the remaining area of Basin 100, which will not be disturbed by the substation, drains naturally or is routed through a "bypass" storm drain system which discharges at a point downstream of the proposed detention basin.

Basin 200 is located on the southeast side of the proposed substation. Runoff from the proposed grading and substation pad within Basin 200 is also routed through a storm drain system which drains to a detention basin within Basin 200. The area of Basin 200 which is not affected by the proposed substation, will drain naturally.

Basin 300 is located at the center of the proposed substation, and similar to Basin 200, all runoff from the proposed site within Basin 300 is routed through a storm drain system into a detention basin within Basin 300. Runoff from the remaining portion of Basin 300 remains undisturbed.

Basin 400 is on the southwest side of the proposed substation and is minimally affected by grading for a proposed pad for a transmission tower. Basin 400 does not include a storm drain system and the entire basin drains naturally.

Table 1 summarizes the peak 100-year flows for existing and proposed conditions. The proposed flows in the table reflect post-detention conditions that are necessary to mitigate for increases in peak flows that discharge from the site.

Table 1: Basin Summary; 100-Year Discharge (Q) (cfs), and Area (acres)

Site Condition	Basin 100		Basin 200		Basin 300		Basin 400	
	Q	Area	Q	Area	Q	Area	Q	Area
Existing	85.2	57.5	165.7	89.1	71.7	43.7	11.7	6.0
Proposed	84.7	63.2	165.7	91.0	63.1	41.3	11.3	5.8

4.2 Access Road Hydrologic Results

In addition to the substation site, a 2.8-mile road provides access to the proposed substation. This access road begins east of the proposed substation at Japatul Valley Road, and connects at the northeast corner of the proposed substation, impacting several major drainage basins that drain towards the proposed access road. Culverts will be installed at several locations along the access road to allow existing channels to drain under the proposed access road. Approximately 0.4 miles of this access road is part of Basin 100 and is included in Basin 100's hydrologic analysis. The Culvert and Rip Rap Sizing Summary Table located in Appendix B if this report provides the flows and tributary areas to size the proposed culvert crossings. Section 3.3 of this report explains the methodology used to determine the quantity of flows. Appendix B has the rational method calculations for the computed drainage basins (Basins 500, 600, 700, 800, 900, 1000). The Proposed Access Road Hydrology Map is located in Appendix C.

4.3 Substation Hydraulic Results

Hydrologic Basins 100, 200, and 300 each contain detention basins that capture runoff from the proposed site to attenuate downstream flow. Detention basins 100 and 300 have rectangular risers and detention basin 200 has a circular riser that discharge flow in a manner which maintains the natural drainage path. Additionally, each detention basin contains an emergency riser that is designed to help drain the basin in the event of failure of the primary riser outlet system.

The detention basin within Basin 100 is located near the northwest side of the proposed substation and captures runoff from approximately 22.5 acres. The detention basin located within Basin 200 is located on the southeast side of the substation and captures runoff from 2.7 acres of the proposed site. Finally, the third detention basin, located within Basin 300, is situated on the southwest side of the proposed site and has 30.0 acres of tributary drainage area.

The detention basin analyses are primarily comprised of three data types; the inflow hydrograph, stage-storage relationship of the basin, and the outflow rating curve. Using this input data, storage calculations were performed using Bentley Haestad PondPack, Version 10.0 (PondPack).

Detention Basin Analyses

Inflow Hydrograph

Peak discharge volumes and time of concentrations for runoff draining into each detention basin were calculated using AES (see Section 4.1). Inflow hydrographs were generated for each detention basin using the County of San Diego's RatHydro program. The RatHydro program requires the following input (obtained from Nolte's Rational Method analyses in AES) in order to generate a Rational Method Hydrograph:

- Rational Method Time of Concentration (min.)
- 6-Hour Rainfall (inches)
- Basin Area (acres)

- Rational Method Runoff Coefficient
- Peak Discharge (cfs)

Stage-Storage Relationship

Volumes are represented by specifying an area (acres) for each contour of the proposed detention basin. PondPack interpolates linearly between these contours to compute the available storage volume.

Outflow Rating Curve

As previously mentioned, the risers within detention basins 100 and 300 are rectangular and the riser within detention basin 200 is circular. A majority of the flow enters the risers via weir flow or orifice flow through the top. However, orifices along the side of the risers also serve to help drain the basin under low flow conditions. The risers in detention basin 100 and 300 have three six-inch orifices located at the invert of the riser and 1.5 and 2.5 feet above the invert. Detention basin 200 has a 2-inch orifice at the riser invert and a 6-inch orifice 2.5 feet above the invert. Table 3 summarizes the primary riser configurations for the proposed detention basins.

Table 3: Riser Configurations

Riser Data	**Detention Basin 100**	**Detention Basin 200**	**Detention Basin 300**
Top Dimensions	5' x 4'	2' Diameter	5' x 4'
Height (ft)	5.5	5.5	5.5
Perforation Area/Row(ft^2)	0.20	0.02/0.20	0.20

Both weir and orifice equations were used to calculate flow through the top of the riser. The more conservative discharge value (lowest value) was used in the rating curves.

The orifice equation was used to determine the flow through the perforations at given water surface elevations (WSEL) and for flow through the top of the riser for circumstances when the WSEL exceeds the top of the riser:

Orifice Equation: $Q = Ca\sqrt{(2gh)}$

where:

C Orifice Coefficient, 0.6

a Total open area per row of perforations or through top of riser (ft^2)

g Acceleration due to gravity (32.2 ft/sec^2)

h Total head above perforation row or top of riser (ft)

The weir equation is used for flow through the top of riser when the head is above the riser.

Weir Equation: $Q=CLH^{3/2}$

where:

C Weir Coefficient, varies depending upon H/R ratio

L Perimeter at top of riser (ft)

H Total head above top of riser (ft)

Table 4 summarizes the outflow (assuming 50% blockage), maximum ponded WSEL, and volume of each respective detention basin at the 100-year ponded WSEL. See Appendix B for summary input and output from the detention basin analyses.

Table 4: Detention Basin Summary

PondPack Results	Detention Basin 100	Detention Basin 200	Detention Basin 300
100-Year Outflow (cfs)	18.20	0.94	47.66
100-Year Peak WSEL (ft)	3016.12	3048.39	2965.78
Volume (ac-ft)	2.340	0.204	2.226
Volume (ft^3)	101,930	8,886	96,965

Culvert Calculations

It was also necessary to verify that the outlet pipe has greater hydraulic capacity than the riser. This was accomplished by analyzing the outlet pipe as a culvert and comparing the calculated headwater elevation of the culvert to the peak WSEL of the detention basin (determined by the detention analyses). All culverts were analyzed as circular HDPE pipes with a roughness coefficient of 0.012. Table 5 summarizes the culvert diameters and calculated headwater elevations and illustrates that the outlet pipes for each respective detention basin have adequate capacity to convey the design discharge.

Table 5: Culvert Calculations

Culvert Results	Detention Basin 100	Detention Basin 200	Detention Basin 300
Culvert Diameter (ft)	3	1.5	3
Headwater Elevation (ft)	3006.15	3038.53	2957.12

4.4 Access Road Hydraulic Results

Culvert Calculations

CulvertMaster was used to determine adequate culvert sizes for all but two culvert crossings under the proposed access road. Input criteria for culvert analyses consisted of the discharge of

the culvert (peak 100-year flows of each basin), maximum allowable headwater (the edge of the proposed access road at the culvert crossing which would not allow water to overtop the road), and the tailwater elevation (determined as previously mentioned in Substation Hydraulics).

Basin 600 has culvert crossings at two locations; stations 115+38 and 120+15. At station 120+15, there is a natural channel draining to the northwest that crosses the proposed access road. After crossing the access road, the channel changes direction to the west, where it confluences with an additional channel within Basin 600. Downstream of this confluence, the channel drains in the southwest direction to cross the proposed access road a second time at station 115+38. HEC-RAS (Version 4.0) models were created for each of these culvert crossings to determine adequate culvert sizes. HEC-RAS models for Basin 600 included cross sections at a minimum of 100 feet upstream and downstream from the culvert at approximately 50-foot intervals, a coefficient of roughness of 0.05, and the peak 100-year discharge values determined by Rational Method analyses. The Culvert and Rip Rap Sizing Summary Table located in Appendix B lists the culvert sizes for each proposed crossing.

Rip Rap Calculations

Rip Rap Energy Dissipators will be placed at each culvert outlet per San Diego Regional Standard Drawing Number D-40. The purpose is to reduce the chances of runoff eroding the soil at each outlet, which can cause the culvert to shift over time. Rip rap calculations for each culvert are included in Appendix B in the Culvert and Rip Rap Sizing Summary Table.

4.5 Hydromodification Results

The San Diego County Municipal Permit (Order No. R9-2007-0001) was updated in January 2007 to include hydromodification criteria. While the County of San Diego is in the process of developing a comprehensive plan, Interim Hydromodification Criteria (IHC) have been established for those projects disturbing 50 acres or more. The purpose of IHC is to prevent development-related changes in storm water runoff from causing, or further accelerating, stream channel erosion or other adverse impacts to beneficial stream uses. Hydromodification aims to reduce erosion caused, not by the 100-year storm event that is typically used as the basis of design, but rather the steady flows of the more common smaller storms. IHC requires the analysis of historical rainfall data, usually spanning 35 years or more. By utilizing historical rain gauge data from a minimum of 35 years in the region, the hydromodification goal is to maintain the flow between 20 percent of the 5-year flow event and the 10-year flow event to within a ten percent interval from the pre-project to the mitigated land scenario. Nolte used a continuous simulation modeling software known as San Diego Hydrology Model (SDHM) created by Clear Creek Solutions, Inc. in order to model the Suncrest Substation. The SDHM was used to support the sizing of the three detention basins and their outlet structures that will be part of the proposed development. The SDHM output file can be found in Appendix B in the Hydraulic Calculations.

5. REFERENCES

AES Advanced Engineering Software, Rational Method Hydrology System Model, April 2008.

Haestad Methods, Inc., StormCAD v8i, November 2008.

Haestad Methods, Inc., FlowMaster, August 2008.

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Haestad Methods, Inc., PondPack, v10.0, August 2008.

County of San Diego and Rick Engineering Company, RatHydro Program, January 2001.

U.S. Army Corps of Engineers, HEC-RAS 4.0.0, March 2008.

County of San Diego, Department of Public Works, Flood Control Section, San Diego County Hydrology Manual, June 2003

County of San Diego, Department of Public Works, Flood Control Section, San Diego County Drainage Design Manual, May 2005

Clear Creek Solutions, Inc., San Diego Hydrology Model, January 2008.

6. DECLARATION OF RESPONSIBLE CHARGE

I, hereby declare that I am the civil engineer of work for this project, that I have exercised responsible charge over the design of the project as defined in section 6703 of the Business and Professions Code, and that the design is consistent with current design.

I understand that the check of project drawings and specifications by the County of San Diego is confined to a review only and does not relieve me, as engineer of work, of my responsibilities for project design.

_____ _____

Scott Berkebile Date
RCE 66153, Exp. 06/30/10

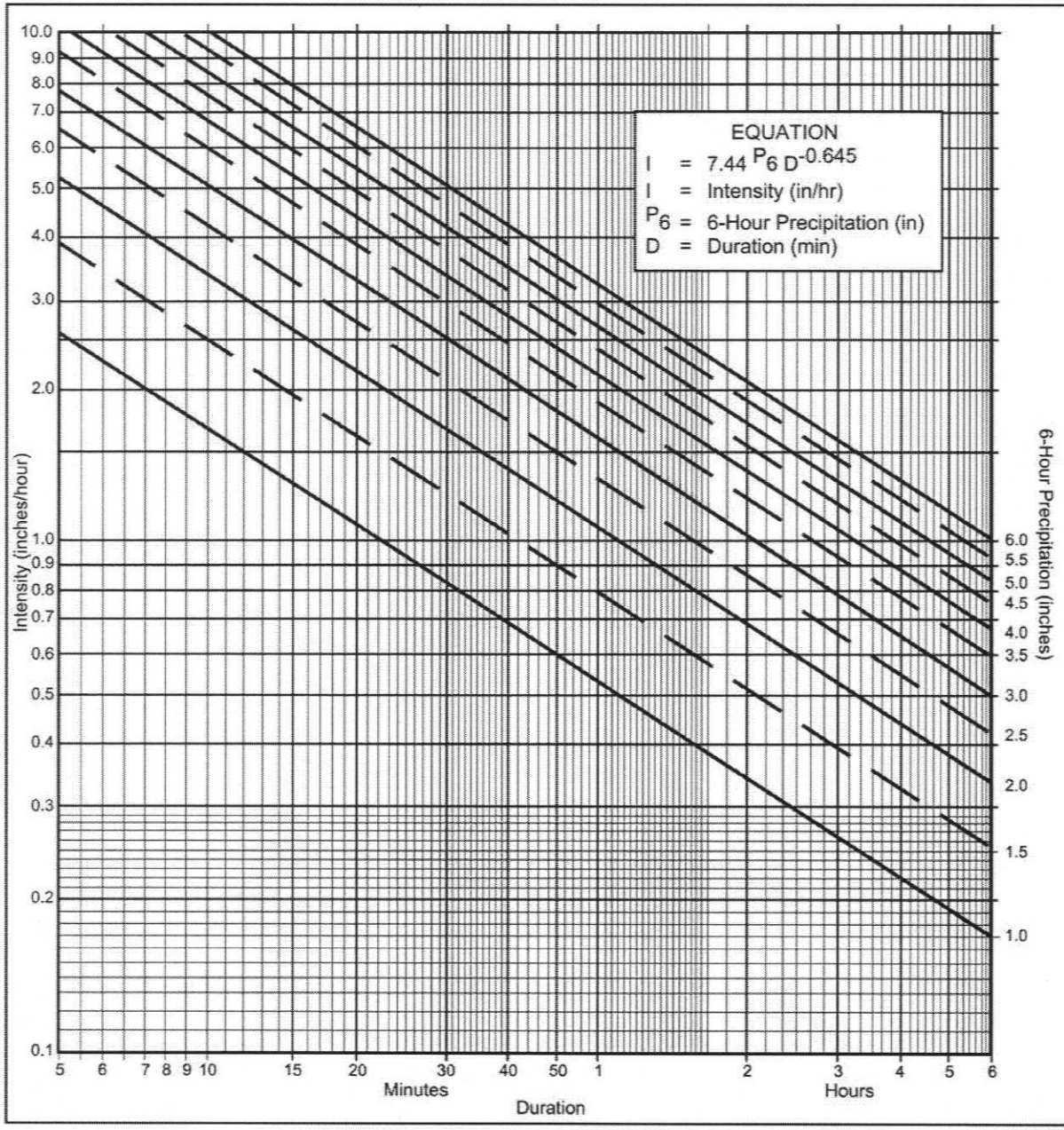
APPENDIX A: RATIONAL METHOD SUPPORTING TABLES AND FIGURES

Rainfall Intensity Duration Frequency Curves

Precipitation Map – 100-Year 6-Hour Isopluvials

Soil Hydrologic Groups Map

Runoff Coefficients



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency _____ year

(b) P_6 = _____ in., P_{24} = _____, $\frac{P_6}{P_{24}}$ = _____ %(2)

(c) Adjusted P_6(2) = _____ in.

(d) t_x = _____ min.

(e) I = _____ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

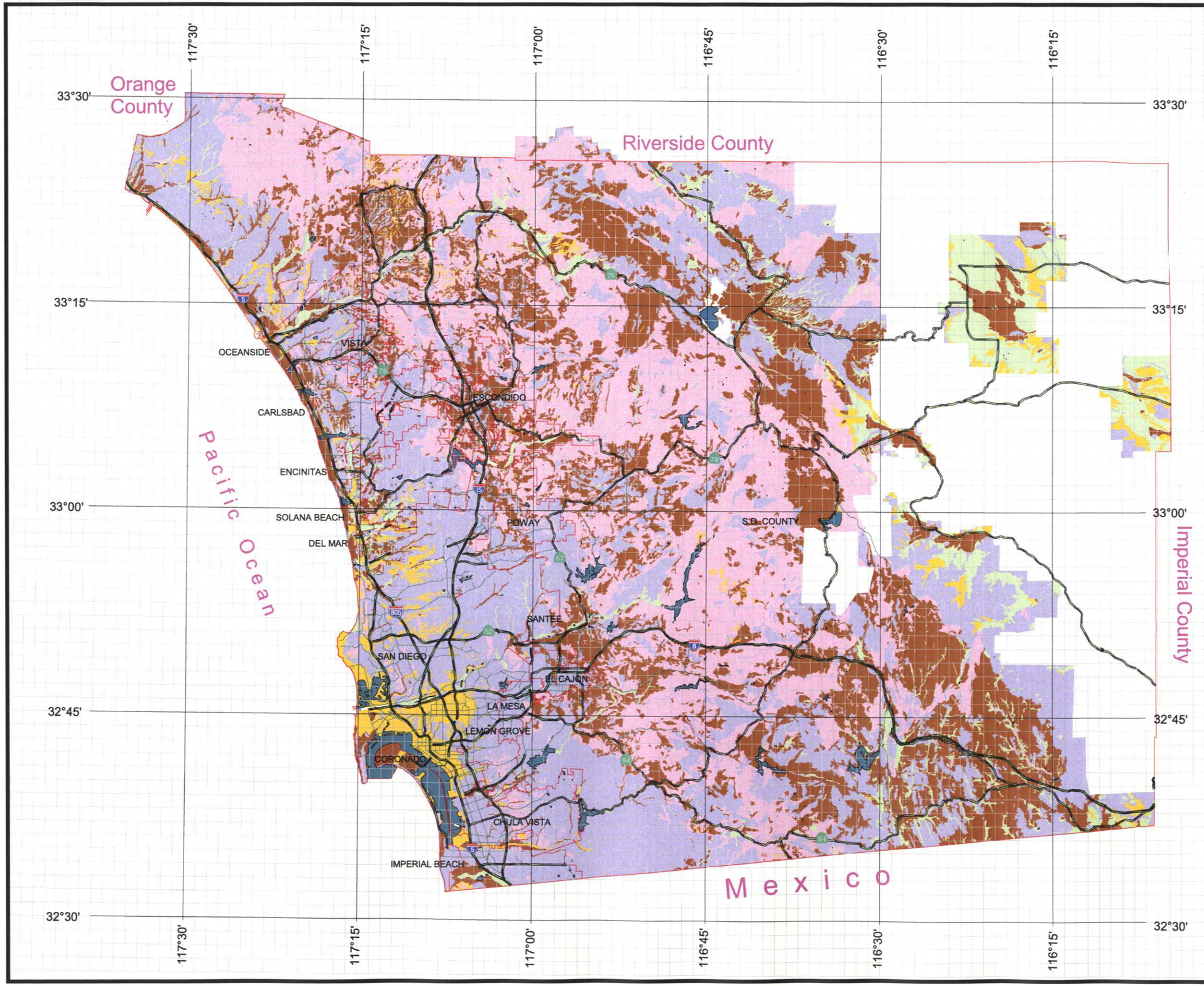
Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

County of San Diego Hydrology Manual

Soil Hydrologic Groups



Legend

Soil Groups

- Group A
- Group B
- Group C
- Group D
- Undetermined
- Data Unavailable

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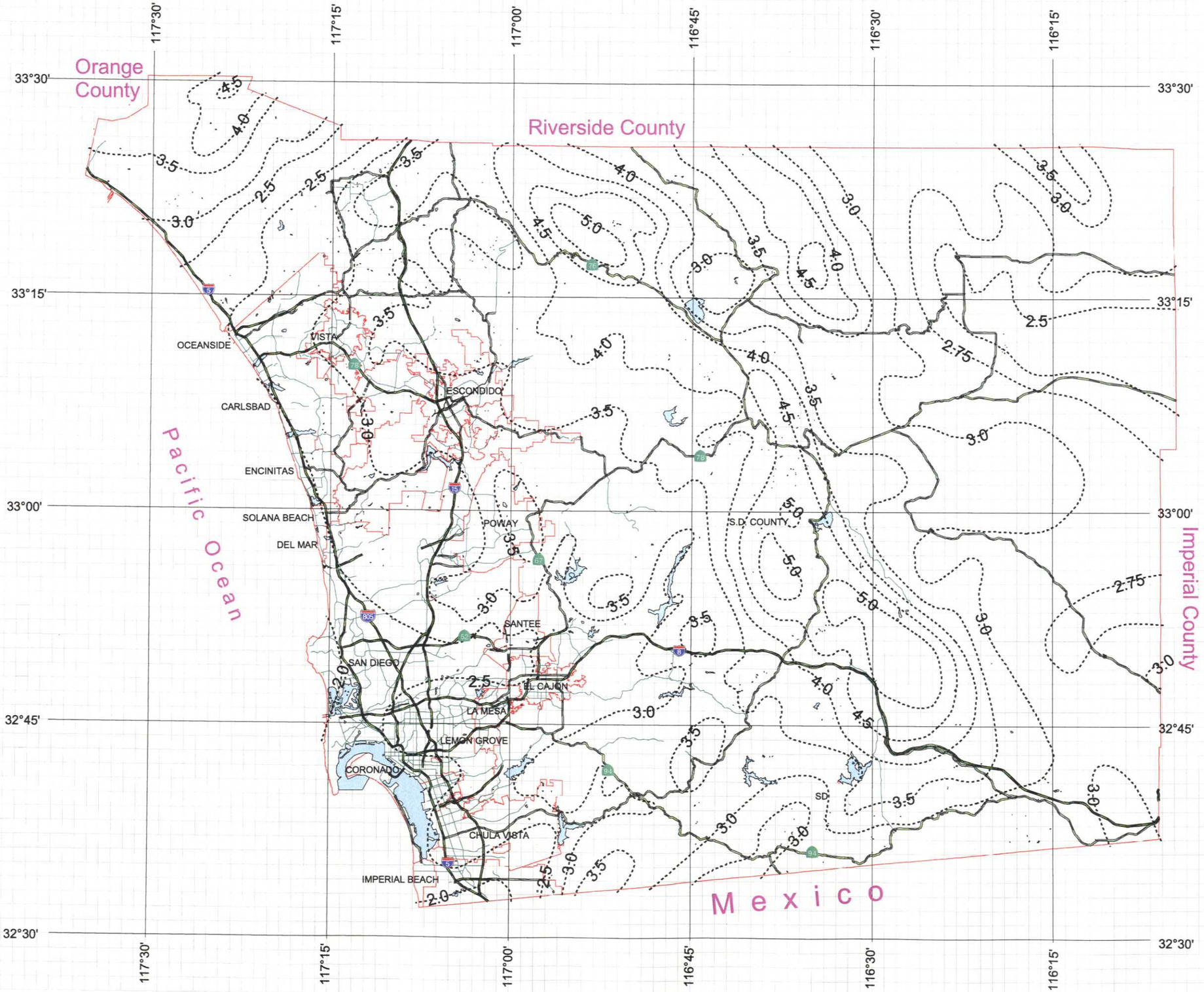
3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)



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3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

Orange County

Riverside County

Imperial County

Mexico

Pacific Ocean

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
CHULA VISTA
IMPERIAL BEACH
SD

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

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3 0 3 Miles

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APPENDIX B: CALCULATIONS

Weighted C Value Calculation Excel Spreadsheet

AES Rational Method Calculations

Hydraulic Calculations

HEC-RAS Calculations

Culvert and Rip Rap Sizing Summary Table

WEIGHTED C VALUE CALCULATION

Weighted C-Value Calculations

	Description	C-Value
A	Paved Street	0.95
B	Proposed Slope/Newly Graded Area	0.40
C	Substation Pad (Class II Base)	0.45
D	Natural (Undisturbed) Terrain	0.35

Basin 100							
Nodes		Total Sub-Area	A	B	C	D	$C_{Average}$
U/S	D/S	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	
100	101	0.10				0.1	0.35
101	102	0.88				0.88	0.35
102	103	0.86				0.86	0.35
103	104	1.83				1.83	0.35
105	105	0.26	0.09			0.17	0.56
151	151	0.88		0.22		0.66	0.36
156	151	3.01		0.67		2.34	0.36
160	161	0.07	0.07				0.95
161	162	0.06	0.06				0.95
162	163	0.19	0.19				0.95
163	164	0.40	0.40				0.95
164	165	0.08	0.08				0.95
165	167	0.32	0.25	0.07			0.83
166	166	1.59		1.59			0.40
167	168	N/A					N/A
170	171	0.04		0.04			0.40
171	172	0.10			0.10		0.45
172	173	0.34			0.34		0.45
173	174	N/A					N/A
175	174	0.51		0.05	0.46		0.45
176	176	0.24		0.01	0.23		0.45
176	169	N/A					N/A
169	178	0.69	0.34	0.17	0.18		0.68
178	179	0.84	0.12	0.23	0.49		0.51
179	180	0.61	0.19		0.42		0.61
180.5	180	1.00	0.11		0.89		0.51
180	181	0.62	0.11	0.02	0.49		0.54
181.5	181	0.97			0.97		0.45
181	182	0.33	0.10		0.23		0.60
183.5	183	0.57	0.11		0.46		0.55
183	184	N/A					N/A

	Description	C-Value
A	Paved Street	0.95
B	Proposed Slope/Newly Graded Area	0.40
C	Substation Pad (Class II Base)	0.45
D	Natural (Undisturbed) Terrain	0.35

Basin 100							
Nodes		Total Sub-Area	A	B	C	D	$C_{Average}$
U/S	D/S	(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	
185	186	0.11			0.11		0.45
186	187	0.12			0.12		0.45
187	188	0.77			0.77		0.45
188	189	0.56	0.35		0.21		0.76
189	190	0.85	0.25		0.60		0.60
190.5	190	0.79			0.79		0.45
190	191	1.51	0.13		1.38		0.49
191	192	1.51	0.21		1.30		0.52
192	193	1.46	0.12		1.34		0.49
193	184	N/A					N/A
194	195	0.15	0.03	0.05	0.07		0.53
195	196	0.23	0.04		0.20		0.53
196	197	0.36	0.07	0.29			0.51
197	198	N/A					N/A
198	199	N/A					N/A
199.1	199.0	0.86	0.28		0.58		0.61
199	184.0	N/A					N/A
184	199.2	N/A					N/A
199.2	199.3	N/A					N/A
199.3	199.4	N/A					N/A
199.4	199.4	1.37		1.37			0.40
199.5	199.5	0.34		0.34			0.40

	Description	C-Value
A	Paved Street	0.95
B	Proposed Slope/Newly Graded Area	0.40
C	Substation Pad (Class II Base)	0.45
D	Natural (Undisturbed) Terrain	0.35

Basin 200							
Nodes		**Total Sub-Area**	**A**	**B**	**C**	**D**	$C_{Average}$
U/S	**D/S**	**(Acres)**	**(Acres)**	**(Acres)**	**(Acres)**	**(Acres)**	
208	210	0.11			0.11		0.45
210	212	0.17			0.17		0.45
212	218	0.77		0.23	0.54		0.44
218	220	0.92		0.12	0.80		0.44
224	226	0.05		0.05			0.40
226	228	0.09		0.02	0.07		0.44
228	230	0.22			0.22		0.45
232	234	0.36	0.03	0.33			0.45

	Description	C-Value
A	Paved Street	0.95
B	Proposed Slope/Newly Graded Area	0.40
C	Substation Pad (Class II Base)	0.45
D	Natural (Undisturbed) Terrain	0.35

Basin 300							
Nodes		**Total Sub-Area**	**A**	**B**	**C**	**D**	$C_{Average}$
U/S	**D/S**	**(Acres)**	**(Acres)**	**(Acres)**	**(Acres)**	**(Acres)**	
300	301	0.11		0.11			0.40
301	302	0.04		0.02	0.02		0.43
302	303	0.38		0.30	0.08		0.41
303	304	0.79		0.06	0.73		0.45
304	305	N/A					N/A
306	305	0.49		0.49			0.40
305	307	0.78	0.05	0.23	0.5		0.47
307	308	0.95	0.20		0.75		0.56
308.5	308	0.68	0.14		0.54		0.55
308	309	1.24	0.21		1.03		0.53
310	311	0.11			0.11		0.45
311	312	0.12			0.12		0.45
312	313	1.00	0.11		0.89		0.51
313	309	N/A					N/A
309	314	1.23	0.21		1.02		0.54
315	316	0.11			0.11		0.45
316	317	0.13			0.13		0.45
317	318	0.98			0.98		0.45
318	319	1.22			1.22		0.45
320	319	1.17			1.17		0.45
319	314	N/A					N/A
322	323	0.11			0.11		0.45
323	324	0.12			0.12		0.45
324	325	1.00	0.11		0.89		0.51
325	314	N/A					N/A
314	326	0.76	0.20	0.21	0.35		0.57
328	329	0.08		0.08			0.40
329	330	0.14		0.14			0.40
330	331	N/A					N/A
331	326	N/A					N/A
326	332	0.78	0.11	0.20	0.47		0.51
332	333	N/A					N/A
333	335	0.55	0.10	0.03	0.42		0.54
335	336	0.46	0.09		0.37		0.55
336	337	0.46	0.08		0.38		0.54
345	346	0.11			0.11		0.45
346	347	0.21			0.21		0.45

	Description	C-Value
A	Paved Street	0.95
B	Proposed Slope/Newly Graded Area	0.40
C	Substation Pad (Class II Base)	0.45
D	Natural (Undisturbed) Terrain	0.35

Basin 300							
Nodes		**Total Sub-Area**	**A**	**B**	**C**	**D**	$C_{Average}$
U/S	**D/S**	**(Acres)**	**(Acres)**	**(Acres)**	**(Acres)**	**(Acres)**	
347	348	1.19			1.19		0.45
348	349	1.56			1.56		0.45
349	350	N/A					N/A
351	350	0.70		0.02	0.68		0.45
350	354	N/A					N/A
355	354	0.73	0.13		0.60		0.54
358	359	0.10			0.10		0.45
359	360	0.18	0.02		0.16		0.51
360	361	0.81	0.09		0.72		0.51
361	362	0.99	0.09		0.90		0.50
362	354	N/A					N/A
355	354	0.73	0.12		0.61		0.53
354	363	N/A					N/A
364	363	0.73	0.19		0.54		0.58
365	367	0.10			0.10		0.45
367	368	0.18	0.02		0.16		0.51
368	369	0.81	0.08		0.73		0.50
369	370	0.99	0.09		0.9		0.50
370	363	N/A					N/A
363	337	N/A					N/A
337	371	N/A					N/A
371	372	N/A					N/A
372	373	0.78		0.78			0.40
373	374	1.17		1.17			0.40
374	376	N/A					N/A
376	378	2.14		2.14			0.40

AES RATIONAL METHOD CALCULATIONS

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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              Ver. 15.0 Release Date: 04/01/2008  License ID 1504

                              Analysis prepared by:

                              Nolte Associates, Inc.
                             15070 Avenue of Science
                                    Suite 100
                               San Diego, CA 92128

 ************************** DESCRIPTION OF STUDY **************************
* 11-11-2009                                                             *
* EXISTING HYDROLOGY BASIN 100                                           *
*                                                                        *
 **************************************************************************

  FILE NAME: EX100.DAT
  TIME/DATE OF STUDY: 10:59 11/11/2009
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   16.0     11.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3395.00
  DOWNSTREAM ELEVATION(FEET) =   3357.00
  ELEVATION DIFFERENCE(FEET) =     38.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.200
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.29

**************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3357.00  DOWNSTREAM(FEET) =   3276.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   198.00   CHANNEL SLOPE =  0.4091
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2151 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.29
  FLOW VELOCITY(FEET/SEC) =   2.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =    7.54
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     298.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.279
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.88   SUBAREA RUNOFF(CFS) =    2.24
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       2.50
  TC(MIN.) =    7.54

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3276.00  DOWNSTREAM(FEET) =   3169.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   400.00   CHANNEL SLOPE =  0.2675
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1858 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.50
  FLOW VELOCITY(FEET/SEC) =   3.27 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.04   Tc(MIN.) =    9.57
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     698.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.239
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.86   SUBAREA RUNOFF(CFS) =    1.88
  TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =       4.02
  TC(MIN.) =    9.57

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3169.00  DOWNSTREAM(FEET) =   3136.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   350.00   CHANNEL SLOPE =  0.0943
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.547
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.05
  AVERAGE FLOW DEPTH(FEET) =   0.21   TRAVEL TIME(MIN.) =   1.91
  Tc(MIN.) =   11.49
  SUBAREA AREA(ACRES) =     3.18       SUBAREA RUNOFF(CFS) =    6.17
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        5.0         PEAK FLOW RATE(CFS) =       9.75
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   3.40
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =    1048.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3136.00  DOWNSTREAM(FEET) =   3116.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   259.00   CHANNEL SLOPE =  0.0772
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.210
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.93
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.68
  AVERAGE FLOW DEPTH(FEET) =   0.35   TRAVEL TIME(MIN.) =   1.17
  Tc(MIN.) =   12.66
  SUBAREA AREA(ACRES) =     5.68       SUBAREA RUNOFF(CFS) =   10.36
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =       10.7         PEAK FLOW RATE(CFS) =      19.51

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.40   FLOW VELOCITY(FEET/SEC.) =   4.05
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    1307.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3116.00  DOWNSTREAM(FEET) =   3034.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   864.00   CHANNEL SLOPE =  0.0949
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.606
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      38.75
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.41
  AVERAGE FLOW DEPTH(FEET) =   0.56   TRAVEL TIME(MIN.) =   2.66
  Tc(MIN.) =   15.32
  SUBAREA AREA(ACRES) =    23.80       SUBAREA RUNOFF(CFS) =   38.37
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =       34.5         PEAK FLOW RATE(CFS) =      55.62

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.68   FLOW VELOCITY(FEET/SEC.) =   6.06
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =    2171.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3034.00  DOWNSTREAM(FEET) =   2962.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   822.00   CHANNEL SLOPE =  0.0876
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.235
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      72.64
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.43
  AVERAGE FLOW DEPTH(FEET) =   0.81   TRAVEL TIME(MIN.) =   2.13
  Tc(MIN.) =   17.45
```

```
  SUBAREA AREA(ACRES) =    22.97       SUBAREA RUNOFF(CFS) =   34.05
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =       57.5         PEAK FLOW RATE(CFS) =      85.18

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.88   FLOW VELOCITY(FEET/SEC.) =   6.72
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    107.00 =    2993.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       57.5  TC(MIN.) =     17.45
  PEAK FLOW RATE(CFS)   =      85.18
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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              Ver. 15.0 Release Date: 04/01/2008  License ID 1504

                              Analysis prepared by:

                              Nolte Associates, Inc.
                             15070 Avenue of Science
                                    Suite 100
                               San Diego, CA 92128

 ************************** DESCRIPTION OF STUDY **************************
* 11-11-2009                                                             *
* EXISTING HYDROLOGY BASIN 200                                           *
*                                                                        *
 **************************************************************************

  FILE NAME: EX200.DAT
  TIME/DATE OF STUDY: 10:56 11/11/2009
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   16.0     11.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3277.00
  DOWNSTREAM ELEVATION(FEET) =   3262.00
  ELEVATION DIFFERENCE(FEET) =     15.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.200
  SUBAREA RUNOFF(CFS) =      0.72
  TOTAL AREA(ACRES) =      0.25   TOTAL RUNOFF(CFS) =      0.72

**************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3262.00  DOWNSTREAM(FEET) =   3207.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   148.00   CHANNEL SLOPE =  0.3716
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2090 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.72
  FLOW VELOCITY(FEET/SEC) =   2.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.96   Tc(MIN.) =    7.23
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     248.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.477
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.63   SUBAREA RUNOFF(CFS) =    1.65
  TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =       2.30
  TC(MIN.) =    7.23

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3207.00  DOWNSTREAM(FEET) =   3170.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   215.00   CHANNEL SLOPE =  0.1721
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1460 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.30
  FLOW VELOCITY(FEET/SEC) =   2.83 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =    8.50
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =     463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.737
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    1.42   SUBAREA RUNOFF(CFS) =    3.35
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       5.42
  TC(MIN.) =    8.50

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3170.00  DOWNSTREAM(FEET) =   3132.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   208.00   CHANNEL SLOPE =  0.1827
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.42
  FLOW VELOCITY(FEET/SEC) =   6.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.51   Tc(MIN.) =    9.01
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =     671.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.488
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    2.36   SUBAREA RUNOFF(CFS) =    5.36
  TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =      10.58
  TC(MIN.) =    9.01

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3132.00  DOWNSTREAM(FEET) =   3050.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   335.00   CHANNEL SLOPE =  0.2448
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      10.58
  FLOW VELOCITY(FEET/SEC) =   8.02 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =    9.70
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =    1006.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.184
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   10.68   SUBAREA RUNOFF(CFS) =   23.12
  TOTAL AREA(ACRES) =       15.3   TOTAL RUNOFF(CFS) =      33.20
  TC(MIN.) =    9.70

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3050.00  DOWNSTREAM(FEET) =   3002.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   431.00   CHANNEL SLOPE =  0.1114
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      33.20
  FLOW VELOCITY(FEET/SEC) =  10.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.66   Tc(MIN.) =   10.36
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =    1437.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.927
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   26.24   SUBAREA RUNOFF(CFS) =   54.44
  TOTAL AREA(ACRES) =       41.6   TOTAL RUNOFF(CFS) =      86.26
  TC(MIN.) =   10.36

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    207.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3002.00  DOWNSTREAM(FEET) =   2952.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   430.00   CHANNEL SLOPE =  0.1163
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      86.26
  FLOW VELOCITY(FEET/SEC) =  14.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =   10.86
```

```
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    207.00 =    1867.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    206.00 TO NODE    207.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.750
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   14.07   SUBAREA RUNOFF(CFS) =   28.32
 TOTAL AREA(ACRES) =       55.7   TOTAL RUNOFF(CFS) =     112.00
 TC(MIN.) =   10.86

****************************************************************************
 FLOW PROCESS FROM NODE    207.00 TO NODE    208.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   2952.00  DOWNSTREAM(FEET) =   2540.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1318.00   CHANNEL SLOPE =  0.3126
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =     112.00
 FLOW VELOCITY(FEET/SEC) =  15.53 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.41   Tc(MIN.) =   12.28
 LONGEST FLOWPATH FROM NODE    200.00 TO NODE    208.00 =    3185.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    207.00 TO NODE    208.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.314
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   33.43   SUBAREA RUNOFF(CFS) =   62.17
 TOTAL AREA(ACRES) =       89.1   TOTAL RUNOFF(CFS) =     165.67
 TC(MIN.) =   12.28
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       89.1  TC(MIN.) =     12.28
 PEAK FLOW RATE(CFS)   =     165.67
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2008 Advanced Engineering Software (aes)
              Ver. 15.0 Release Date: 04/01/2008  License ID 1504

                              Analysis prepared by:

                              Nolte Associates, Inc.
                             15070 Avenue of Science
                                    Suite 100
                               San Diego, CA 92128

 ************************** DESCRIPTION OF STUDY **************************
* SDB039600                                                               *
* EXISTING HYDROLOGY BASIN 300                                            *
*                                                                         *
 *************************************************************************

  FILE NAME: EX300.DAT
  TIME/DATE OF STUDY: 16:09 11/11/2009
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   16.0     11.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3302.00
  DOWNSTREAM ELEVATION(FEET) =   3258.00
  ELEVATION DIFFERENCE(FEET) =     44.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.200
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.17

**************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3258.00  DOWNSTREAM(FEET) =   3169.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   215.00   CHANNEL SLOPE =  0.4140
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2157 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.17
  FLOW VELOCITY(FEET/SEC) =   2.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.38   Tc(MIN.) =    7.64
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     315.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.213
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.17   SUBAREA RUNOFF(CFS) =    0.43
  TOTAL AREA(ACRES) =        0.2   TOTAL RUNOFF(CFS) =       0.58
  TC(MIN.) =    7.64

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3169.00  DOWNSTREAM(FEET) =   3138.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   101.00   CHANNEL SLOPE =  0.3069
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1967 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.58
  FLOW VELOCITY(FEET/SEC) =   2.48 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.68   Tc(MIN.) =    8.32
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     416.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.828
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5743
  SUBAREA AREA(ACRES) =    0.38   SUBAREA RUNOFF(CFS) =    1.84
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       2.39
  TC(MIN.) =    8.32

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3138.00  DOWNSTREAM(FEET) =   3079.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   378.00   CHANNEL SLOPE =  0.1561
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1380 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.39
  FLOW VELOCITY(FEET/SEC) =   2.78 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.26   Tc(MIN.) =   10.59
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =     794.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.847
```

```
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4309
  SUBAREA AREA(ACRES) =    1.08   SUBAREA RUNOFF(CFS) =    2.21
  TOTAL AREA(ACRES) =        1.7   TOTAL RUNOFF(CFS) =       4.26
  TC(MIN.) =   10.59

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    305.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3079.00  DOWNSTREAM(FEET) =   3062.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   222.00   CHANNEL SLOPE =  0.0766
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0766 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.26
  FLOW VELOCITY(FEET/SEC) =   2.51 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.47   Tc(MIN.) =   12.06
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =    1016.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.375
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3790
  SUBAREA AREA(ACRES) =    3.02   SUBAREA RUNOFF(CFS) =    5.68
  TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =       9.60
  TC(MIN.) =   12.06

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    306.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3062.00  DOWNSTREAM(FEET) =   3044.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0783
  CHANNEL FLOW THRU SUBAREA(CFS) =       9.60
  FLOW VELOCITY(FEET/SEC) =   6.92 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.55   Tc(MIN.) =   12.61
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    306.00 =    1246.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    306.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.222
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3611
  SUBAREA AREA(ACRES) =    7.57   SUBAREA RUNOFF(CFS) =   13.83
  TOTAL AREA(ACRES) =       12.3   TOTAL RUNOFF(CFS) =      23.16
  TC(MIN.) =   12.61

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    307.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3044.00  DOWNSTREAM(FEET) =   2974.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   621.00   CHANNEL SLOPE =  0.1127
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      23.16
```

```
  FLOW VELOCITY(FEET/SEC) =   9.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.05   Tc(MIN.) =   13.66
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    307.00 =    1867.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    307.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.959
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3564
  SUBAREA AREA(ACRES) =    9.25   SUBAREA RUNOFF(CFS) =   16.06
  TOTAL AREA(ACRES) =       21.5   TOTAL RUNOFF(CFS) =      38.05
  TC(MIN.) =   13.66

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    308.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2974.00  DOWNSTREAM(FEET) =   2916.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   656.00   CHANNEL SLOPE =  0.0884
  CHANNEL FLOW THRU SUBAREA(CFS) =      38.05
  FLOW VELOCITY(FEET/SEC) =  10.64 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.03   Tc(MIN.) =   14.69
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    308.00 =    2523.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    308.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.733
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3539
  SUBAREA AREA(ACRES) =   13.18   SUBAREA RUNOFF(CFS) =   21.83
  TOTAL AREA(ACRES) =       34.7   TOTAL RUNOFF(CFS) =      58.14
  TC(MIN.) =   14.69

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2916.00  DOWNSTREAM(FEET) =   2868.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   311.00   CHANNEL SLOPE =  0.1543
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      58.14
  FLOW VELOCITY(FEET/SEC) =  12.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =   15.10
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    309.00 =    2834.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.650
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3531
  SUBAREA AREA(ACRES) =    8.99   SUBAREA RUNOFF(CFS) =   14.63
  TOTAL AREA(ACRES) =       43.7   TOTAL RUNOFF(CFS) =      71.76
  TC(MIN.) =   15.10
============================================================================
  END OF STUDY SUMMARY:
```

```
                                          EX300.RES
  TOTAL AREA(ACRES)     =       43.7  TC(MIN.) =     15.10
  PEAK FLOW RATE(CFS)   =      71.76
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2008 Advanced Engineering Software (aes)
              Ver. 15.0 Release Date: 04/01/2008  License ID 1504

                              Analysis prepared by:

                              Nolte Associates, Inc.
                             15070 Avenue of Science
                                    Suite 100
                               San Diego, CA 92128

 ************************** DESCRIPTION OF STUDY **************************
* 01-09-2009                                                             *
* EXISTING HYDROLOGY BASIN 400                                           *
*                                                                        *
 **************************************************************************

  FILE NAME: SDGEE400.DAT
  TIME/DATE OF STUDY: 08:03 01/12/2009
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   16.0     11.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   2979.00
  DOWNSTREAM ELEVATION(FEET) =   2962.00
  ELEVATION DIFFERENCE(FEET) =     17.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.200
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.26

**************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2962.00  DOWNSTREAM(FEET) =   2924.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   147.00   CHANNEL SLOPE =  0.2585
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1828 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.26
  FLOW VELOCITY(FEET/SEC) =   2.39 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.02   Tc(MIN.) =    7.29
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     247.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.437
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.28   SUBAREA RUNOFF(CFS) =    0.73
  TOTAL AREA(ACRES) =        0.4   TOTAL RUNOFF(CFS) =       0.96
  TC(MIN.) =    7.29

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    403.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2924.00  DOWNSTREAM(FEET) =   2784.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   243.00   CHANNEL SLOPE =  0.5761
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2288 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.96
  FLOW VELOCITY(FEET/SEC) =   2.68 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.51   Tc(MIN.) =    8.80
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    403.00 =     490.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    403.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.586
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    1.03   SUBAREA RUNOFF(CFS) =    2.37
  TOTAL AREA(ACRES) =        1.4   TOTAL RUNOFF(CFS) =       3.23
  TC(MIN.) =    8.80

****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    404.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2784.00  DOWNSTREAM(FEET) =   2671.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   177.00   CHANNEL SLOPE =  0.6384
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2300 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.23
  FLOW VELOCITY(FEET/SEC) =   3.97 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =    9.55
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    404.00 =     667.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    404.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.250
```

```
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    1.90   SUBAREA RUNOFF(CFS) =    4.16
  TOTAL AREA(ACRES) =        3.3   TOTAL RUNOFF(CFS) =       7.22
  TC(MIN.) =    9.55

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    405.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2671.00  DOWNSTREAM(FEET) =   2510.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   516.00   CHANNEL SLOPE =  0.3120
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1980 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.22
  FLOW VELOCITY(FEET/SEC) =   4.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.79   Tc(MIN.) =   11.33
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    405.00 =    1183.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.596
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    2.67   SUBAREA RUNOFF(CFS) =    5.23
  TOTAL AREA(ACRES) =        6.0   TOTAL RUNOFF(CFS) =      11.69
  TC(MIN.) =   11.33
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        6.0  TC(MIN.) =     11.33
  PEAK FLOW RATE(CFS)   =      11.69
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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              Ver. 15.0 Release Date: 04/01/2008  License ID 1504

                              Analysis prepared by:

                              Nolte Associates, Inc.
                             15070 Avenue of Science
                                    Suite 100
                               San Diego, CA 92128

 ************************** DESCRIPTION OF STUDY **************************
* SDB039600                                                               *
* 11-13-2009                                                              *
* FINAL HYDROLOGY: BASIN 100 OUTFALL                                      *
 **************************************************************************

  FILE NAME: PR100A.DAT
  TIME/DATE OF STUDY: 09:53 11/13/2009
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   16.0     11.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3395.00
  DOWNSTREAM ELEVATION(FEET) =   3357.00
  ELEVATION DIFFERENCE(FEET) =     38.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.200
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.29

**************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3357.00  DOWNSTREAM(FEET) =   3276.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   198.00   CHANNEL SLOPE =  0.4091
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2151 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.29
  FLOW VELOCITY(FEET/SEC) =   2.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =    7.54
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     298.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.279
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.88   SUBAREA RUNOFF(CFS) =    2.24
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       2.50
  TC(MIN.) =    7.54

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3276.00  DOWNSTREAM(FEET) =   3169.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   400.00   CHANNEL SLOPE =  0.2675
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1858 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.50
  FLOW VELOCITY(FEET/SEC) =   3.27 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.04   Tc(MIN.) =    9.57
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     698.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.239
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.86   SUBAREA RUNOFF(CFS) =    1.88
  TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =       4.02
  TC(MIN.) =    9.57

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3169.00  DOWNSTREAM(FEET) =   3146.24
  CHANNEL LENGTH THRU SUBAREA(FEET) =   332.80   CHANNEL SLOPE =  0.0684
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0684 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.02
  FLOW VELOCITY(FEET/SEC) =   2.33 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.38   Tc(MIN.) =   11.96
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =    1030.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.405
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
```

```
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    1.83   SUBAREA RUNOFF(CFS) =    3.46
  TOTAL AREA(ACRES) =        3.7   TOTAL RUNOFF(CFS) =       6.94
  TC(MIN.) =   11.96

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.405
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .5600
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3639
  SUBAREA AREA(ACRES) =    0.26   SUBAREA RUNOFF(CFS) =    0.79
  TOTAL AREA(ACRES) =        3.9   TOTAL RUNOFF(CFS) =       7.73
  TC(MIN.) =   11.96

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3140.33  DOWNSTREAM(FEET) =  3127.66
  FLOW LENGTH(FEET) =   432.50   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.78
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.73
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   12.69
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =    1463.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.201
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3569
  SUBAREA AREA(ACRES) =    4.02   SUBAREA RUNOFF(CFS) =    7.32
  TOTAL AREA(ACRES) =        7.9   TOTAL RUNOFF(CFS) =      14.75
  TC(MIN.) =   12.69

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3127.66  DOWNSTREAM(FEET) =  3107.98
  FLOW LENGTH(FEET) =   452.90   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.28
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.75
  PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =   13.26
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    107.00 =    1916.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.056
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3540
  SUBAREA AREA(ACRES) =    5.73   SUBAREA RUNOFF(CFS) =   10.14
  TOTAL AREA(ACRES) =       13.7   TOTAL RUNOFF(CFS) =      24.48
  TC(MIN.) =   13.26

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3107.98  DOWNSTREAM(FEET) =  3090.99
  FLOW LENGTH(FEET) =   296.10   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.21
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.48
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   13.57
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =    2212.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.982
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3529
  SUBAREA AREA(ACRES) =    5.13   SUBAREA RUNOFF(CFS) =    8.95
  TOTAL AREA(ACRES) =       18.8   TOTAL RUNOFF(CFS) =      33.07
  TC(MIN.) =   13.57

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3090.99  DOWNSTREAM(FEET) =  3076.41
  FLOW LENGTH(FEET) =   299.50   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.51
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.07
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   13.87
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =    2511.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.912
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3524
  SUBAREA AREA(ACRES) =    3.58   SUBAREA RUNOFF(CFS) =    6.15
  TOTAL AREA(ACRES) =       22.4   TOTAL RUNOFF(CFS) =      38.76
  TC(MIN.) =   13.87

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3076.41  DOWNSTREAM(FEET) =  3061.41
  FLOW LENGTH(FEET) =    34.20   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.6 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  40.39
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      38.76
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   13.88
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =    2546.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.909
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3523
  SUBAREA AREA(ACRES) =    1.00   SUBAREA RUNOFF(CFS) =    1.72
  TOTAL AREA(ACRES) =       23.4   TOTAL RUNOFF(CFS) =      40.45
  TC(MIN.) =   13.88

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3061.41  DOWNSTREAM(FEET) =  3052.85
  FLOW LENGTH(FEET) =    19.60   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  40.74
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.45
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   13.89
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.50 =    2565.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.50 TO NODE    110.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.907
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3527
  SUBAREA AREA(ACRES) =    0.18   SUBAREA RUNOFF(CFS) =    0.35
  TOTAL AREA(ACRES) =       23.6   TOTAL RUNOFF(CFS) =      40.79
  TC(MIN.) =   13.89

****************************************************************************
  FLOW PROCESS FROM NODE    110.50 TO NODE    111.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3052.85  DOWNSTREAM(FEET) =  3048.64
  FLOW LENGTH(FEET) =    13.70   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  35.62
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.79
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   13.90
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    111.00 =    2579.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  13
----------------------------------------------------------------------------
```

```
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
==============================================================================

******************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3332.00
  DOWNSTREAM ELEVATION(FEET) =   3308.00
  ELEVATION DIFFERENCE(FEET) =     24.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.200
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.14

******************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  53
------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3308.00  DOWNSTREAM(FEET) =   3212.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   189.00   CHANNEL SLOPE =  0.5079
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2254 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.14
  FLOW VELOCITY(FEET/SEC) =   2.66 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.18   Tc(MIN.) =    7.45
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    114.00 =     289.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.333
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.17   SUBAREA RUNOFF(CFS) =    0.44
  TOTAL AREA(ACRES) =        0.2   TOTAL RUNOFF(CFS) =       0.56
  TC(MIN.) =    7.45

******************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    115.00 IS CODE =  53
------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3212.00  DOWNSTREAM(FEET) =   3174.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   112.00   CHANNEL SLOPE =  0.3393
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2034 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.56
  FLOW VELOCITY(FEET/SEC) =   2.53 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =    8.19
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    115.00 =     401.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    115.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.899
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
```

```
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.24   SUBAREA RUNOFF(CFS) =    0.58
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       1.11
  TC(MIN.) =    8.19

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3174.00  DOWNSTREAM(FEET) =   3155.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   154.60   CHANNEL SLOPE =  0.1229
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1169 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.11
  FLOW VELOCITY(FEET/SEC) =   1.98 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.30   Tc(MIN.) =    9.49
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    116.00 =     555.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.274
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    1.23   SUBAREA RUNOFF(CFS) =    2.70
  TOTAL AREA(ACRES) =        1.7   TOTAL RUNOFF(CFS) =       3.71
  TC(MIN.) =    9.49

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    117.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3155.00  DOWNSTREAM(FEET) =   3105.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   652.90   CHANNEL SLOPE =  0.0766
  CHANNEL BASE(FEET) =    2.50   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.868
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.25
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.48
  AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   1.04
  Tc(MIN.) =   10.53
  SUBAREA AREA(ACRES) =     5.39       SUBAREA RUNOFF(CFS) =   11.07
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        7.1         PEAK FLOW RATE(CFS) =      14.54

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.37   FLOW VELOCITY(FEET/SEC.) =  12.09
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    117.00 =    1208.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    117.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.868
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.69   SUBAREA RUNOFF(CFS) =    1.42
  TOTAL AREA(ACRES) =        7.8   TOTAL RUNOFF(CFS) =      15.96
```

```
  TC(MIN.) =   10.53

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    118.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3102.75  DOWNSTREAM(FEET) =   3056.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =    83.40   CHANNEL SLOPE =  0.5558
  CHANNEL BASE(FEET) =    2.50   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.847
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  24.41
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   0.06
  Tc(MIN.) =   10.59
  SUBAREA AREA(ACRES) =     0.69       SUBAREA RUNOFF(CFS) =    1.61
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.354
  TOTAL AREA(ACRES) =        8.5         PEAK FLOW RATE(CFS) =      17.52

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =  25.26
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    118.00 =    1291.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    119.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3048.42  DOWNSTREAM(FEET) =  3047.02
  FLOW LENGTH(FEET) =   101.70   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.78
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.52
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   10.78
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    119.00 =    1393.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3047.02  DOWNSTREAM(FEET) =  3046.20
  FLOW LENGTH(FEET) =   107.20   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.10
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.52
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   11.03
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    120.00 =    1500.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3046.20  DOWNSTREAM(FEET) =  3044.48
  FLOW LENGTH(FEET) =   288.60   MANNING'S N =  0.012
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.56
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.52
  PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =   11.76
  LONGEST FLOWPATH FROM NODE    112.00 TO NODE    121.00 =    1789.40 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    121.00 TO NODE    111.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  3044.48  DOWNSTREAM(FEET) =  3041.50
 FLOW LENGTH(FEET) =   298.50   MANNING'S N =  0.012
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.94
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.52
 PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =   12.39
 LONGEST FLOWPATH FROM NODE    112.00 TO NODE    111.00 =    2087.90 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       17.52    12.39       5.283        8.46
 LONGEST FLOWPATH FROM NODE    112.00 TO NODE    111.00 =    2087.90 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       40.79    13.90       4.905       23.57
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    111.00 =    2579.30 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1      53.88      12.39        5.283
     2      57.06      13.90        4.905

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      57.06   Tc(MIN.) =   13.90
 TOTAL AREA(ACRES) =       32.0

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    122.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  3041.50  DOWNSTREAM(FEET) =  3040.03
 FLOW LENGTH(FEET) =   239.21   MANNING'S N =  0.012
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.80
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      57.06
 PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   14.35
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    122.00 =    2818.51 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    122.00 TO NODE    124.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  3040.03  DOWNSTREAM(FEET) =  2998.17
 FLOW LENGTH(FEET) =   157.30   MANNING'S N =  0.012
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  36.71
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      57.06
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   14.42
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    124.00 =    2975.81 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    124.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.790
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3539
  SUBAREA AREA(ACRES) =    0.58   SUBAREA RUNOFF(CFS) =    1.11
  TOTAL AREA(ACRES) =       32.6   TOTAL RUNOFF(CFS) =      57.06
  TC(MIN.) =   14.42
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    126.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2998.17  DOWNSTREAM(FEET) =  2978.56
  FLOW LENGTH(FEET) =    73.70   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  36.71
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      57.06
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   14.46
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    126.00 =    3049.51 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    126.00 TO NODE    126.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.782
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3544
  SUBAREA AREA(ACRES) =    0.34   SUBAREA RUNOFF(CFS) =    0.65
  TOTAL AREA(ACRES) =       33.0   TOTAL RUNOFF(CFS) =      57.06
  TC(MIN.) =   14.46
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    126.00 TO NODE    128.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2978.56  DOWNSTREAM(FEET) =  2962.03
  FLOW LENGTH(FEET) =    65.80   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  35.88
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      57.06
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   14.49
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    128.00 =    3115.31 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2962.03  DOWNSTREAM(FEET) =  2961.94
  FLOW LENGTH(FEET) =    21.50   MANNING'S N =  0.012
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.62
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      57.06
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   14.53
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    130.00 =    3136.81 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    199.00 TO NODE    151.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  18.20   RAIN INTENSITY(INCH/HOUR) =  4.12
  TOTAL AREA(ACRES) =    22.50   TOTAL RUNOFF(CFS) =     18.20

****************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE    151.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       18.20    18.20       4.122       22.50
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    151.00 =    3136.81 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc       INTENSITY     AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       57.06    14.53       4.766       32.95
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    151.00 =    3136.81 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      71.59      14.53        4.766
      2      67.55      18.20        4.122

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      71.59   Tc(MIN.) =   14.53
  TOTAL AREA(ACRES) =       55.5

****************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE    151.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE    151.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE    151.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    152.00 TO NODE    153.00 IS CODE =  21
```

```
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3390.00
  DOWNSTREAM ELEVATION(FEET) =   3336.00
  ELEVATION DIFFERENCE(FEET) =     54.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.200
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.17

************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    154.00 IS CODE =  53
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3336.00  DOWNSTREAM(FEET) =   3257.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   154.00   CHANNEL SLOPE =  0.5130
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2256 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.17
  FLOW VELOCITY(FEET/SEC) =   2.66 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.96   Tc(MIN.) =    7.23
  LONGEST FLOWPATH FROM NODE    152.00 TO NODE    154.00 =     254.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    154.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.476
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.15   SUBAREA RUNOFF(CFS) =    0.39
  TOTAL AREA(ACRES) =        0.2   TOTAL RUNOFF(CFS) =       0.55
  TC(MIN.) =    7.23

************************************************************************
  FLOW PROCESS FROM NODE    154.00 TO NODE    155.00 IS CODE =  53
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3257.00  DOWNSTREAM(FEET) =   3073.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   419.00   CHANNEL SLOPE =  0.4391
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2187 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.55
  FLOW VELOCITY(FEET/SEC) =   2.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.67   Tc(MIN.) =    9.90
  LONGEST FLOWPATH FROM NODE    152.00 TO NODE    155.00 =     673.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    154.00 TO NODE    155.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.106
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    1.23   SUBAREA RUNOFF(CFS) =    2.63
  TOTAL AREA(ACRES) =        1.4   TOTAL RUNOFF(CFS) =       3.08
```

```
  TC(MIN.) =    9.90

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    156.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3073.00  DOWNSTREAM(FEET) =   3065.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   157.00   CHANNEL SLOPE =  0.0478
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0478 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.08
  FLOW VELOCITY(FEET/SEC) =   1.78 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.47   Tc(MIN.) =   11.37
  LONGEST FLOWPATH FROM NODE    152.00 TO NODE    156.00 =     830.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    156.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.584
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    2.39   SUBAREA RUNOFF(CFS) =    4.67
  TOTAL AREA(ACRES) =        3.8   TOTAL RUNOFF(CFS) =       7.49
  TC(MIN.) =   11.37

****************************************************************************
  FLOW PROCESS FROM NODE    156.00 TO NODE    151.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3065.50  DOWNSTREAM(FEET) =   2963.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   486.00   CHANNEL SLOPE =  0.2109
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1655 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.49
  FLOW VELOCITY(FEET/SEC) =   4.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.82   Tc(MIN.) =   13.19
  LONGEST FLOWPATH FROM NODE    152.00 TO NODE    151.00 =    1316.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    156.00 TO NODE    151.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.074
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3544
  SUBAREA AREA(ACRES) =    3.03   SUBAREA RUNOFF(CFS) =    5.53
  TOTAL AREA(ACRES) =        6.9   TOTAL RUNOFF(CFS) =      12.34
  TC(MIN.) =   13.19

****************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE    151.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.074
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3551
  SUBAREA AREA(ACRES) =    0.88   SUBAREA RUNOFF(CFS) =    1.61
  TOTAL AREA(ACRES) =        7.7   TOTAL RUNOFF(CFS) =      13.94
  TC(MIN.) =   13.19
```

```
******************************************************************************
  FLOW PROCESS FROM NODE    151.00 TO NODE    151.00 IS CODE =  11
------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
==============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       13.94    13.19       5.074        7.74
  LONGEST FLOWPATH FROM NODE    152.00 TO NODE    151.00 =    1316.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       71.59    14.53       4.766       55.45
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    151.00 =    3136.81 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      78.90      13.19        5.074
      2      84.69      14.53        4.766

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      84.69   Tc(MIN.) =   14.53
  TOTAL AREA(ACRES) =       63.2
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       63.2  TC(MIN.) =     14.53
  PEAK FLOW RATE(CFS)   =      84.69
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
****************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2008 Advanced Engineering Software (aes)
              Ver. 15.0 Release Date: 04/01/2008  License ID 1504

                              Analysis prepared by:

                              Nolte Associates, Inc.
                             15070 Avenue of Science
                                    Suite 100
                               San Diego, CA 92128

 ************************** DESCRIPTION OF STUDY **************************
* SDB039600                                                               *
* 11-6-2009                                                               *
* PROPOSED FINAL HYDROLOGY                                                *
 ****************************************************************************

  FILE NAME: PR100B.DAT
  TIME/DATE OF STUDY: 08:21 11/06/2009
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   16.0     11.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    161.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3164.50
  DOWNSTREAM ELEVATION(FEET) =   3163.00
  ELEVATION DIFFERENCE(FEET) =      1.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    1.902
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    65.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.485
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.54
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.54

****************************************************************************
  FLOW PROCESS FROM NODE    161.00 TO NODE    162.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3163.00  DOWNSTREAM(FEET) =   3150.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   181.60   CHANNEL SLOPE =  0.0716
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.016   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.485
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.95
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.89
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   1.05
  Tc(MIN.) =    2.95
  SUBAREA AREA(ACRES) =     0.09       SUBAREA RUNOFF(CFS) =    0.81
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.950
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       1.35

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   3.30
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    162.00 =     281.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    162.00 TO NODE    163.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3150.00  DOWNSTREAM(FEET) =   3122.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   281.80   CHANNEL SLOPE =  0.0994
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.016   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.485
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.21
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.09
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   1.15
  Tc(MIN.) =    4.10
  SUBAREA AREA(ACRES) =     0.19       SUBAREA RUNOFF(CFS) =    1.71
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.950
  TOTAL AREA(ACRES) =        0.3         PEAK FLOW RATE(CFS) =       3.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =   4.31
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    163.00 =     563.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    163.00 TO NODE    164.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3122.00  DOWNSTREAM(FEET) =   3066.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   574.30   CHANNEL SLOPE =  0.0975
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.016   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.420
  *USER SPECIFIED(SUBAREA):
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.99
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   1.92
  Tc(MIN.) =    6.01
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    3.20
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.950
  TOTAL AREA(ACRES) =        0.7         PEAK FLOW RATE(CFS) =       5.92

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   5.14
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    164.00 =    1137.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    164.00 TO NODE    165.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3066.00  DOWNSTREAM(FEET) =   3058.64
  CHANNEL LENGTH THRU SUBAREA(FEET) =   121.90   CHANNEL SLOPE =  0.0604
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =  50.000
  MANNING'S FACTOR = 0.016   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.033
  *USER SPECIFIED(SUBAREA):
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .9500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.22
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.46
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   0.46
  Tc(MIN.) =    6.47
  SUBAREA AREA(ACRES) =     0.08       SUBAREA RUNOFF(CFS) =    0.61
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.950
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       6.26

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   4.48
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    165.00 =    1259.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    165.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.033
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6168
  SUBAREA AREA(ACRES) =    1.26   SUBAREA RUNOFF(CFS) =    4.05
  TOTAL AREA(ACRES) =        2.1   TOTAL RUNOFF(CFS) =      10.31
  TC(MIN.) =    6.47

****************************************************************************
  FLOW PROCESS FROM NODE    165.00 TO NODE    167.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3051.56  DOWNSTREAM(FEET) =  3050.86
  FLOW LENGTH(FEET) =    84.70   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.50
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.31
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    6.69
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    167.00 =    1344.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    167.00 TO NODE    167.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.863
  *USER SPECIFIED(SUBAREA):
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6452
  SUBAREA AREA(ACRES) =    0.32   SUBAREA RUNOFF(CFS) =    2.09
  TOTAL AREA(ACRES) =        2.4   TOTAL RUNOFF(CFS) =      12.18
  TC(MIN.) =    6.69

****************************************************************************
  FLOW PROCESS FROM NODE    166.00 TO NODE    166.00 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.863
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5475
  SUBAREA AREA(ACRES) =    1.59   SUBAREA RUNOFF(CFS) =    5.00
  TOTAL AREA(ACRES) =        4.0   TOTAL RUNOFF(CFS) =      17.18
  TC(MIN.) =    6.69

************************************************************************
  FLOW PROCESS FROM NODE    167.00 TO NODE    169.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3050.86  DOWNSTREAM(FEET) =  3050.23
  FLOW LENGTH(FEET) =    69.90   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.58
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.18
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    6.84
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    169.00 =    1414.20 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    169.00 TO NODE    169.00 IS CODE =  10
------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
========================================================================

************************************************************************
  FLOW PROCESS FROM NODE    169.00 TO NODE    169.00 IS CODE =  13
------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
========================================================================

************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    171.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3190.00
  DOWNSTREAM ELEVATION(FEET) =   3060.00
  ELEVATION DIFFERENCE(FEET) =    130.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.849
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.573
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.14

************************************************************************
  FLOW PROCESS FROM NODE    171.00 TO NODE    172.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3060.00  DOWNSTREAM(FEET) =   3053.37
  CHANNEL LENGTH THRU SUBAREA(FEET) =    48.10   CHANNEL SLOPE =  0.1378
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.251
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.32
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.24
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   0.36
```

```
  Tc(MIN.) =    6.21
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.37
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.436
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.50

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   2.59
  LONGEST FLOWPATH FROM NODE    170.00 TO NODE    172.00 =     148.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    172.00 TO NODE    173.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3053.37  DOWNSTREAM(FEET) =   3052.57
  CHANNEL LENGTH THRU SUBAREA(FEET) =   163.70   CHANNEL SLOPE =  0.0049
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.510
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.00
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.99
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   2.76
  Tc(MIN.) =    8.96
  SUBAREA AREA(ACRES) =     0.34       SUBAREA RUNOFF(CFS) =    1.00
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.446
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       1.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.27   FLOW VELOCITY(FEET/SEC.) =   1.09
  LONGEST FLOWPATH FROM NODE    170.00 TO NODE    173.00 =     311.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    173.00 TO NODE    174.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3053.31  DOWNSTREAM(FEET) =  3052.90
  FLOW LENGTH(FEET) =    22.90   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.06
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.39
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    9.04
  LONGEST FLOWPATH FROM NODE    170.00 TO NODE    174.00 =     334.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    174.00 TO NODE    174.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.475
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4480
  SUBAREA AREA(ACRES) =    0.51   SUBAREA RUNOFF(CFS) =    1.49
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       2.87
  TC(MIN.) =    9.04

****************************************************************************
  FLOW PROCESS FROM NODE    174.00 TO NODE    176.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3052.90  DOWNSTREAM(FEET) =  3051.75
  FLOW LENGTH(FEET) =   133.60   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
```

```
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.79
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.87
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =    9.50
  LONGEST FLOWPATH FROM NODE    170.00 TO NODE    176.00 =     468.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    176.00 TO NODE    176.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.269
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4484
  SUBAREA AREA(ACRES) =    0.24   SUBAREA RUNOFF(CFS) =    0.68
  TOTAL AREA(ACRES) =        1.2   TOTAL RUNOFF(CFS) =       3.46
  TC(MIN.) =    9.50

****************************************************************************
  FLOW PROCESS FROM NODE    176.00 TO NODE    169.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3051.75  DOWNSTREAM(FEET) =  3050.30
  FLOW LENGTH(FEET) =    73.50   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.81
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.46
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    9.68
  LONGEST FLOWPATH FROM NODE    170.00 TO NODE    169.00 =     541.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    169.00 TO NODE    169.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1         3.46     9.68       6.193        1.23
  LONGEST FLOWPATH FROM NODE    170.00 TO NODE    169.00 =     541.80 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        17.18     6.84       7.749        3.99
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    169.00 =    1414.20 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      19.62       6.84        7.749
      2      17.19       9.68        6.193

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      19.62   Tc(MIN.) =    6.84
  TOTAL AREA(ACRES) =        5.2

****************************************************************************
  FLOW PROCESS FROM NODE    169.00 TO NODE    169.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    169.00 TO NODE    178.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3051.75  DOWNSTREAM(FEET) =  3048.57
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.20
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.62
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    7.04
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    178.00 =    1550.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    178.00 TO NODE    178.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.605
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .6800
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5424
  SUBAREA AREA(ACRES) =    0.69   SUBAREA RUNOFF(CFS) =    3.57
  TOTAL AREA(ACRES) =        5.9   TOTAL RUNOFF(CFS) =      24.37
  TC(MIN.) =    7.04

****************************************************************************
  FLOW PROCESS FROM NODE    178.00 TO NODE    179.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3048.57  DOWNSTREAM(FEET) =  3047.34
  FLOW LENGTH(FEET) =   153.70   MANNING'S N =  0.012
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.85
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.37
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =    7.37
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    179.00 =    1703.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    179.00 TO NODE    179.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.386
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5100
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5393
  SUBAREA AREA(ACRES) =    0.61   SUBAREA RUNOFF(CFS) =    2.30
  TOTAL AREA(ACRES) =        6.5   TOTAL RUNOFF(CFS) =      25.97
  TC(MIN.) =    7.37

****************************************************************************
  FLOW PROCESS FROM NODE    179.50 TO NODE    179.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.386
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5231
  SUBAREA AREA(ACRES) =    0.86   SUBAREA RUNOFF(CFS) =    2.54
  TOTAL AREA(ACRES) =        7.4   TOTAL RUNOFF(CFS) =      28.51
  TC(MIN.) =    7.37

****************************************************************************
  FLOW PROCESS FROM NODE    179.00 TO NODE    180.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3047.34  DOWNSTREAM(FEET) =  3045.98
  FLOW LENGTH(FEET) =   250.80   MANNING'S N =  0.012
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.99
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.51
  PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =    7.97
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    180.00 =    1954.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    180.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.023
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .6100
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5297
  SUBAREA AREA(ACRES) =    0.61   SUBAREA RUNOFF(CFS) =    2.61
  TOTAL AREA(ACRES) =        8.0   TOTAL RUNOFF(CFS) =      29.72
  TC(MIN.) =    7.97

****************************************************************************
  FLOW PROCESS FROM NODE    180.50 TO NODE    180.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.023
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5100
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5275
  SUBAREA AREA(ACRES) =    1.00   SUBAREA RUNOFF(CFS) =    3.58
  TOTAL AREA(ACRES) =        9.0   TOTAL RUNOFF(CFS) =      33.31
  TC(MIN.) =    7.97

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    181.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3045.98  DOWNSTREAM(FEET) =  3044.66
  FLOW LENGTH(FEET) =   209.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.84
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.31
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =    8.41
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    181.00 =    2163.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    181.00 TO NODE    181.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.781
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5400
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5283
  SUBAREA AREA(ACRES) =    0.62   SUBAREA RUNOFF(CFS) =    2.27
  TOTAL AREA(ACRES) =        9.6   TOTAL RUNOFF(CFS) =      34.43
  TC(MIN.) =    8.41

****************************************************************************
  FLOW PROCESS FROM NODE    181.50 TO NODE    181.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.781
  *USER SPECIFIED(SUBAREA):
```

```
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5212
  SUBAREA AREA(ACRES) =    0.97   SUBAREA RUNOFF(CFS) =    2.96
  TOTAL AREA(ACRES) =       10.6   TOTAL RUNOFF(CFS) =      37.39
  TC(MIN.) =    8.41

****************************************************************************
  FLOW PROCESS FROM NODE    181.00 TO NODE    182.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3044.66  DOWNSTREAM(FEET) =  3043.58
  FLOW LENGTH(FEET) =   161.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.19
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.39
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =    8.74
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    182.00 =    2324.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    182.00 TO NODE    182.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.616
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5235
  SUBAREA AREA(ACRES) =    0.33   SUBAREA RUNOFF(CFS) =    1.31
  TOTAL AREA(ACRES) =       10.9   TOTAL RUNOFF(CFS) =      37.79
  TC(MIN.) =    8.74

****************************************************************************
  FLOW PROCESS FROM NODE    182.00 TO NODE    183.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3043.58  DOWNSTREAM(FEET) =  3042.32
  FLOW LENGTH(FEET) =   197.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.04
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.79
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =    9.15
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    183.00 =    2521.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    183.50 TO NODE    183.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.424
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5249
  SUBAREA AREA(ACRES) =    0.57   SUBAREA RUNOFF(CFS) =    2.01
  TOTAL AREA(ACRES) =       11.5   TOTAL RUNOFF(CFS) =      38.71
  TC(MIN.) =    9.15

****************************************************************************
  FLOW PROCESS FROM NODE    183.00 TO NODE    184.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3042.32  DOWNSTREAM(FEET) =  3041.22
  FLOW LENGTH(FEET) =   222.50   MANNING'S N =  0.012
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.0 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.40
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      38.71
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =    9.65
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    184.00 =    2744.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    184.00 TO NODE    184.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    184.00 TO NODE    184.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    186.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3057.70
  DOWNSTREAM ELEVATION(FEET) =   3056.70
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.063
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    60.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.463
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
  FLOW PROCESS FROM NODE    186.00 TO NODE    187.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3056.70  DOWNSTREAM(FEET) =   3056.64
  CHANNEL LENGTH THRU SUBAREA(FEET) =    42.20   CHANNEL SLOPE =  0.0014
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.815
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.48
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.44
  AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =   1.61
  Tc(MIN.) =   10.68
  SUBAREA AREA(ACRES) =     0.12       SUBAREA RUNOFF(CFS) =    0.31
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.60

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   0.45
  LONGEST FLOWPATH FROM NODE    185.00 TO NODE    187.00 =     142.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    187.00 TO NODE    188.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3056.64  DOWNSTREAM(FEET) =   3056.22
  CHANNEL LENGTH THRU SUBAREA(FEET) =     6.00   CHANNEL SLOPE =  0.0700
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
```

```
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.801
 *USER SPECIFIED(SUBAREA):
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =  88
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.61
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.50
 AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   0.04
 Tc(MIN.) =   10.72
 SUBAREA AREA(ACRES) =     0.77       SUBAREA RUNOFF(CFS) =    2.01
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
 TOTAL AREA(ACRES) =        1.0         PEAK FLOW RATE(CFS) =       2.61

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.15   FLOW VELOCITY(FEET/SEC.) =   2.91
 LONGEST FLOWPATH FROM NODE    185.00 TO NODE    188.00 =     148.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    188.00 TO NODE    189.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  3049.72  DOWNSTREAM(FEET) =  3048.60
 FLOW LENGTH(FEET) =   162.00   MANNING'S N =  0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.31
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.61
 PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =   11.34
 LONGEST FLOWPATH FROM NODE    185.00 TO NODE    189.00 =     310.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    189.00 TO NODE    189.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.592
 *USER SPECIFIED(SUBAREA):
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .7600
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5613
 SUBAREA AREA(ACRES) =    0.56   SUBAREA RUNOFF(CFS) =    2.38
 TOTAL AREA(ACRES) =        1.6   TOTAL RUNOFF(CFS) =       4.90
 TC(MIN.) =   11.34

****************************************************************************
 FLOW PROCESS FROM NODE    189.00 TO NODE    190.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  3048.60  DOWNSTREAM(FEET) =  3047.22
 FLOW LENGTH(FEET) =   222.50   MANNING'S N =  0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.87
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.90
 PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =   12.10
 LONGEST FLOWPATH FROM NODE    185.00 TO NODE    190.00 =     532.70 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    190.00 TO NODE    190.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.363
 *USER SPECIFIED(SUBAREA):
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .6000
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5749
 SUBAREA AREA(ACRES) =    0.85   SUBAREA RUNOFF(CFS) =    2.74
```

```
  TOTAL AREA(ACRES) =        2.4   TOTAL RUNOFF(CFS) =       7.43
  TC(MIN.) =   12.10

****************************************************************************
  FLOW PROCESS FROM NODE    190.50 TO NODE    190.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.363
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5441
  SUBAREA AREA(ACRES) =    0.79   SUBAREA RUNOFF(CFS) =    1.91
  TOTAL AREA(ACRES) =        3.2   TOTAL RUNOFF(CFS) =       9.34
  TC(MIN.) =   12.10

****************************************************************************
  FLOW PROCESS FROM NODE    190.00 TO NODE    191.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3047.22  DOWNSTREAM(FEET) =  3046.13
  FLOW LENGTH(FEET) =   162.30   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.86
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.34
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   12.57
  LONGEST FLOWPATH FROM NODE    185.00 TO NODE    191.00 =     695.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    191.00 TO NODE    191.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.235
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4900
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5268
  SUBAREA AREA(ACRES) =    1.51   SUBAREA RUNOFF(CFS) =    3.87
  TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =      12.99
  TC(MIN.) =   12.57

****************************************************************************
  FLOW PROCESS FROM NODE    191.00 TO NODE    192.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3046.13  DOWNSTREAM(FEET) =  3044.57
  FLOW LENGTH(FEET) =   215.70   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.37
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.99
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =   13.13
  LONGEST FLOWPATH FROM NODE    185.00 TO NODE    192.00 =     910.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    192.00 TO NODE    192.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.089
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5200
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5251
  SUBAREA AREA(ACRES) =    1.51   SUBAREA RUNOFF(CFS) =    4.00
  TOTAL AREA(ACRES) =        6.2   TOTAL RUNOFF(CFS) =      16.62
  TC(MIN.) =   13.13
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    192.00 TO NODE    193.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3044.57  DOWNSTREAM(FEET) =  3042.53
  FLOW LENGTH(FEET) =   211.30   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.75
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.62
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   13.58
  LONGEST FLOWPATH FROM NODE    185.00 TO NODE    193.00 =    1122.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    193.00 TO NODE    193.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.978
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4900
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5184
  SUBAREA AREA(ACRES) =    1.46   SUBAREA RUNOFF(CFS) =    3.56
  TOTAL AREA(ACRES) =        7.7   TOTAL RUNOFF(CFS) =      19.82
  TC(MIN.) =   13.58

****************************************************************************
  FLOW PROCESS FROM NODE    193.00 TO NODE    184.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3042.53  DOWNSTREAM(FEET) =  3040.92
  FLOW LENGTH(FEET) =   158.10   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.17
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.82
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   13.91
  LONGEST FLOWPATH FROM NODE    185.00 TO NODE    184.00 =    1280.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    184.00 TO NODE    184.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       19.82    13.91       4.903        7.68
  LONGEST FLOWPATH FROM NODE    185.00 TO NODE    184.00 =    1280.10 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       38.71     9.65       6.207       11.48
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    184.00 =    2744.20 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      52.46       9.65        6.207
      2      50.40      13.91        4.903

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      52.46   Tc(MIN.) =    9.65
  TOTAL AREA(ACRES) =       19.2

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    184.00 TO NODE    184.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    184.00 TO NODE    184.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    184.00 TO NODE    184.00 IS CODE =  13
----------------------------------------------------------------------------
 >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    194.00 TO NODE    195.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5300
 S.C.S. CURVE NUMBER (AMC II) =  88
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    66.80
 UPSTREAM ELEVATION(FEET) =   3057.70
 DOWNSTREAM ELEVATION(FEET) =   3056.90
 ELEVATION DIFFERENCE(FEET) =      0.80
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.606
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    61.98
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.237
 SUBAREA RUNOFF(CFS) =      0.58
 TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      0.58

****************************************************************************
 FLOW PROCESS FROM NODE    195.00 TO NODE    196.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3056.90  DOWNSTREAM(FEET) =   3056.26
 CHANNEL LENGTH THRU SUBAREA(FEET) =    53.00   CHANNEL SLOPE =  0.0121
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.792
 *USER SPECIFIED(SUBAREA):
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5300
 S.C.S. CURVE NUMBER (AMC II) =  88
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.99
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.12
 AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   0.79
 Tc(MIN.) =    8.39
 SUBAREA AREA(ACRES) =     0.23       SUBAREA RUNOFF(CFS) =    0.83
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.530
 TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       1.37

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   1.25
 LONGEST FLOWPATH FROM NODE    194.00 TO NODE    196.00 =     119.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    196.00 TO NODE    197.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3056.26  DOWNSTREAM(FEET) =   3056.14
 CHANNEL LENGTH THRU SUBAREA(FEET) =     6.00   CHANNEL SLOPE =  0.0200
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.761
*USER SPECIFIED(SUBAREA):
GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5100
S.C.S. CURVE NUMBER (AMC II) =  88
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.99
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.67
AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   0.06
Tc(MIN.) =    8.45
SUBAREA AREA(ACRES) =     0.36       SUBAREA RUNOFF(CFS) =    1.24
AREA-AVERAGE RUNOFF COEFFICIENT =  0.520
TOTAL AREA(ACRES) =        0.7         PEAK FLOW RATE(CFS) =       2.60

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   1.81
LONGEST FLOWPATH FROM NODE    194.00 TO NODE    197.00 =     125.80 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    197.00 TO NODE    198.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  3051.64  DOWNSTREAM(FEET) =  3050.19
FLOW LENGTH(FEET) =    41.50   MANNING'S N =  0.012
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   7.70
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       2.60
PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    8.54
LONGEST FLOWPATH FROM NODE    194.00 TO NODE    198.00 =     167.30 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    198.00 TO NODE    199.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  3050.19  DOWNSTREAM(FEET) =  3048.58
FLOW LENGTH(FEET) =   264.80   MANNING'S N =  0.012
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.11
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       2.60
PIPE TRAVEL TIME(MIN.) =   1.07    Tc(MIN.) =    9.61
LONGEST FLOWPATH FROM NODE    194.00 TO NODE    199.00 =     432.10 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    199.10 TO NODE    199.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.221
*USER SPECIFIED(SUBAREA):
GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .6100
S.C.S. CURVE NUMBER (AMC II) =  88
AREA-AVERAGE RUNOFF COEFFICIENT = 0.5685
SUBAREA AREA(ACRES) =    0.86   SUBAREA RUNOFF(CFS) =    3.26
TOTAL AREA(ACRES) =        1.6   TOTAL RUNOFF(CFS) =       5.66
TC(MIN.) =    9.61

****************************************************************************
FLOW PROCESS FROM NODE    199.00 TO NODE    184.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  3048.58  DOWNSTREAM(FEET) =  3048.39
FLOW LENGTH(FEET) =    42.20   MANNING'S N =  0.012
DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.43
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       5.66
```

```
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    9.77
  LONGEST FLOWPATH FROM NODE    194.00 TO NODE    184.00 =     474.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    184.00 TO NODE    184.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        5.66     9.77       6.156        1.60
  LONGEST FLOWPATH FROM NODE    194.00 TO NODE    184.00 =     474.30 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       52.46     9.65       6.207       19.16
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    184.00 =    2744.20 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      58.05       9.65        6.207
      2      57.69       9.77        6.156

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      58.05   Tc(MIN.) =    9.65
  TOTAL AREA(ACRES) =       20.8

****************************************************************************
  FLOW PROCESS FROM NODE    184.00 TO NODE    184.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    184.00 TO NODE    199.20 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3040.92  DOWNSTREAM(FEET) =  3040.87
  FLOW LENGTH(FEET) =    18.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.52
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      58.05
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    9.70
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    199.20 =    2762.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    199.20 TO NODE    199.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3034.55  DOWNSTREAM(FEET) =  3011.11
  FLOW LENGTH(FEET) =   112.90   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  33.32
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      58.05
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    9.75
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    199.30 =    2875.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    199.30 TO NODE    199.40 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3011.11  DOWNSTREAM(FEET) =  3011.00
```

```
  FLOW LENGTH(FEET) =    24.80   MANNING'S N =  0.012
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.83
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      58.05
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    9.80
  LONGEST FLOWPATH FROM NODE    160.00 TO NODE    199.40 =    2899.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    199.40 TO NODE    199.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.143
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5181
  SUBAREA AREA(ACRES) =    1.37   SUBAREA RUNOFF(CFS) =    3.37
  TOTAL AREA(ACRES) =       22.1   TOTAL RUNOFF(CFS) =      70.43
  TC(MIN.) =    9.80

****************************************************************************
  FLOW PROCESS FROM NODE    199.50 TO NODE    199.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.143
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5163
  SUBAREA AREA(ACRES) =    0.34   SUBAREA RUNOFF(CFS) =    0.84
  TOTAL AREA(ACRES) =       22.5   TOTAL RUNOFF(CFS) =      71.27
  TC(MIN.) =    9.80
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       22.5  TC(MIN.) =      9.80
  PEAK FLOW RATE(CFS)   =      71.27
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2008 Advanced Engineering Software (aes)
              Ver. 15.0 Release Date: 04/01/2008  License ID 1504

                             Analysis prepared by:

                             Nolte Associates, Inc.
                            15070 Avenue of Science
                                  Suite 100
                              San Diego, CA 92128

 ************************** DESCRIPTION OF STUDY **************************
* 07-15-2009                                                             *
* PROPOSED HYDROLOGY BASIN 200                                           *
*                                                                        *
 **************************************************************************

  FILE NAME: PR200A.DAT
  TIME/DATE OF STUDY: 14:48 07/22/2009
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   16.0     11.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    208.00 TO NODE    210.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3057.70
  DOWNSTREAM ELEVATION(FEET) =   3056.70
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.433
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    65.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.298
  SUBAREA RUNOFF(CFS) =      0.31
  TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.31

**************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    212.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3056.70  DOWNSTREAM(FEET) =   3056.09
  CHANNEL LENGTH THRU SUBAREA(FEET) =    61.30   CHANNEL SLOPE =  0.0099
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.804
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.80
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   1.27
  Tc(MIN.) =   10.71
  SUBAREA AREA(ACRES) =     0.17       SUBAREA RUNOFF(CFS) =    0.44
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =        0.3         PEAK FLOW RATE(CFS) =       0.73

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   0.91
  LONGEST FLOWPATH FROM NODE    208.00 TO NODE    212.00 =     161.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    218.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3056.09  DOWNSTREAM(FEET) =   3056.04
  CHANNEL LENGTH THRU SUBAREA(FEET) =     5.00   CHANNEL SLOPE =  0.0100
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.781
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4400
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.26
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   0.07
  Tc(MIN.) =   10.77
  SUBAREA AREA(ACRES) =     0.77       SUBAREA RUNOFF(CFS) =    1.96
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.443
  TOTAL AREA(ACRES) =        1.0         PEAK FLOW RATE(CFS) =       2.69

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   1.50
  LONGEST FLOWPATH FROM NODE    208.00 TO NODE    218.00 =     166.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    218.00 TO NODE    220.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3049.54  DOWNSTREAM(FEET) =  3047.87
  FLOW LENGTH(FEET) =   277.80   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.30
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.69
  PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =   11.85
  LONGEST FLOWPATH FROM NODE    208.00 TO NODE    220.00 =     444.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.436
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4414
```

```
  SUBAREA AREA(ACRES) =    0.92   SUBAREA RUNOFF(CFS) =    2.20
  TOTAL AREA(ACRES) =        2.0   TOTAL RUNOFF(CFS) =       4.73
  TC(MIN.) =   11.85

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    224.00 TO NODE    226.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    18.30
  UPSTREAM ELEVATION(FEET) =   3070.00
  DOWNSTREAM ELEVATION(FEET) =   3058.00
  ELEVATION DIFFERENCE(FEET) =     12.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.502
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.485
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE    226.00 TO NODE    228.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3058.00  DOWNSTREAM(FEET) =   3057.12
  CHANNEL LENGTH THRU SUBAREA(FEET) =    80.60   CHANNEL SLOPE =  0.0109
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.75
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.485
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4400
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.38
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.04
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   0.66
  Tc(MIN.) =    3.16
  SUBAREA AREA(ACRES) =     0.09       SUBAREA RUNOFF(CFS) =    0.38
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.426
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.57

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   2.28
  LONGEST FLOWPATH FROM NODE    224.00 TO NODE    228.00 =      98.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    228.00 TO NODE    230.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3057.12  DOWNSTREAM(FEET) =   3056.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =    51.50   CHANNEL SLOPE =  0.0115
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.75
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.485
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
```

```
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.90
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   0.30
  Tc(MIN.) =    3.46
  SUBAREA AREA(ACRES) =     0.22       SUBAREA RUNOFF(CFS) =    0.94
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.441
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       1.50

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   3.36
  LONGEST FLOWPATH FROM NODE    224.00 TO NODE    230.00 =     150.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    220.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3049.85  DOWNSTREAM(FEET) =  3048.88
  FLOW LENGTH(FEET) =   198.70   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.39
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        1.50
  PIPE TRAVEL TIME(MIN.) =   0.98    Tc(MIN.) =    4.43
  LONGEST FLOWPATH FROM NODE    224.00 TO NODE    220.00 =     349.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1         1.50     4.43       9.485        0.36
  LONGEST FLOWPATH FROM NODE    224.00 TO NODE    220.00 =     349.10 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1         4.73    11.85       5.436        1.97
  LONGEST FLOWPATH FROM NODE    208.00 TO NODE    220.00 =     444.10 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       3.27       4.43        9.485
      2       5.59      11.85        5.436

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.59   Tc(MIN.) =   11.85
  TOTAL AREA(ACRES) =        2.3

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    220.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    232.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3047.87  DOWNSTREAM(FEET) =  3043.45
  FLOW LENGTH(FEET) =    14.90   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
```

```
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.37
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.59
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.86
  LONGEST FLOWPATH FROM NODE    208.00 TO NODE    232.00 =     459.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    232.00 TO NODE    234.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3043.45  DOWNSTREAM(FEET) =  3043.00
  FLOW LENGTH(FEET) =    81.80   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.00
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.59
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   12.13
  LONGEST FLOWPATH FROM NODE    208.00 TO NODE    234.00 =     540.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    234.00 TO NODE    234.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.354
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4425
  SUBAREA AREA(ACRES) =    0.36   SUBAREA RUNOFF(CFS) =    0.87
  TOTAL AREA(ACRES) =        2.7   TOTAL RUNOFF(CFS) =       6.37
  TC(MIN.) =   12.13
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.7  TC(MIN.) =     12.13
  PEAK FLOW RATE(CFS)   =       6.37
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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              Ver. 15.0 Release Date: 04/01/2008  License ID 1504

                              Analysis prepared by:

                              Nolte Associates, Inc.
                             15070 Avenue of Science
                                    Suite 100
                               San Diego, CA 92128

 ************************** DESCRIPTION OF STUDY **************************
* SDB039600                                                               *
* 11-11-2009                                                              *
* FINAL HYDROLOGY: BASIN 200 OUTFALL                                      *
 **************************************************************************

  FILE NAME: PR200B.DAT
  TIME/DATE OF STUDY: 11:50 11/11/2009
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   16.0     11.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3277.00
  DOWNSTREAM ELEVATION(FEET) =   3262.00
  ELEVATION DIFFERENCE(FEET) =     15.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.200
  SUBAREA RUNOFF(CFS) =      0.72
  TOTAL AREA(ACRES) =      0.25   TOTAL RUNOFF(CFS) =      0.72

**************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3262.00  DOWNSTREAM(FEET) =   3207.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   148.00   CHANNEL SLOPE =  0.3716
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2090 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.72
  FLOW VELOCITY(FEET/SEC) =   2.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.96   Tc(MIN.) =    7.23
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     248.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.477
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.63   SUBAREA RUNOFF(CFS) =    1.65
  TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =       2.30
  TC(MIN.) =    7.23

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3207.00  DOWNSTREAM(FEET) =   3170.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   215.00   CHANNEL SLOPE =  0.1721
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1460 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.30
  FLOW VELOCITY(FEET/SEC) =   2.83 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =    8.50
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =     463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.737
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    1.42   SUBAREA RUNOFF(CFS) =    3.35
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       5.42
  TC(MIN.) =    8.50

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3170.00  DOWNSTREAM(FEET) =   3132.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   208.00   CHANNEL SLOPE =  0.1827
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.42
  FLOW VELOCITY(FEET/SEC) =   6.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.51   Tc(MIN.) =    9.01
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =     671.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.488
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    2.36   SUBAREA RUNOFF(CFS) =    5.36
  TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =      10.58
  TC(MIN.) =    9.01

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3132.00  DOWNSTREAM(FEET) =   3050.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   335.00   CHANNEL SLOPE =  0.2448
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      10.58
  FLOW VELOCITY(FEET/SEC) =   8.02 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =    9.70
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =    1006.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.184
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   10.68   SUBAREA RUNOFF(CFS) =   23.12
  TOTAL AREA(ACRES) =       15.3   TOTAL RUNOFF(CFS) =      33.20
  TC(MIN.) =    9.70

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3050.00  DOWNSTREAM(FEET) =   3002.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   431.00   CHANNEL SLOPE =  0.1114
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      33.20
  FLOW VELOCITY(FEET/SEC) =  10.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.66   Tc(MIN.) =   10.36
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =    1437.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.927
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   26.24   SUBAREA RUNOFF(CFS) =   54.44
  TOTAL AREA(ACRES) =       41.6   TOTAL RUNOFF(CFS) =      86.26
  TC(MIN.) =   10.36

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    207.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3002.00  DOWNSTREAM(FEET) =   2952.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   430.00   CHANNEL SLOPE =  0.1163
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      86.26
  FLOW VELOCITY(FEET/SEC) =  14.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =   10.86
```

LONGEST FLOWPATH FROM NODE 200.00 TO NODE 207.00 = 1867.00 FEET.

****
FLOW PROCESS FROM NODE 206.00 TO NODE 207.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.750
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 88
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) = 14.23 SUBAREA RUNOFF(CFS) = 28.64
TOTAL AREA(ACRES) = 55.8 TOTAL RUNOFF(CFS) = 112.32
TC(MIN.) = 10.86

****
FLOW PROCESS FROM NODE 207.00 TO NODE 207.00 IS CODE = 10

>>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==========

****
FLOW PROCESS FROM NODE 207.00 TO NODE 207.00 IS CODE = 13

>>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
==========

****
FLOW PROCESS FROM NODE 236.00 TO NODE 236.00 IS CODE = 7

>>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========
USER-SPECIFIED VALUES ARE AS FOLLOWS:
TC(MIN) = 22.93 RAIN INTENSITY(INCH/HOUR) = 3.55
TOTAL AREA(ACRES) = 2.70 TOTAL RUNOFF(CFS) = 0.94

****
FLOW PROCESS FROM NODE 236.00 TO NODE 207.00 IS CODE = 53

>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
==========
ELEVATION DATA: UPSTREAM(FEET) = 3040.00 DOWNSTREAM(FEET) = 2952.00
CHANNEL LENGTH THRU SUBAREA(FEET) = 231.00 CHANNEL SLOPE = 0.3810
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2107 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) = 0.94
FLOW VELOCITY(FEET/SEC) = 2.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 1.50 Tc(MIN.) = 24.43
LONGEST FLOWPATH FROM NODE 200.00 TO NODE 207.00 = 2098.00 FEET.

****
FLOW PROCESS FROM NODE 207.00 TO NODE 207.00 IS CODE = 81

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 3.409
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) = 88
AREA-AVERAGE RUNOFF COEFFICIENT = 0.1225
SUBAREA AREA(ACRES) = 0.29 SUBAREA RUNOFF(CFS) = 0.35
TOTAL AREA(ACRES) = 3.0 TOTAL RUNOFF(CFS) = 1.25
TC(MIN.) = 24.43

****
FLOW PROCESS FROM NODE 207.00 TO NODE 207.00 IS CODE = 11

>>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
==========

** MAIN STREAM CONFLUENCE DATA **

```
  STREAM     RUNOFF       Tc       INTENSITY     AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1         1.25    24.43        3.409        2.99
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    207.00 =    2098.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF       Tc       INTENSITY     AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       112.32    10.86        5.750       55.81
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    207.00 =    1867.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc       INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     112.88      10.86        5.750
      2      67.85      24.43        3.409

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     112.88   Tc(MIN.) =   10.86
  TOTAL AREA(ACRES) =       58.8

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    250.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2952.00  DOWNSTREAM(FEET) =   2540.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1318.00   CHANNEL SLOPE =  0.3126
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =     112.88
  FLOW VELOCITY(FEET/SEC) =  15.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.41   Tc(MIN.) =   12.27
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    250.00 =    3416.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    207.00 TO NODE    250.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.315
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3425
  SUBAREA AREA(ACRES) =   32.20   SUBAREA RUNOFF(CFS) =   59.90
  TOTAL AREA(ACRES) =       91.0   TOTAL RUNOFF(CFS) =     165.66
  TC(MIN.) =   12.27
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       91.0  TC(MIN.) =     12.27
  PEAK FLOW RATE(CFS)   =     165.66
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
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                              Analysis prepared by:

                              Nolte Associates, Inc.
                             15070 Avenue of Science
                                    Suite 100
                               San Diego, CA 92128

 ************************** DESCRIPTION OF STUDY **************************
* SDB039600                                                               *
* 11-24-2009                                                              *
* FINAL HYDROLOGY: BASIN 300 OUTFALL                                      *
 **************************************************************************

  FILE NAME: PR300A.DAT
  TIME/DATE OF STUDY: 09:56 11/24/2009
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   11.0      5.5    0.020/0.020/0.020   0.08    0.10 0.0100 0.010 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    380.00 TO NODE    380.00 IS CODE =   7
--------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  20.52   RAIN INTENSITY(INCH/HOUR) =  3.82
  TOTAL AREA(ACRES) =    30.00   TOTAL RUNOFF(CFS) =     47.66

**************************************************************************
  FLOW PROCESS FROM NODE    380.00 TO NODE    382.00 IS CODE =  41
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2953.23  DOWNSTREAM(FEET) =  2915.05
  FLOW LENGTH(FEET) =   121.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  36.0 INCH PIPE IS   8.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  36.32
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      47.66
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   20.58
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    382.00 =     121.00 FEET.

**************************************************************************
```

```
 FLOW PROCESS FROM NODE    382.00 TO NODE    382.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.809
 *USER SPECIFIED(SUBAREA):
 URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4162
 SUBAREA AREA(ACRES) =    0.44   SUBAREA RUNOFF(CFS) =    0.67
 TOTAL AREA(ACRES) =       30.4   TOTAL RUNOFF(CFS) =      48.25
 TC(MIN.) =   20.58

****************************************************************************
 FLOW PROCESS FROM NODE    382.00 TO NODE    386.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  2915.05  DOWNSTREAM(FEET) =  2889.67
 FLOW LENGTH(FEET) =    91.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  36.0 INCH PIPE IS   9.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  34.88
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      48.25
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   20.62
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE    386.00 =     212.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    386.00 TO NODE    386.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.803
 *USER SPECIFIED(SUBAREA):
 URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4158
 SUBAREA AREA(ACRES) =    0.70   SUBAREA RUNOFF(CFS) =    1.06
 TOTAL AREA(ACRES) =       31.1   TOTAL RUNOFF(CFS) =      49.25
 TC(MIN.) =   20.62

****************************************************************************
 FLOW PROCESS FROM NODE    386.00 TO NODE    392.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   2887.90  DOWNSTREAM(FEET) =   2868.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   138.00   CHANNEL SLOPE =  0.1442
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      49.25
 FLOW VELOCITY(FEET/SEC) =  12.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.19   Tc(MIN.) =   20.81
 LONGEST FLOWPATH FROM NODE      0.00 TO NODE    392.00 =     350.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    392.00 TO NODE    392.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.781
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3990
 SUBAREA AREA(ACRES) =   10.69   SUBAREA RUNOFF(CFS) =   14.15
 TOTAL AREA(ACRES) =       41.8   TOTAL RUNOFF(CFS) =      63.11
 TC(MIN.) =   20.81
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       41.8  TC(MIN.) =     20.81
 PEAK FLOW RATE(CFS)   =      63.11
============================================================================
```

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END OF RATIONAL METHOD ANALYSIS

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**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2008 Advanced Engineering Software (aes)
              Ver. 15.0 Release Date: 04/01/2008  License ID 1504

                             Analysis prepared by:

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                              San Diego, CA 92128

 ************************** DESCRIPTION OF STUDY **************************
* SDB039600                                                               *
* 11-6-2009                                                               *
* FINAL HYDROLOGY                                                         *
 **************************************************************************

  FILE NAME: PR300B.DAT
  TIME/DATE OF STUDY: 10:25 11/06/2009
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   11.0      5.5    0.020/0.020/0.020   0.08    0.10 0.0100 0.010 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =  94
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3190.00
  DOWNSTREAM ELEVATION(FEET) =   3060.00
  ELEVATION DIFFERENCE(FEET) =    130.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.849
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.573
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.14

**************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3060.00  DOWNSTREAM(FEET) =   3053.40
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =    53.00   CHANNEL SLOPE =  0.1245
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.228
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4300
  S.C.S. CURVE NUMBER (AMC II) =  94
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.30
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   0.38
  Tc(MIN.) =    6.23
  SUBAREA AREA(ACRES) =     0.11       SUBAREA RUNOFF(CFS) =    0.39
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.422
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.52

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   2.59
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     153.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3053.40  DOWNSTREAM(FEET) =   3052.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   195.10   CHANNEL SLOPE =  0.0051
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.280
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =  94
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.00
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   3.24
  Tc(MIN.) =    9.48
  SUBAREA AREA(ACRES) =     0.38       SUBAREA RUNOFF(CFS) =    0.98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.413
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       1.38

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.27   FLOW VELOCITY(FEET/SEC.) =   1.08
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     348.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3052.40  DOWNSTREAM(FEET) =  3050.81
  FLOW LENGTH(FEET) =    68.80   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.52
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.38
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    9.68
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =     416.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.192
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  94
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4353
  SUBAREA AREA(ACRES) =    0.79   SUBAREA RUNOFF(CFS) =    2.20
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       3.56
  TC(MIN.) =    9.68
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    305.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3050.81  DOWNSTREAM(FEET) =  3050.65
  FLOW LENGTH(FEET) =    83.70   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.87
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.56
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   10.17
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =     500.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    305.20 TO NODE    305.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3302.00
  DOWNSTREAM ELEVATION(FEET) =   3266.00
  ELEVATION DIFFERENCE(FEET) =     36.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.200
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.15

****************************************************************************
  FLOW PROCESS FROM NODE    305.40 TO NODE    305.60 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3266.00  DOWNSTREAM(FEET) =   3218.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   140.00   CHANNEL SLOPE =  0.3429
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2040 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.15
  FLOW VELOCITY(FEET/SEC) =   2.53 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.92   Tc(MIN.) =    7.19
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    305.60 =     240.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.40 TO NODE    305.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.504
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.14   SUBAREA RUNOFF(CFS) =    0.35
  TOTAL AREA(ACRES) =        0.2   TOTAL RUNOFF(CFS) =       0.49
```

```
  TC(MIN.) =    7.19

****************************************************************************
  FLOW PROCESS FROM NODE    305.60 TO NODE    306.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3218.00  DOWNSTREAM(FEET) =   3056.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   412.00   CHANNEL SLOPE =  0.3920
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.495
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.57
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.80
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   1.80
  Tc(MIN.) =    8.99
  SUBAREA AREA(ACRES) =     0.83       SUBAREA RUNOFF(CFS) =    2.16
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.391
  TOTAL AREA(ACRES) =        1.0         PEAK FLOW RATE(CFS) =       2.58

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   4.68
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    306.00 =     652.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    305.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3051.50  DOWNSTREAM(FEET) =  3050.65
  FLOW LENGTH(FEET) =    24.70   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.64
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.58
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    9.05
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    305.00 =     676.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        2.58     9.05       6.470        1.02
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    305.00 =     676.70 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        3.56    10.17       6.000        1.32
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =     500.60 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       5.75       9.05       6.470
      2       5.95      10.17       6.000

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.95   Tc(MIN.) =   10.17
  TOTAL AREA(ACRES) =        2.3

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =  12
----------------------------------------------------------------------------
```

```
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    307.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3050.65  DOWNSTREAM(FEET) =  3049.49
  FLOW LENGTH(FEET) =   122.80   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.99
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.95
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   10.51
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    307.00 =     799.50 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    307.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.873
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4700
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4295
  SUBAREA AREA(ACRES) =    0.78   SUBAREA RUNOFF(CFS) =    2.15
  TOTAL AREA(ACRES) =        3.1   TOTAL RUNOFF(CFS) =       7.86
  TC(MIN.) =   10.51

********************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    308.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3049.49  DOWNSTREAM(FEET) =  3048.21
  FLOW LENGTH(FEET) =   162.50   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.91
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.86
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   10.97
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    308.00 =     962.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.714
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5600
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4600
  SUBAREA AREA(ACRES) =    0.95   SUBAREA RUNOFF(CFS) =    3.04
  TOTAL AREA(ACRES) =        4.1   TOTAL RUNOFF(CFS) =      10.69
  TC(MIN.) =   10.97

********************************************************************************
  FLOW PROCESS FROM NODE    308.50 TO NODE    308.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.714
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4729
  SUBAREA AREA(ACRES) =    0.68   SUBAREA RUNOFF(CFS) =    2.14
  TOTAL AREA(ACRES) =        4.7   TOTAL RUNOFF(CFS) =      12.83
```

```
  TC(MIN.) =   10.97

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    309.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3048.21  DOWNSTREAM(FEET) =  3045.78
  FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.80
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.83
  PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =   11.68
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    309.00 =    1252.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    309.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.487
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5300
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4847
  SUBAREA AREA(ACRES) =    1.24   SUBAREA RUNOFF(CFS) =    3.61
  TOTAL AREA(ACRES) =        6.0   TOTAL RUNOFF(CFS) =      15.92
  TC(MIN.) =   11.68

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    309.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    309.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3057.70
  DOWNSTREAM ELEVATION(FEET) =   3056.70
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.063
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    60.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.463
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    312.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3056.70  DOWNSTREAM(FEET) =   3056.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =    44.00   CHANNEL SLOPE =  0.0114
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.121
*USER SPECIFIED(SUBAREA):
GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
S.C.S. CURVE NUMBER (AMC II) =  88
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.49
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.92
AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   0.80
Tc(MIN.) =    9.86
SUBAREA AREA(ACRES) =     0.12       SUBAREA RUNOFF(CFS) =    0.33
AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.63

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   0.99
LONGEST FLOWPATH FROM NODE    310.00 TO NODE    312.00 =     144.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    312.00 TO NODE    313.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   3056.20  DOWNSTREAM(FEET) =   3055.93
CHANNEL LENGTH THRU SUBAREA(FEET) =    11.40   CHANNEL SLOPE =  0.0237
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.080
*USER SPECIFIED(SUBAREA):
GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5100
S.C.S. CURVE NUMBER (AMC II) =  88
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.18
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.83
AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   0.10
Tc(MIN.) =    9.96
SUBAREA AREA(ACRES) =     1.00       SUBAREA RUNOFF(CFS) =    3.10
AREA-AVERAGE RUNOFF COEFFICIENT =  0.499
TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       3.73

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   2.11
LONGEST FLOWPATH FROM NODE    310.00 TO NODE    313.00 =     155.40 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    313.00 TO NODE    309.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  3049.43  DOWNSTREAM(FEET) =  3046.47
FLOW LENGTH(FEET) =   216.20   MANNING'S N =  0.012
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   6.09
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       3.73
PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   10.56
LONGEST FLOWPATH FROM NODE    310.00 TO NODE    309.00 =     371.60 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    309.00 TO NODE    309.00 IS CODE =  11
----------------------------------------------------------------------------
>>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

** MAIN STREAM CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY     AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
    1        3.73    10.56       5.858        1.23
LONGEST FLOWPATH FROM NODE    310.00 TO NODE    309.00 =     371.60 FEET.

** MEMORY BANK #  1 CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY     AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
    1       15.92    11.68       5.487        5.99
```

```
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    309.00 =    1252.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      18.12      10.56        5.858
      2      19.42      11.68        5.487

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      19.42   Tc(MIN.) =   11.68
  TOTAL AREA(ACRES) =        7.2

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    309.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    314.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3045.78  DOWNSTREAM(FEET) =  3044.19
  FLOW LENGTH(FEET) =   260.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.76
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.42
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =   12.32
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    314.00 =    1512.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.301
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5400
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4948
  SUBAREA AREA(ACRES) =    1.23   SUBAREA RUNOFF(CFS) =    3.52
  TOTAL AREA(ACRES) =        8.4   TOTAL RUNOFF(CFS) =      22.16
  TC(MIN.) =   12.32

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    316.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3057.70
  DOWNSTREAM ELEVATION(FEET) =   3056.70
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.063
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    60.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.463
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.32
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    317.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3056.70  DOWNSTREAM(FEET) =   3056.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =    45.69   CHANNEL SLOPE =  0.0109
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.012   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.273
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.50
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.77
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   0.43
  Tc(MIN.) =    9.49
  SUBAREA AREA(ACRES) =     0.13       SUBAREA RUNOFF(CFS) =    0.37
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   1.87
  LONGEST FLOWPATH FROM NODE    315.00 TO NODE    317.00 =     145.69 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    318.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3056.20  DOWNSTREAM(FEET) =   3056.06
  CHANNEL LENGTH THRU SUBAREA(FEET) =    17.80   CHANNEL SLOPE =  0.0079
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.170
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.04
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.20
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   0.25
  Tc(MIN.) =    9.74
  SUBAREA AREA(ACRES) =     0.98       SUBAREA RUNOFF(CFS) =    2.72
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       3.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   1.36
  LONGEST FLOWPATH FROM NODE    315.00 TO NODE    318.00 =     163.49 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    318.00 TO NODE    319.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3049.50  DOWNSTREAM(FEET) =  3048.10
  FLOW LENGTH(FEET) =   216.30   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.51
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        3.39
  PIPE TRAVEL TIME(MIN.) =   0.80    Tc(MIN.) =   10.54
  LONGEST FLOWPATH FROM NODE    315.00 TO NODE    319.00 =     379.79 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    319.00 TO NODE    319.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.864
```

```
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =    1.22   SUBAREA RUNOFF(CFS) =    3.22
  TOTAL AREA(ACRES) =        2.4   TOTAL RUNOFF(CFS) =       6.44
  TC(MIN.) =   10.54

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    319.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.864
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =    1.17   SUBAREA RUNOFF(CFS) =    3.09
  TOTAL AREA(ACRES) =        3.6   TOTAL RUNOFF(CFS) =       9.53
  TC(MIN.) =   10.54

****************************************************************************
  FLOW PROCESS FROM NODE    319.00 TO NODE    314.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3048.10  DOWNSTREAM(FEET) =  3044.19
  FLOW LENGTH(FEET) =   268.70   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.87
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.53
  PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =   11.11
  LONGEST FLOWPATH FROM NODE    315.00 TO NODE    314.00 =     648.49 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        9.53    11.11       5.668        3.61
  LONGEST FLOWPATH FROM NODE    315.00 TO NODE    314.00 =     648.49 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       22.16    12.32       5.301        8.45
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    314.00 =    1512.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      29.50      11.11       5.668
      2      31.07      12.32       5.301

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      31.07   Tc(MIN.) =   12.32
  TOTAL AREA(ACRES) =       12.1

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =  10
----------------------------------------------------------------------------
```

```
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =  13
--------------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    322.00 TO NODE    323.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3057.70
  DOWNSTREAM ELEVATION(FEET) =   3056.70
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.063
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    60.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.463
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.32

********************************************************************************
  FLOW PROCESS FROM NODE    323.00 TO NODE    324.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3056.70  DOWNSTREAM(FEET) =   3056.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =    44.00   CHANNEL SLOPE =  0.0114
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.121
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.92
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   0.80
  Tc(MIN.) =    9.86
  SUBAREA AREA(ACRES) =     0.12       SUBAREA RUNOFF(CFS) =    0.33
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.63

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   0.99
  LONGEST FLOWPATH FROM NODE    322.00 TO NODE    324.00 =     144.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    324.00 TO NODE    325.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3056.20  DOWNSTREAM(FEET) =   3055.92
  CHANNEL LENGTH THRU SUBAREA(FEET) =    11.70   CHANNEL SLOPE =  0.0239
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.079
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5100
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.18
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.83
  AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   0.11
  Tc(MIN.) =    9.97
```

```
  SUBAREA AREA(ACRES) =     1.00       SUBAREA RUNOFF(CFS) =    3.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.499
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       3.73

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   2.11
  LONGEST FLOWPATH FROM NODE    322.00 TO NODE    325.00 =     155.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    325.00 TO NODE    314.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3049.42  DOWNSTREAM(FEET) =  3044.19
  FLOW LENGTH(FEET) =   215.70   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.49
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.73
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   10.45
  LONGEST FLOWPATH FROM NODE    322.00 TO NODE    314.00 =     371.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        3.73    10.45       5.897        1.23
  LONGEST FLOWPATH FROM NODE    322.00 TO NODE    314.00 =     371.40 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       31.07    12.32       5.301       12.06
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    314.00 =    1512.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      30.07      10.45        5.897
      2      34.42      12.32        5.301

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      34.42   Tc(MIN.) =   12.32
  TOTAL AREA(ACRES) =       13.3

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    326.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3044.19  DOWNSTREAM(FEET) =  3041.87
  FLOW LENGTH(FEET) =   239.50   MANNING'S N =  0.012
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.23
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.42
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   12.75
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    326.00 =    1751.50 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.185
 *USER SPECIFIED(SUBAREA):
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5700
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4878
 SUBAREA AREA(ACRES) =    0.77   SUBAREA RUNOFF(CFS) =    2.28
 TOTAL AREA(ACRES) =       14.1   TOTAL RUNOFF(CFS) =      35.55
 TC(MIN.) =   12.75

****************************************************************************
 FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =  13
----------------------------------------------------------------------------
 >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    328.00 TO NODE    329.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
 S.C.S. CURVE NUMBER (AMC II) =  88
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    98.00
 UPSTREAM ELEVATION(FEET) =   3134.00
 DOWNSTREAM ELEVATION(FEET) =   3088.79
 ELEVATION DIFFERENCE(FEET) =     45.21
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.790
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.629
 SUBAREA RUNOFF(CFS) =      0.35
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.35

****************************************************************************
 FLOW PROCESS FROM NODE    329.00 TO NODE    330.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3088.79  DOWNSTREAM(FEET) =    307.82
 CHANNEL LENGTH THRU SUBAREA(FEET) =   110.80   CHANNEL SLOPE = 25.0990
 CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.571
 *USER SPECIFIED(SUBAREA):
 URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
 S.C.S. CURVE NUMBER (AMC II) =  88
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.76
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  30.32
 AVERAGE FLOW DEPTH(FEET) =   0.01   TRAVEL TIME(MIN.) =   0.06
 Tc(MIN.) =    5.85
 SUBAREA AREA(ACRES) =     0.24       SUBAREA RUNOFF(CFS) =    0.82
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.400
 TOTAL AREA(ACRES) =        0.3         PEAK FLOW RATE(CFS) =       1.17

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.02   FLOW VELOCITY(FEET/SEC.) =  31.88
 LONGEST FLOWPATH FROM NODE    328.00 TO NODE    330.00 =     208.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    330.00 TO NODE    331.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3085.02  DOWNSTREAM(FEET) =  3050.52
  FLOW LENGTH(FEET) =    59.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.37
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.17
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    5.91
  LONGEST FLOWPATH FROM NODE    328.00 TO NODE    331.00 =     267.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    331.00 TO NODE    326.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3050.52  DOWNSTREAM(FEET) =  3041.87
  FLOW LENGTH(FEET) =    21.10   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.43
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.17
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.94
  LONGEST FLOWPATH FROM NODE    328.00 TO NODE    326.00 =     288.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
==============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        1.17     5.94       8.492        0.34
  LONGEST FLOWPATH FROM NODE    328.00 TO NODE    326.00 =     288.90 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       35.55    12.75       5.185       14.06
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    326.00 =    1751.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      17.71       5.94        8.492
      2      36.26      12.75        5.185

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      36.26   Tc(MIN.) =   12.75
  TOTAL AREA(ACRES) =       14.4

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
==============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    332.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3041.87  DOWNSTREAM(FEET) =  3040.79
  FLOW LENGTH(FEET) =   216.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.17
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      36.26
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =   13.26
```

```
 LONGEST FLOWPATH FROM NODE    305.20 TO NODE    332.00 =    1967.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    332.00 TO NODE    332.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.057
 *USER SPECIFIED(SUBAREA):
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5100
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4869
 SUBAREA AREA(ACRES) =    0.78   SUBAREA RUNOFF(CFS) =    2.01
 TOTAL AREA(ACRES) =       15.2   TOTAL RUNOFF(CFS) =      37.37
 TC(MIN.) =   13.26

****************************************************************************
 FLOW PROCESS FROM NODE    332.00 TO NODE    333.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  3040.79  DOWNSTREAM(FEET) =  3040.43
 FLOW LENGTH(FEET) =    75.80   MANNING'S N =  0.012
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.24
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      37.37
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.43
 LONGEST FLOWPATH FROM NODE    305.20 TO NODE    333.00 =    2043.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    333.00 TO NODE    335.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  3040.43  DOWNSTREAM(FEET) =  3039.83
 FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.39
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      37.37
 PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   13.70
 LONGEST FLOWPATH FROM NODE    305.20 TO NODE    335.00 =    2163.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.950
 *USER SPECIFIED(SUBAREA):
 GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5400
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4888
 SUBAREA AREA(ACRES) =    0.55   SUBAREA RUNOFF(CFS) =    1.47
 TOTAL AREA(ACRES) =       15.7   TOTAL RUNOFF(CFS) =      38.06
 TC(MIN.) =   13.70

****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  3039.83  DOWNSTREAM(FEET) =  3038.68
 FLOW LENGTH(FEET) =   174.10   MANNING'S N =  0.012
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.16
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      38.06
 PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   14.06
 LONGEST FLOWPATH FROM NODE    305.20 TO NODE    336.00 =    2337.40 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.869
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5500
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4905
  SUBAREA AREA(ACRES) =    0.46   SUBAREA RUNOFF(CFS) =    1.23
  TOTAL AREA(ACRES) =       16.2   TOTAL RUNOFF(CFS) =      38.66
  TC(MIN.) =   14.06

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    337.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3038.68  DOWNSTREAM(FEET) =  3037.72
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.42
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      38.66
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   14.33
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    337.00 =    2473.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    337.00 TO NODE    337.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.810
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5400
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4915
  SUBAREA AREA(ACRES) =    0.33   SUBAREA RUNOFF(CFS) =    0.86
  TOTAL AREA(ACRES) =       16.5   TOTAL RUNOFF(CFS) =      39.05
  TC(MIN.) =   14.33

****************************************************************************
  FLOW PROCESS FROM NODE    337.00 TO NODE    337.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    337.00 TO NODE    337.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE    346.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3057.70
  DOWNSTREAM ELEVATION(FEET) =   3056.70
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.063
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    60.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.463
```

```
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
  FLOW PROCESS FROM NODE    346.00 TO NODE    347.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3056.70  DOWNSTREAM(FEET) =   3056.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    68.60   CHANNEL SLOPE =  0.0102
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.958
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.94
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   1.22
  Tc(MIN.) =   10.28
  SUBAREA AREA(ACRES) =     0.21       SUBAREA RUNOFF(CFS) =    0.56
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =        0.3         PEAK FLOW RATE(CFS) =       0.86

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   1.03
  LONGEST FLOWPATH FROM NODE    345.00 TO NODE    347.00 =     168.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    347.00 TO NODE    348.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3056.00  DOWNSTREAM(FEET) =   3055.88
  CHANNEL LENGTH THRU SUBAREA(FEET) =    13.70   CHANNEL SLOPE =  0.0088
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.894
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.31
  AVERAGE FLOW DEPTH(FEET) =   0.24   TRAVEL TIME(MIN.) =   0.17
  Tc(MIN.) =   10.46
  SUBAREA AREA(ACRES) =     1.19       SUBAREA RUNOFF(CFS) =    3.16
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.450
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       4.00

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.30   FLOW VELOCITY(FEET/SEC.) =   1.48
  LONGEST FLOWPATH FROM NODE    345.00 TO NODE    348.00 =     182.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    348.00 TO NODE    349.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3049.38  DOWNSTREAM(FEET) =  3048.00
  FLOW LENGTH(FEET) =   277.70   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.27
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.00
  PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =   11.54
  LONGEST FLOWPATH FROM NODE    345.00 TO NODE    349.00 =     460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    349.00 TO NODE    349.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.531
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =    1.56   SUBAREA RUNOFF(CFS) =    3.88
  TOTAL AREA(ACRES) =        3.1   TOTAL RUNOFF(CFS) =       7.64
  TC(MIN.) =   11.54

********************************************************************************
  FLOW PROCESS FROM NODE    349.00 TO NODE    350.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3048.00  DOWNSTREAM(FEET) =  3046.12
  FLOW LENGTH(FEET) =   195.40   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.38
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.64
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   12.05
  LONGEST FLOWPATH FROM NODE    345.00 TO NODE    350.00 =     655.40 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    351.00 TO NODE    350.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.378
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
  SUBAREA AREA(ACRES) =    0.70   SUBAREA RUNOFF(CFS) =    1.69
  TOTAL AREA(ACRES) =        3.8   TOTAL RUNOFF(CFS) =       9.12
  TC(MIN.) =   12.05

********************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    354.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3046.12  DOWNSTREAM(FEET) =  3044.66
  FLOW LENGTH(FEET) =   236.10   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.65
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.12
  PIPE TRAVEL TIME(MIN.) =   0.70    Tc(MIN.) =   12.75
  LONGEST FLOWPATH FROM NODE    345.00 TO NODE    354.00 =     891.50 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    355.00 TO NODE    354.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.187
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5400
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4646
  SUBAREA AREA(ACRES) =    0.73   SUBAREA RUNOFF(CFS) =    2.04
  TOTAL AREA(ACRES) =        4.5   TOTAL RUNOFF(CFS) =      10.84
  TC(MIN.) =   12.75

********************************************************************************
  FLOW PROCESS FROM NODE    354.00 TO NODE    354.00 IS CODE =  10
--------------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
================================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    358.00 TO NODE    359.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3057.70
  DOWNSTREAM ELEVATION(FEET) =   3056.70
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.063
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    60.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.463
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
  FLOW PROCESS FROM NODE    359.00 TO NODE    360.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3056.70  DOWNSTREAM(FEET) =   3056.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    65.70   CHANNEL SLOPE =  0.0107
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.991
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5100
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.57
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.97
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   1.13
  Tc(MIN.) =   10.19
  SUBAREA AREA(ACRES) =     0.18       SUBAREA RUNOFF(CFS) =    0.55
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.489
  TOTAL AREA(ACRES) =        0.3         PEAK FLOW RATE(CFS) =       0.82

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   1.07
  LONGEST FLOWPATH FROM NODE    358.00 TO NODE    360.00 =     165.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    360.00 TO NODE    361.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3056.00  DOWNSTREAM(FEET) =   3055.99
  CHANNEL LENGTH THRU SUBAREA(FEET) =     5.00   CHANNEL SLOPE =  0.0020
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.948
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5100
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.05
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.72
  AVERAGE FLOW DEPTH(FEET) =   0.31   TRAVEL TIME(MIN.) =   0.12
  Tc(MIN.) =   10.31
  SUBAREA AREA(ACRES) =     0.81       SUBAREA RUNOFF(CFS) =    2.46
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.504
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       3.27

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.38   FLOW VELOCITY(FEET/SEC.) =   0.82
  LONGEST FLOWPATH FROM NODE    358.00 TO NODE    361.00 =     170.70 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    361.00 TO NODE    362.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3049.49  DOWNSTREAM(FEET) =  3048.33
  FLOW LENGTH(FEET) =   174.10   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.52
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.27
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =   10.95
  LONGEST FLOWPATH FROM NODE    358.00 TO NODE    362.00 =     344.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    362.00 TO NODE    362.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.720
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5024
  SUBAREA AREA(ACRES) =    0.98   SUBAREA RUNOFF(CFS) =    2.80
  TOTAL AREA(ACRES) =        2.1   TOTAL RUNOFF(CFS) =       5.95
  TC(MIN.) =   10.95

****************************************************************************
  FLOW PROCESS FROM NODE    362.00 TO NODE    354.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3048.33  DOWNSTREAM(FEET) =  3044.66
  FLOW LENGTH(FEET) =   136.10   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.85
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.95
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   11.21
  LONGEST FLOWPATH FROM NODE    358.00 TO NODE    354.00 =     480.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    354.00 TO NODE    354.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1         5.95    11.21       5.636        2.07
  LONGEST FLOWPATH FROM NODE    358.00 TO NODE    354.00 =     480.90 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        10.84    12.75       5.187        4.50
  LONGEST FLOWPATH FROM NODE    345.00 TO NODE    354.00 =     891.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      15.48      11.21        5.636
      2      16.32      12.75        5.187

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      16.32   Tc(MIN.) =   12.75
  TOTAL AREA(ACRES) =        6.6
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    354.00 TO NODE    354.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    354.00 TO NODE    363.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3044.66  DOWNSTREAM(FEET) =  3043.08
  FLOW LENGTH(FEET) =   260.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.37
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.32
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   13.43
  LONGEST FLOWPATH FROM NODE    345.00 TO NODE    363.00 =    1151.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    364.00 TO NODE    363.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.016
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5800
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4868
  SUBAREA AREA(ACRES) =    0.73   SUBAREA RUNOFF(CFS) =    2.12
  TOTAL AREA(ACRES) =        7.3   TOTAL RUNOFF(CFS) =      17.83
  TC(MIN.) =   13.43

****************************************************************************
  FLOW PROCESS FROM NODE    363.00 TO NODE    363.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    363.00 TO NODE    363.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    365.00 TO NODE    367.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3057.70
  DOWNSTREAM ELEVATION(FEET) =   3056.70
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.063
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    60.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.463
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
  FLOW PROCESS FROM NODE    367.00 TO NODE    368.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   3056.70  DOWNSTREAM(FEET) =   3056.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    65.70   CHANNEL SLOPE =  0.0107
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.991
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5100
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.57
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.97
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   1.13
  Tc(MIN.) =   10.19
  SUBAREA AREA(ACRES) =     0.18       SUBAREA RUNOFF(CFS) =    0.55
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.489
  TOTAL AREA(ACRES) =        0.3         PEAK FLOW RATE(CFS) =       0.82

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   1.07
  LONGEST FLOWPATH FROM NODE    365.00 TO NODE    368.00 =     165.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    368.00 TO NODE    369.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3056.00  DOWNSTREAM(FEET) =   3055.99
  CHANNEL LENGTH THRU SUBAREA(FEET) =     5.10   CHANNEL SLOPE =  0.0020
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.946
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.71
  AVERAGE FLOW DEPTH(FEET) =   0.31   TRAVEL TIME(MIN.) =   0.12
  Tc(MIN.) =   10.31
  SUBAREA AREA(ACRES) =     0.81       SUBAREA RUNOFF(CFS) =    2.41
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.497
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       3.22

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.38   FLOW VELOCITY(FEET/SEC.) =   0.80
  LONGEST FLOWPATH FROM NODE    365.00 TO NODE    369.00 =     170.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    369.00 TO NODE    370.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3049.49  DOWNSTREAM(FEET) =  3048.34
  FLOW LENGTH(FEET) =   174.10   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.49
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.22
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =   10.96
  LONGEST FLOWPATH FROM NODE    365.00 TO NODE    370.00 =     344.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    370.00 TO NODE    370.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.718
  *USER SPECIFIED(SUBAREA):
  GENERAL INDUSTRIAL RUNOFF COEFFICIENT = .5000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4985
  SUBAREA AREA(ACRES) =    0.98   SUBAREA RUNOFF(CFS) =    2.80
  TOTAL AREA(ACRES) =        2.1   TOTAL RUNOFF(CFS) =       5.90
```

```
  TC(MIN.) =   10.96

****************************************************************************
  FLOW PROCESS FROM NODE    370.00 TO NODE    363.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3048.34  DOWNSTREAM(FEET) =  3043.08
  FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.012
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.08
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.90
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   11.18
  LONGEST FLOWPATH FROM NODE    365.00 TO NODE    363.00 =     480.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    363.00 TO NODE    363.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        5.90    11.18       5.643        2.07
  LONGEST FLOWPATH FROM NODE    365.00 TO NODE    363.00 =     480.90 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       17.83    13.43       5.016        7.30
  LONGEST FLOWPATH FROM NODE    345.00 TO NODE    363.00 =    1151.50 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      20.75      11.18        5.643
      2      23.07      13.43        5.016

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      23.07   Tc(MIN.) =   13.43
  TOTAL AREA(ACRES) =        9.4

****************************************************************************
  FLOW PROCESS FROM NODE    363.00 TO NODE    363.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    363.00 TO NODE    337.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3043.08  DOWNSTREAM(FEET) =  3041.20
  FLOW LENGTH(FEET) =   239.50   MANNING'S N =  0.012
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.73
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.07
  PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =   13.94
  LONGEST FLOWPATH FROM NODE    345.00 TO NODE    337.00 =    1391.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    337.00 TO NODE    337.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
```

```
  STREAM     RUNOFF       Tc       INTENSITY     AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        23.07    13.94        4.895        9.37
  LONGEST FLOWPATH FROM NODE    345.00 TO NODE    337.00 =    1391.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF       Tc       INTENSITY     AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        39.05    14.33        4.810       16.52
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    337.00 =    2473.40 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc       INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      61.07      13.94        4.895
      2      61.72      14.33        4.810

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      61.72   Tc(MIN.) =   14.33
  TOTAL AREA(ACRES) =       25.9

****************************************************************************
  FLOW PROCESS FROM NODE    337.00 TO NODE    337.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    337.00 TO NODE    371.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3037.72  DOWNSTREAM(FEET) =  3037.64
  FLOW LENGTH(FEET) =    22.80   MANNING'S N =  0.012
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.29
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      61.72
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   14.38
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    371.00 =    2496.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    371.00 TO NODE    372.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3037.64  DOWNSTREAM(FEET) =  3037.25
  FLOW LENGTH(FEET) =    25.80   MANNING'S N =  0.012
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.44
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      61.72
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   14.41
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    372.00 =    2522.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    372.00 TO NODE    373.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3037.25  DOWNSTREAM(FEET) =  3007.99
  FLOW LENGTH(FEET) =    77.80   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  41.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      61.72
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   14.45
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    373.00 =    2599.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    373.00 TO NODE    373.00 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.785
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4881
  SUBAREA AREA(ACRES) =    0.78   SUBAREA RUNOFF(CFS) =    1.49
  TOTAL AREA(ACRES) =       26.7   TOTAL RUNOFF(CFS) =      62.28
  TC(MIN.) =   14.45

************************************************************************
  FLOW PROCESS FROM NODE    373.00 TO NODE    374.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3007.99  DOWNSTREAM(FEET) =  2984.19
  FLOW LENGTH(FEET) =    67.30   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  40.25
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      62.28
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   14.47
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    374.00 =    2667.10 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    374.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.779
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4843
  SUBAREA AREA(ACRES) =    1.19   SUBAREA RUNOFF(CFS) =    2.27
  TOTAL AREA(ACRES) =       27.9   TOTAL RUNOFF(CFS) =      64.48
  TC(MIN.) =   14.47

************************************************************************
  FLOW PROCESS FROM NODE    374.00 TO NODE    376.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2984.19  DOWNSTREAM(FEET) =  2962.02
  FLOW LENGTH(FEET) =    66.40   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  41.20
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      64.48
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   14.50
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    376.00 =    2733.50 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    376.00 TO NODE    378.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2962.02  DOWNSTREAM(FEET) =  2960.90
  FLOW LENGTH(FEET) =    27.90   MANNING'S N =  0.012
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.52
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      64.48
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   14.52
  LONGEST FLOWPATH FROM NODE    305.20 TO NODE    378.00 =    2761.40 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    378.00 TO NODE    378.00 IS CODE =  81
------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.768
  *USER SPECIFIED(SUBAREA):
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4783
  SUBAREA AREA(ACRES) =    2.14   SUBAREA RUNOFF(CFS) =    4.08
  TOTAL AREA(ACRES) =       30.0   TOTAL RUNOFF(CFS) =      68.41
  TC(MIN.) =   14.52
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       30.0  TC(MIN.) =     14.52
  PEAK FLOW RATE(CFS)   =      68.41
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2008 Advanced Engineering Software (aes)
              Ver. 15.0 Release Date: 04/01/2008  License ID 1504

                              Analysis prepared by:

                              Nolte Associates, Inc.
                             15070 Avenue of Science
                                    Suite 100
                               San Diego, CA 92128

 ************************** DESCRIPTION OF STUDY **************************
* SDB039600                                                               *
* 11-9-2009                                                               *
* PROPOSED HYDROLOGY                                                      *
 **************************************************************************

  FILE NAME: PR400.DAT
  TIME/DATE OF STUDY: 08:48 11/09/2009
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   16.0     11.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   2979.00
  DOWNSTREAM ELEVATION(FEET) =   2962.00
  ELEVATION DIFFERENCE(FEET) =     17.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.200
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.26

**************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2962.00  DOWNSTREAM(FEET) =   2924.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   147.00   CHANNEL SLOPE =  0.2585
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1828 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.26
  FLOW VELOCITY(FEET/SEC) =   2.39 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.02   Tc(MIN.) =    7.29
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     247.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.437
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.27   SUBAREA RUNOFF(CFS) =    0.70
  TOTAL AREA(ACRES) =        0.4   TOTAL RUNOFF(CFS) =       0.94
  TC(MIN.) =    7.29

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    403.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2924.00  DOWNSTREAM(FEET) =   2784.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   243.00   CHANNEL SLOPE =  0.5761
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2288 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.94
  FLOW VELOCITY(FEET/SEC) =   2.68 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.51   Tc(MIN.) =    8.80
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    403.00 =     490.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    403.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.586
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.94   SUBAREA RUNOFF(CFS) =    2.17
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       3.00
  TC(MIN.) =    8.80

****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    404.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2784.00  DOWNSTREAM(FEET) =   2671.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   176.00   CHANNEL SLOPE =  0.6420
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2300 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.00
  FLOW VELOCITY(FEET/SEC) =   3.87 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.76   Tc(MIN.) =    9.56
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    404.00 =     666.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    404.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.244
```

```
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    1.83   SUBAREA RUNOFF(CFS) =    4.00
  TOTAL AREA(ACRES) =        3.1   TOTAL RUNOFF(CFS) =       6.84
  TC(MIN.) =    9.56

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    405.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2671.00  DOWNSTREAM(FEET) =   2510.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   520.00   CHANNEL SLOPE =  0.3096
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1974 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.84
  FLOW VELOCITY(FEET/SEC) =   4.72 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   11.40
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    405.00 =    1186.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.575
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    2.67   SUBAREA RUNOFF(CFS) =    5.21
  TOTAL AREA(ACRES) =        5.8   TOTAL RUNOFF(CFS) =      11.32
  TC(MIN.) =   11.40
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.8  TC(MIN.) =     11.40
  PEAK FLOW RATE(CFS)   =      11.32
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2008 Advanced Engineering Software (aes)
              Ver. 15.0 Release Date: 04/01/2008  License ID 1504

                              Analysis prepared by:

                              Nolte Associates, Inc.
                             15070 Avenue of Science
                                    Suite 100
                               San Diego, CA 92128

 *************************** DESCRIPTION OF STUDY ***************************
* SDB039600                                                                 *
* 05-21-2009                                                                *
* BASIN 500                                                                 *
 **************************************************************************

  FILE NAME: PR500.DAT
  TIME/DATE OF STUDY: 08:50 05/21/2009
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   16.0     11.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    505.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3256.00
  DOWNSTREAM ELEVATION(FEET) =   3248.20
  ELEVATION DIFFERENCE(FEET) =      7.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.808
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.773
  SUBAREA RUNOFF(CFS) =      0.52
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.52

**************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    510.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3248.20  DOWNSTREAM(FEET) =   3244.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    87.00   CHANNEL SLOPE =  0.0483
```

```
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0483 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.52
  FLOW VELOCITY(FEET/SEC) =   1.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.18   Tc(MIN.) =    7.99
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    510.00 =     187.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    510.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.012
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.70   SUBAREA RUNOFF(CFS) =    1.72
  TOTAL AREA(ACRES) =        0.9   TOTAL RUNOFF(CFS) =       2.18
  TC(MIN.) =    7.99

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    515.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3244.00  DOWNSTREAM(FEET) =   3236.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   154.00   CHANNEL SLOPE =  0.0519
  CHANNEL BASE(FEET) =   40.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.050
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.13
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.25
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   2.05
  Tc(MIN.) =   10.04
  SUBAREA AREA(ACRES) =     1.84       SUBAREA RUNOFF(CFS) =    3.90
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        2.7         PEAK FLOW RATE(CFS) =       5.78

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   1.47
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    515.00 =     341.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    515.00 TO NODE    520.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3236.00  DOWNSTREAM(FEET) =   3218.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   398.00   CHANNEL SLOPE =  0.0452
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.985
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.70
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.89
  AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   3.51
  Tc(MIN.) =   13.55
  SUBAREA AREA(ACRES) =     5.60       SUBAREA RUNOFF(CFS) =    9.77
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        8.3         PEAK FLOW RATE(CFS) =      14.54

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.21   FLOW VELOCITY(FEET/SEC.) =   2.15
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    520.00 =     739.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    525.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3218.00  DOWNSTREAM(FEET) =   3208.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   233.00   CHANNEL SLOPE =  0.0429
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.640
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.43
  AVERAGE FLOW DEPTH(FEET) =   0.27   TRAVEL TIME(MIN.) =   1.60
  Tc(MIN.) =   15.15
  SUBAREA AREA(ACRES) =     8.51       SUBAREA RUNOFF(CFS) =   13.82
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =       16.8         PEAK FLOW RATE(CFS) =      27.35

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =   2.67
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    525.00 =     972.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    530.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3208.00  DOWNSTREAM(FEET) =   3136.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1267.00   CHANNEL SLOPE =  0.0568
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =   7.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.746
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      43.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.55
  AVERAGE FLOW DEPTH(FEET) =   0.38   TRAVEL TIME(MIN.) =   5.96
  Tc(MIN.) =   21.11
  SUBAREA AREA(ACRES) =    25.02       SUBAREA RUNOFF(CFS) =   32.81
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =       41.9         PEAK FLOW RATE(CFS) =      54.89

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   3.85
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    530.00 =    2239.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    535.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3136.00  DOWNSTREAM(FEET) =   3062.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1438.00   CHANNEL SLOPE =  0.0515
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.259
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     100.66
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.71
  AVERAGE FLOW DEPTH(FEET) =   0.64   TRAVEL TIME(MIN.) =   5.09
  Tc(MIN.) =   26.20
  SUBAREA AREA(ACRES) =    80.02       SUBAREA RUNOFF(CFS) =   91.27
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      121.9         PEAK FLOW RATE(CFS) =     139.02
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.78   FLOW VELOCITY(FEET/SEC.) =   5.29
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    535.00 =    3677.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      121.9  TC(MIN.) =     26.20
  PEAK FLOW RATE(CFS)   =     139.02
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2008 Advanced Engineering Software (aes)
              Ver. 15.0 Release Date: 04/01/2008  License ID 1504

                              Analysis prepared by:

                              Nolte Associates, Inc.
                             15070 Avenue of Science
                                    Suite 100
                               San Diego, CA 92128

 ************************** DESCRIPTION OF STUDY **************************
* SDB039600                                                               *
* 08-10-2009                                                              *
* BASIN 600                                                               *
 **************************************************************************

  FILE NAME: PR600.DAT
  TIME/DATE OF STUDY: 11:30 08/10/2009
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   16.0     11.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    601.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3362.00
  DOWNSTREAM ELEVATION(FEET) =   3341.00
  ELEVATION DIFFERENCE(FEET) =     21.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.200
  SUBAREA RUNOFF(CFS) =      0.20
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.20

**************************************************************************
  FLOW PROCESS FROM NODE    601.00 TO NODE    602.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3341.00  DOWNSTREAM(FEET) =   3324.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =    62.00   CHANNEL SLOPE =  0.2742
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1881 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.20
  FLOW VELOCITY(FEET/SEC) =   2.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.43   Tc(MIN.) =    6.69
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    602.00 =     162.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    601.00 TO NODE    602.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.859
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.21   SUBAREA RUNOFF(CFS) =    0.58
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       0.77
  TC(MIN.) =    6.69

****************************************************************************
  FLOW PROCESS FROM NODE    602.00 TO NODE    604.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3324.00  DOWNSTREAM(FEET) =   3288.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   253.00   CHANNEL SLOPE =  0.1423
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1299 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.77
  FLOW VELOCITY(FEET/SEC) =   2.02 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.09   Tc(MIN.) =    8.78
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    604.00 =     415.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    602.00 TO NODE    604.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.596
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.39   SUBAREA RUNOFF(CFS) =    0.90
  TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       1.55
  TC(MIN.) =    8.78

****************************************************************************
  FLOW PROCESS FROM NODE    604.00 TO NODE    606.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3288.00  DOWNSTREAM(FEET) =   3286.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    65.00   CHANNEL SLOPE =  0.0308
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0308 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.55
  FLOW VELOCITY(FEET/SEC) =   1.14 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.95   Tc(MIN.) =    9.74
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    606.00 =     480.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    604.00 TO NODE    606.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.171
```

```
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    2.84   SUBAREA RUNOFF(CFS) =    6.13
  TOTAL AREA(ACRES) =        3.5   TOTAL RUNOFF(CFS) =       7.58
  TC(MIN.) =    9.74

****************************************************************************
  FLOW PROCESS FROM NODE    606.00 TO NODE    608.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3286.00  DOWNSTREAM(FEET) =   3260.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   348.00   CHANNEL SLOPE =  0.0747
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0747 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.58
  FLOW VELOCITY(FEET/SEC) =   3.01 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.93   Tc(MIN.) =   11.67
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    608.00 =     828.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    606.00 TO NODE    608.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.492
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    5.84   SUBAREA RUNOFF(CFS) =   11.23
  TOTAL AREA(ACRES) =        9.4   TOTAL RUNOFF(CFS) =      17.97
  TC(MIN.) =   11.67

****************************************************************************
  FLOW PROCESS FROM NODE    608.00 TO NODE    610.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3260.00  DOWNSTREAM(FEET) =   3228.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   419.00   CHANNEL SLOPE =  0.0764
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0764 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      17.97
  FLOW VELOCITY(FEET/SEC) =   4.05 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.72   Tc(MIN.) =   13.39
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    610.00 =    1247.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    608.00 TO NODE    610.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.025
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   19.32   SUBAREA RUNOFF(CFS) =   33.98
  TOTAL AREA(ACRES) =       28.7   TOTAL RUNOFF(CFS) =      50.42
  TC(MIN.) =   13.39

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    612.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3228.00  DOWNSTREAM(FEET) =   3190.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   708.00   CHANNEL SLOPE =  0.0537
```

```
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.600
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      92.17
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.01
  AVERAGE FLOW DEPTH(FEET) =   1.07   TRAVEL TIME(MIN.) =   1.96
  Tc(MIN.) =   15.35
  SUBAREA AREA(ACRES) =    51.81       SUBAREA RUNOFF(CFS) =   83.42
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =       80.5         PEAK FLOW RATE(CFS) =     129.58

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.29   FLOW VELOCITY(FEET/SEC.) =   6.65
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    612.00 =    1955.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    612.00 TO NODE    614.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3190.00  DOWNSTREAM(FEET) =   3082.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2185.00   CHANNEL SLOPE =  0.0494
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.859
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     191.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.57
  AVERAGE FLOW DEPTH(FEET) =   1.68   TRAVEL TIME(MIN.) =   4.81
  Tc(MIN.) =   20.16
  SUBAREA AREA(ACRES) =    91.43       SUBAREA RUNOFF(CFS) =  123.48
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      171.9         PEAK FLOW RATE(CFS) =     232.17

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.86   FLOW VELOCITY(FEET/SEC.) =   7.99
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    614.00 =    4140.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    614.00 TO NODE    616.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3082.00  DOWNSTREAM(FEET) =   3042.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1069.00   CHANNEL SLOPE =  0.0374
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.568
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     295.57
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.84
  AVERAGE FLOW DEPTH(FEET) =   1.63   TRAVEL TIME(MIN.) =   2.61
  Tc(MIN.) =   22.77
  SUBAREA AREA(ACRES) =   101.50       SUBAREA RUNOFF(CFS) =  126.74
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =      273.4         PEAK FLOW RATE(CFS) =     341.41

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.77   FLOW VELOCITY(FEET/SEC.) =   7.14
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    616.00 =    5209.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    616.00 TO NODE    616.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
```

```
==========================================================================

**************************************************************************
  FLOW PROCESS FROM NODE    616.00 TO NODE    616.00 IS CODE =  13
--------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
==========================================================================

**************************************************************************
  FLOW PROCESS FROM NODE    618.00 TO NODE    620.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    88.00
  UPSTREAM ELEVATION(FEET) =   3433.90
  DOWNSTREAM ELEVATION(FEET) =   3404.90
  ELEVATION DIFFERENCE(FEET) =     29.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.879
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.545
  SUBAREA RUNOFF(CFS) =      0.36
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.36

**************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    622.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3404.90  DOWNSTREAM(FEET) =   3360.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   136.00   CHANNEL SLOPE =  0.3301
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2018 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.36
  FLOW VELOCITY(FEET/SEC) =   2.52 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.90   Tc(MIN.) =    6.78
  LONGEST FLOWPATH FROM NODE    618.00 TO NODE    622.00 =     224.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    622.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.794
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.43   SUBAREA RUNOFF(CFS) =    1.17
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       1.50
  TC(MIN.) =    6.78

**************************************************************************
  FLOW PROCESS FROM NODE    622.00 TO NODE    626.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3265.00  DOWNSTREAM(FEET) =   3205.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   638.00   CHANNEL SLOPE =  0.0940
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0940 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.50
  FLOW VELOCITY(FEET/SEC) =   1.97 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.41   Tc(MIN.) =   12.19
  LONGEST FLOWPATH FROM NODE    618.00 TO NODE    626.00 =     862.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    622.00 TO NODE    626.00 IS CODE =  81
--------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.339
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    1.69   SUBAREA RUNOFF(CFS) =    3.16
  TOTAL AREA(ACRES) =        2.2   TOTAL RUNOFF(CFS) =       4.19
  TC(MIN.) =   12.19

********************************************************************************
  FLOW PROCESS FROM NODE    626.00 TO NODE    628.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3205.00  DOWNSTREAM(FEET) =   3150.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   509.00   CHANNEL SLOPE =  0.1081
  CHANNEL BASE(FEET) =   50.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.429
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.62
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.07
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   4.09
  Tc(MIN.) =   16.28
  SUBAREA AREA(ACRES) =     8.25       SUBAREA RUNOFF(CFS) =   12.79
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =       10.5         PEAK FLOW RATE(CFS) =      16.26

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   2.44
  LONGEST FLOWPATH FROM NODE    618.00 TO NODE    628.00 =    1371.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    628.00 TO NODE    630.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3150.00  DOWNSTREAM(FEET) =   3095.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   741.00   CHANNEL SLOPE =  0.0742
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.027
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      28.37
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.76
  AVERAGE FLOW DEPTH(FEET) =   0.52   TRAVEL TIME(MIN.) =   2.59
  Tc(MIN.) =   18.87
  SUBAREA AREA(ACRES) =    17.17       SUBAREA RUNOFF(CFS) =   24.20
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =       27.7         PEAK FLOW RATE(CFS) =      38.98

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.62   FLOW VELOCITY(FEET/SEC.) =   5.29
  LONGEST FLOWPATH FROM NODE    618.00 TO NODE    630.00 =    2112.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    630.00 TO NODE    632.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3095.00  DOWNSTREAM(FEET) =   3060.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   569.00   CHANNEL SLOPE =  0.0615
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.794
```

```
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      59.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.19
  AVERAGE FLOW DEPTH(FEET) =   0.67   TRAVEL TIME(MIN.) =   1.83
  Tc(MIN.) =   20.70
  SUBAREA AREA(ACRES) =    30.93       SUBAREA RUNOFF(CFS) =   41.07
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =       58.6         PEAK FLOW RATE(CFS) =      77.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.78   FLOW VELOCITY(FEET/SEC.) =   5.73
  LONGEST FLOWPATH FROM NODE    618.00 TO NODE    632.00 =    2681.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    633.00 TO NODE    633.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.794
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3550
  SUBAREA AREA(ACRES) =   11.71   SUBAREA RUNOFF(CFS) =   16.88
  TOTAL AREA(ACRES) =       70.3   TOTAL RUNOFF(CFS) =      94.67
  TC(MIN.) =   20.70

****************************************************************************
  FLOW PROCESS FROM NODE    632.00 TO NODE    616.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3060.00  DOWNSTREAM(FEET) =   3042.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   342.00   CHANNEL SLOPE =  0.0526
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   9.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.669
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .5900
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      96.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.20
  AVERAGE FLOW DEPTH(FEET) =   0.99   TRAVEL TIME(MIN.) =   1.10
  Tc(MIN.) =   21.80
  SUBAREA AREA(ACRES) =     2.14       SUBAREA RUNOFF(CFS) =    4.63
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.362
  TOTAL AREA(ACRES) =       72.4         PEAK FLOW RATE(CFS) =      96.21

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.98   FLOW VELOCITY(FEET/SEC.) =   5.21
  LONGEST FLOWPATH FROM NODE    618.00 TO NODE    616.00 =    3023.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    616.00 TO NODE    616.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       96.21    21.80       3.669       72.44
  LONGEST FLOWPATH FROM NODE    618.00 TO NODE    616.00 =    3023.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      341.41    22.77       3.568      273.41
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    616.00 =    5209.00 FEET.

  ** PEAK FLOW RATE TABLE **
```

```
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     423.06      21.80        3.669
      2     434.95      22.77        3.568

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     434.95   Tc(MIN.) =   22.77
  TOTAL AREA(ACRES) =      345.9

****************************************************************************
  FLOW PROCESS FROM NODE    616.00 TO NODE    634.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3042.00  DOWNSTREAM(FEET) =   3032.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   259.00   CHANNEL SLOPE =  0.0386
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.516
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3900
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     442.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.29
  AVERAGE FLOW DEPTH(FEET) =   2.61   TRAVEL TIME(MIN.) =   0.52
  Tc(MIN.) =   23.29
  SUBAREA AREA(ACRES) =    11.15       SUBAREA RUNOFF(CFS) =   15.29
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.354
  TOTAL AREA(ACRES) =      357.0         PEAK FLOW RATE(CFS) =     443.94

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.61   FLOW VELOCITY(FEET/SEC.) =   8.30
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    634.00 =    5468.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      357.0  TC(MIN.) =     23.29
  PEAK FLOW RATE(CFS)   =     443.94
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2008 Advanced Engineering Software (aes)
              Ver. 15.0 Release Date: 04/01/2008  License ID 1504

                              Analysis prepared by:

                              Nolte Associates, Inc.
                             15070 Avenue of Science
                                    Suite 100
                               San Diego, CA 92128

 ************************** DESCRIPTION OF STUDY **************************
* SDB039600                                                               *
* 05-21-2009                                                              *
* BASIN 700                                                               *
 **************************************************************************

  FILE NAME: PR700.DAT
  TIME/DATE OF STUDY: 09:17 05/21/2009
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   16.0     11.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    702.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3450.00
  DOWNSTREAM ELEVATION(FEET) =   3434.00
  ELEVATION DIFFERENCE(FEET) =     16.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.200
  SUBAREA RUNOFF(CFS) =      0.11
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.11

**************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    704.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3434.00  DOWNSTREAM(FEET) =   3416.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =    92.00   CHANNEL SLOPE =  0.1957
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1578 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.11
  FLOW VELOCITY(FEET/SEC) =   2.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.69   Tc(MIN.) =    6.96
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    704.00 =     192.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    704.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.666
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.10   SUBAREA RUNOFF(CFS) =    0.27
  TOTAL AREA(ACRES) =        0.1   TOTAL RUNOFF(CFS) =       0.38
  TC(MIN.) =    6.96

****************************************************************************
  FLOW PROCESS FROM NODE    704.00 TO NODE    706.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3416.00  DOWNSTREAM(FEET) =   3370.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   132.00   CHANNEL SLOPE =  0.3485
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2050 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.38
  FLOW VELOCITY(FEET/SEC) =   2.54 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =    7.82
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    706.00 =     324.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    704.00 TO NODE    706.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.106
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.20   SUBAREA RUNOFF(CFS) =    0.50
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       0.85
  TC(MIN.) =    7.82

****************************************************************************
  FLOW PROCESS FROM NODE    706.00 TO NODE    708.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3370.00  DOWNSTREAM(FEET) =   3272.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   294.00   CHANNEL SLOPE =  0.3333
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2023 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.85
  FLOW VELOCITY(FEET/SEC) =   2.52 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.95   Tc(MIN.) =    9.77
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    708.00 =     618.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    706.00 TO NODE    708.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.158
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  88
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =    0.64   SUBAREA RUNOFF(CFS) =    1.38
TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       2.11
TC(MIN.) =    9.77

****************************************************************************
FLOW PROCESS FROM NODE    708.00 TO NODE    710.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   3272.00  DOWNSTREAM(FEET) =   3214.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   192.00   CHANNEL SLOPE =  0.3021
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1955 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       2.11
FLOW VELOCITY(FEET/SEC) =   3.18 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.01   Tc(MIN.) =   10.78
LONGEST FLOWPATH FROM NODE    700.00 TO NODE    710.00 =     810.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    708.00 TO NODE    710.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.780
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  88
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =    2.66   SUBAREA RUNOFF(CFS) =    5.38
TOTAL AREA(ACRES) =        3.6   TOTAL RUNOFF(CFS) =       7.36
TC(MIN.) =   10.78

****************************************************************************
FLOW PROCESS FROM NODE    710.00 TO NODE    712.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   3214.00  DOWNSTREAM(FEET) =   3100.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   418.00   CHANNEL SLOPE =  0.2727
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   3.00
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.362
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  88
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.62
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.24
AVERAGE FLOW DEPTH(FEET) =   0.21   TRAVEL TIME(MIN.) =   1.33
Tc(MIN.) =   12.11
SUBAREA AREA(ACRES) =     4.53       SUBAREA RUNOFF(CFS) =    8.50
AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
TOTAL AREA(ACRES) =        8.2         PEAK FLOW RATE(CFS) =      15.33

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   5.78
LONGEST FLOWPATH FROM NODE    700.00 TO NODE    712.00 =    1228.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    712.00 TO NODE    714.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   3100.00  DOWNSTREAM(FEET) =   3068.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   172.15   CHANNEL SLOPE =  0.1859
CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   4.000
MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   3.00
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.219
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.66
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.53
 AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   0.52
 Tc(MIN.) =   12.63
 SUBAREA AREA(ACRES) =     4.74       SUBAREA RUNOFF(CFS) =    8.66
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
 TOTAL AREA(ACRES) =       12.9         PEAK FLOW RATE(CFS) =      23.58

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.35   FLOW VELOCITY(FEET/SEC.) =   5.84
 LONGEST FLOWPATH FROM NODE    700.00 TO NODE    714.00 =    1400.15 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       12.9  TC(MIN.) =     12.63
 PEAK FLOW RATE(CFS)   =      23.58
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2008 Advanced Engineering Software (aes)
              Ver. 15.0 Release Date: 04/01/2008  License ID 1504

                             Analysis prepared by:

                             Nolte Associates, Inc.
                            15070 Avenue of Science
                                  Suite 100
                              San Diego, CA 92128

 ************************** DESCRIPTION OF STUDY **************************
* SDB039600                                                               *
* 11-9-2009                                                               *
* BASIN 800: CFS/AC RATIO TO BE USED FOR CULVERTS W/BASINS UP TO 6 AC     *
 **************************************************************************

  FILE NAME: PR800.DAT
  TIME/DATE OF STUDY: 16:44 11/11/2009
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   16.0     11.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    800.00 TO NODE    805.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3243.00
  DOWNSTREAM ELEVATION(FEET) =   3231.80
  ELEVATION DIFFERENCE(FEET) =     11.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.200
  SUBAREA RUNOFF(CFS) =      0.11
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.11

**************************************************************************
  FLOW PROCESS FROM NODE    805.00 TO NODE    810.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3231.80  DOWNSTREAM(FEET) =   3210.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =    88.80   CHANNEL SLOPE =  0.2455
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.146
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.20
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.99
  AVERAGE FLOW DEPTH(FEET) =   0.02   TRAVEL TIME(MIN.) =   1.49
  Tc(MIN.) =    7.76
  SUBAREA AREA(ACRES) =     0.07       SUBAREA RUNOFF(CFS) =    0.18
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.28

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   1.04
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    810.00 =     188.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    810.00 TO NODE    815.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3210.00  DOWNSTREAM(FEET) =   3178.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   145.10   CHANNEL SLOPE =  0.2205
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.394
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.57
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.66
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   1.46
  Tc(MIN.) =    9.21
  SUBAREA AREA(ACRES) =     0.26       SUBAREA RUNOFF(CFS) =    0.58
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       0.83

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   1.95
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    815.00 =     333.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    815.00 TO NODE    820.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3178.00  DOWNSTREAM(FEET) =   3154.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   140.70   CHANNEL SLOPE =  0.1706
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.850
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.72
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   1.36
  Tc(MIN.) =   10.58
  SUBAREA AREA(ACRES) =     0.19       SUBAREA RUNOFF(CFS) =    0.39
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       1.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.86
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    820.00 =     474.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    820.00 TO NODE    825.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3154.00  DOWNSTREAM(FEET) =   3148.79
  CHANNEL LENGTH THRU SUBAREA(FEET) =    37.30   CHANNEL SLOPE =  0.1397
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.734
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.09
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.86
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   0.33
  Tc(MIN.) =   10.91
  SUBAREA AREA(ACRES) =     0.94       SUBAREA RUNOFF(CFS) =    1.89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       3.01

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   2.14
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    825.00 =     511.90 FEET.
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.5  TC(MIN.) =     10.91
  PEAK FLOW RATE(CFS)   =       3.01
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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              Ver. 15.0 Release Date: 04/01/2008  License ID 1504

                             Analysis prepared by:

                             Nolte Associates, Inc.
                            15070 Avenue of Science
                                  Suite 100
                              San Diego, CA 92128

 ************************** DESCRIPTION OF STUDY **************************
* SDB039600                                                               *
* 11-9-2009                                                               *
* BASIN 900: CFS/AC RATIO USED FOR CULVERTS W/BASINS BTWN 7-9AC           *
 *************************************************************************

  FILE NAME: PR900.DAT
  TIME/DATE OF STUDY: 16:35 11/11/2009
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   16.0     11.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    900.00 TO NODE    905.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3250.00
  DOWNSTREAM ELEVATION(FEET) =   3232.00
  ELEVATION DIFFERENCE(FEET) =     18.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.200
  SUBAREA RUNOFF(CFS) =      0.11
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.11

**************************************************************************
  FLOW PROCESS FROM NODE    905.00 TO NODE    910.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3232.00  DOWNSTREAM(FEET) =   3200.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   110.60   CHANNEL SLOPE =  0.2893
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.883
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.94
  AVERAGE FLOW DEPTH(FEET) =   0.01   TRAVEL TIME(MIN.) =   1.95
  Tc(MIN.) =    8.22
  SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.24
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.34

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.02   FLOW VELOCITY(FEET/SEC.) =   0.91
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    910.00 =     210.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    910.00 TO NODE    915.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3200.00  DOWNSTREAM(FEET) =   3166.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   115.60   CHANNEL SLOPE =  0.2941
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.117
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.62
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.17
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   1.65
  Tc(MIN.) =    9.87
  SUBAREA AREA(ACRES) =     0.26       SUBAREA RUNOFF(CFS) =    0.56
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       0.86

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.03   FLOW VELOCITY(FEET/SEC.) =   1.51
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    915.00 =     326.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    915.00 TO NODE    920.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3166.00  DOWNSTREAM(FEET) =   3150.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    56.80   CHANNEL SLOPE =  0.2817
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.968
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.46
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   0.39
  Tc(MIN.) =   10.26
  SUBAREA AREA(ACRES) =     0.63       SUBAREA RUNOFF(CFS) =    1.32
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        1.0         PEAK FLOW RATE(CFS) =       2.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   2.73
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    920.00 =     383.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    920.00 TO NODE    925.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3150.00  DOWNSTREAM(FEET) =   3110.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   146.70   CHANNEL SLOPE =  0.2727
  CHANNEL BASE(FEET) =    6.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.759
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.59
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.20
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   0.58
  Tc(MIN.) =   10.84
  SUBAREA AREA(ACRES) =     2.42       SUBAREA RUNOFF(CFS) =    4.88
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        3.5         PEAK FLOW RATE(CFS) =       6.95

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   4.79
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    925.00 =     529.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    925.00 TO NODE    930.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3110.00  DOWNSTREAM(FEET) =   3094.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   126.00   CHANNEL SLOPE =  0.1270
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.601
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.38
  AVERAGE FLOW DEPTH(FEET) =   0.32   TRAVEL TIME(MIN.) =   0.48
  Tc(MIN.) =   11.32
  SUBAREA AREA(ACRES) =     1.30       SUBAREA RUNOFF(CFS) =    2.55
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        4.8         PEAK FLOW RATE(CFS) =       9.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.34   FLOW VELOCITY(FEET/SEC.) =   4.57
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    930.00 =     655.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    930.00 TO NODE    935.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3094.00  DOWNSTREAM(FEET) =   3067.81
  CHANNEL LENGTH THRU SUBAREA(FEET) =   361.50   CHANNEL SLOPE =  0.0724
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   1.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.450
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.13
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.31
  AVERAGE FLOW DEPTH(FEET) =   0.41   TRAVEL TIME(MIN.) =   0.49
  Tc(MIN.) =   11.81
  SUBAREA AREA(ACRES) =     2.96       SUBAREA RUNOFF(CFS) =    5.65
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        7.7         PEAK FLOW RATE(CFS) =      14.71

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.46   FLOW VELOCITY(FEET/SEC.) =  12.97
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    935.00 =    1017.20 FEET.
```

```
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =         7.7  TC(MIN.) =     11.81
  PEAK FLOW RATE(CFS)   =      14.71
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2008 Advanced Engineering Software (aes)
              Ver. 15.0 Release Date: 04/01/2008  License ID 1504

                              Analysis prepared by:

                              Nolte Associates, Inc.
                             15070 Avenue of Science
                                    Suite 100
                               San Diego, CA 92128

 ************************** DESCRIPTION OF STUDY **************************
* SDB039600                                                               *
* 11-9-2009                                                               *
* BASIN 1000: CFS/AC RATIO USED FOR CULVERTS W/BASINS BTWN 17-23AC        *
 *************************************************************************

  FILE NAME: PR1000.DAT
  TIME/DATE OF STUDY: 11:49 11/12/2009
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.600
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   16.0     11.0    0.018/0.018/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1005.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    95.90
  UPSTREAM ELEVATION(FEET) =   3362.00
  DOWNSTREAM ELEVATION(FEET) =   3328.00
  ELEVATION DIFFERENCE(FEET) =     34.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.137
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.311
  SUBAREA RUNOFF(CFS) =      0.15
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.15

**************************************************************************
  FLOW PROCESS FROM NODE   1005.00 TO NODE   1010.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3328.00  DOWNSTREAM(FEET) =   3314.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =    76.70   CHANNEL SLOPE =  0.1825
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.166
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.81
  AVERAGE FLOW DEPTH(FEET) =   0.02   TRAVEL TIME(MIN.) =   1.59
  Tc(MIN.) =    7.72
  SUBAREA AREA(ACRES) =     0.12       SUBAREA RUNOFF(CFS) =    0.30
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.02   FLOW VELOCITY(FEET/SEC.) =   1.04
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1010.00 =     172.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1015.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3314.00  DOWNSTREAM(FEET) =   3310.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    32.80   CHANNEL SLOPE =  0.1220
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.970
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.62
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   0.34
  Tc(MIN.) =    8.06
  SUBAREA AREA(ACRES) =     1.22       SUBAREA RUNOFF(CFS) =    2.98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       3.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   1.90
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1015.00 =     205.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1020.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3310.00  DOWNSTREAM(FEET) =   3290.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   195.60   CHANNEL SLOPE =  0.1022
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   6.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.251
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.20
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   1.48
  Tc(MIN.) =    9.54
  SUBAREA AREA(ACRES) =     1.54       SUBAREA RUNOFF(CFS) =    3.37
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        2.9         PEAK FLOW RATE(CFS) =       6.41

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   2.33
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1020.00 =     401.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1025.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3290.00  DOWNSTREAM(FEET) =   3188.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   502.90   CHANNEL SLOPE =  0.2028
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.540
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.61
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.26
  AVERAGE FLOW DEPTH(FEET) =   0.21   TRAVEL TIME(MIN.) =   1.97
  Tc(MIN.) =   11.51
  SUBAREA AREA(ACRES) =     2.26       SUBAREA RUNOFF(CFS) =    4.38
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        5.2         PEAK FLOW RATE(CFS) =      10.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   4.41
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00 =     903.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1030.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3188.00  DOWNSTREAM(FEET) =   3174.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    53.70   CHANNEL SLOPE =  0.2607
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   8.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.494
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.00
  AVERAGE FLOW DEPTH(FEET) =   0.30   TRAVEL TIME(MIN.) =   0.15
  Tc(MIN.) =   11.66
  SUBAREA AREA(ACRES) =     9.19       SUBAREA RUNOFF(CFS) =   17.67
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =       14.4         PEAK FLOW RATE(CFS) =      27.65

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.38   FLOW VELOCITY(FEET/SEC.) =   6.66
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1030.00 =     957.60 FEET.

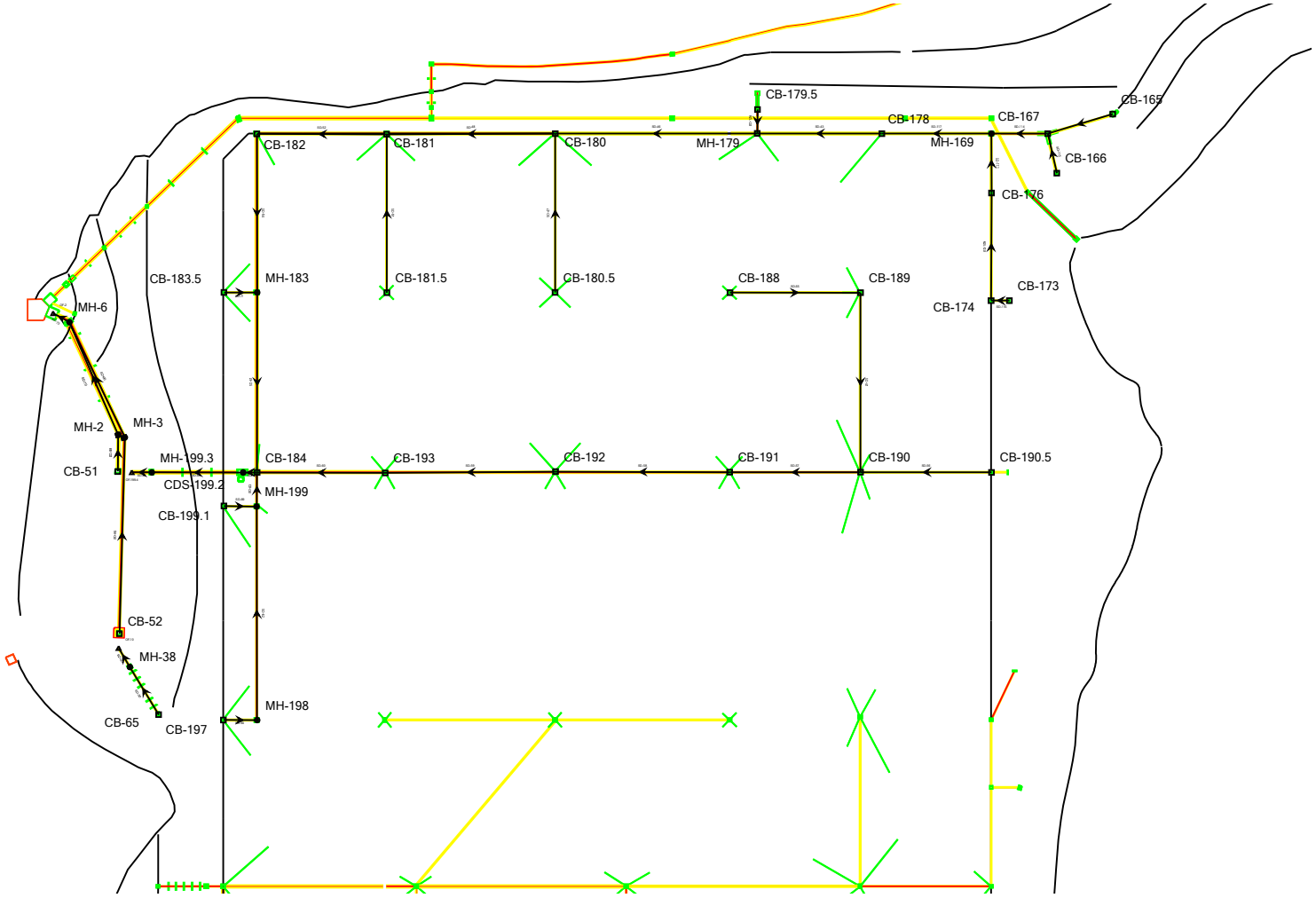
****************************************************************************
  FLOW PROCESS FROM NODE   1030.00 TO NODE   1035.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3174.00  DOWNSTREAM(FEET) =   3121.75
  CHANNEL LENGTH THRU SUBAREA(FEET) =   508.70   CHANNEL SLOPE =  0.1027
  CHANNEL BASE(FEET) =    6.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.050   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.030
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      31.74
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.96
  AVERAGE FLOW DEPTH(FEET) =   0.55   TRAVEL TIME(MIN.) =   1.71
  Tc(MIN.) =   13.37
  SUBAREA AREA(ACRES) =     4.65       SUBAREA RUNOFF(CFS) =    8.19
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =       19.0         PEAK FLOW RATE(CFS) =      33.50

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.57   FLOW VELOCITY(FEET/SEC.) =   5.03
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1035.00 =    1466.30 FEET.
```

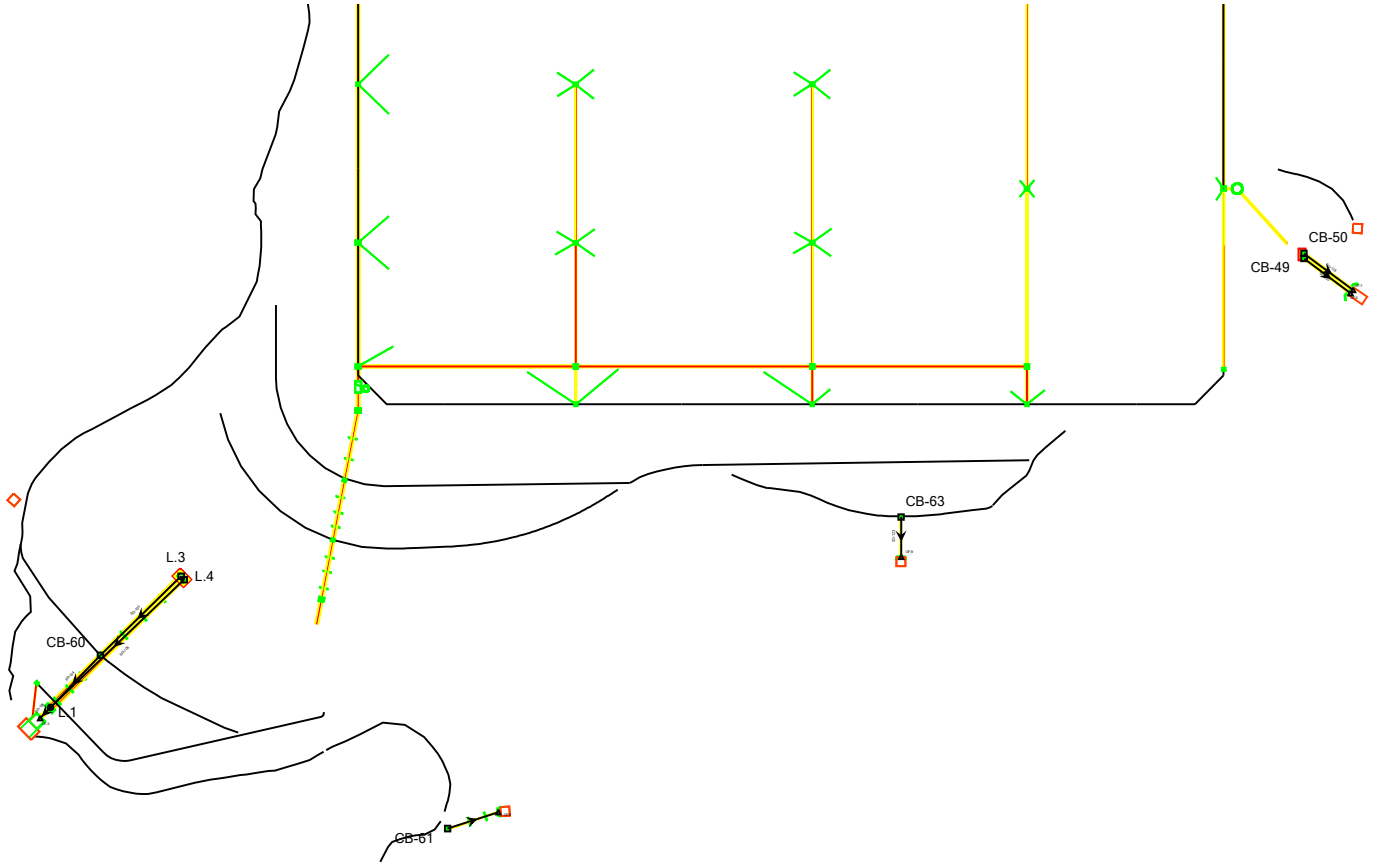
```
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       19.0  TC(MIN.) =     13.37
  PEAK FLOW RATE(CFS)   =      33.50
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

HYDRAULIC CALCULATIONS

Scenario: 100yr Basin 100



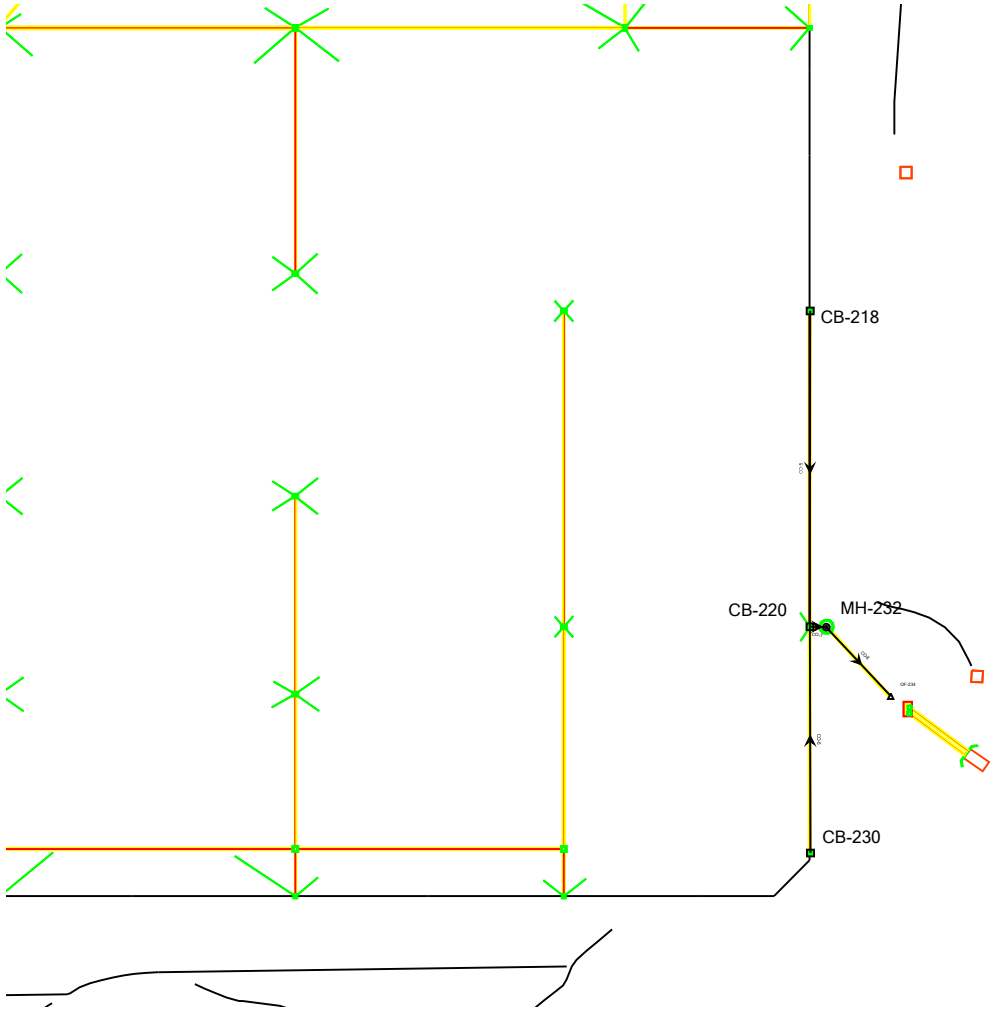
Scenario: 100yr Basin 100



FlexTable: Conduit Table (Rev Basin 100.stc)

Label	Start Node	Invert (Upstream) (ft)	Stop Node	Invert (Downstream) (ft)	Manning's n	Section Size	Diameter (in)	Flow (ft^3/s)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Cover (Start) (ft)	Cover (Stop) (ft)	Velocity (Average) (ft/s)
SD-64	CDS-199.2	3,034.55	MH-199.3	3,011.11	0.012	42 inch	42.0	58.05	104.8	0.224	3,056.30	3,017.80	3,036.94	3,016.48	18.25	3.19	35.46
SD-68	MH-199.3	3,011.11	OF-199.4	3,011.00	0.013	42 inch	42.0	58.05	22.8	0.005	3,017.80	3,011.00	3,016.20	3,016.12	3.19	-3.50	6.03
SD-57	CB-190	3,047.22	CB-191	3,046.43	0.012	18 inch	18.0	9.34	159.3	0.005	3,055.75	3,055.56	3,048.78	3,047.61	7.03	7.63	5.29
SD-56	CB-190.5	3,048.87	CB-190	3,048.08	0.012	18 inch	18.0	1.91	159.6	0.005	3,055.62	3,055.75	3,049.43	3,049.43	5.25	6.17	3.72
SD-55	CB-188	3,049.72	CB-189	3,048.90	0.012	18 inch	18.0	2.61	158.5	0.005	3,056.22	3,056.22	3,050.33	3,050.03	5.00	5.82	4.12
SD-41	CB-189	3,048.60	CB-190	3,047.50	0.012	18 inch	18.0	4.90	219.0	0.005	3,056.22	3,055.75	3,049.78	3,049.43	6.12	6.75	4.78
SD-71	CB-183.5	3,051.81	MH-183	3,051.60	0.012	18 inch	18.0	2.01	38.0	0.006	3,056.31	3,056.91	3,052.34	3,052.10	3.00	3.81	3.93
SD-94	CB-197	3,051.64	MH-198	3,051.40	0.012	18 inch	18.0	2.60	38.0	0.006	3,056.14	3,056.82	3,052.25	3,051.95	3.00	3.92	4.42
SD-43	CB-178	3,048.57	MH-179	3,047.82	0.012	36 inch	36.0	24.37	150.2	0.005	3,056.45	3,056.00	3,050.26	3,050.31	4.88	5.18	7.14
SD-47	CB-180.5	3,049.72	CB-180	3,048.70	0.012	18 inch	18.0	3.58	193.5	0.005	3,056.22	3,056.28	3,050.44	3,049.39	5.00	6.08	4.51
SD-46	MH-179	3,047.52	CB-180	3,046.28	0.012	36 inch	36.0	28.51	246.8	0.005	3,056.00	3,056.28	3,049.25	3,049.01	5.48	7.00	7.44
SD-58	CB-191	3,045.93	CB-192	3,044.87	0.012	24 inch	24.0	12.99	212.2	0.005	3,055.56	3,055.56	3,047.23	3,046.45	7.63	8.69	6.05
SD-59	CB-192	3,044.57	CB-193	3,043.53	0.012	24 inch	24.0	16.62	207.3	0.005	3,055.56	3,055.58	3,046.14	3,045.00	8.99	10.05	6.29
SD-60	CB-193	3,042.53	CB-184	3,041.76	0.012	36 inch	36.0	19.82	154.2	0.005	3,055.58	3,056.62	3,044.38	3,044.38	10.05	11.86	6.77
SD-61	MH-183	3,042.32	CB-184	3,041.22	0.012	42 inch	42.0	39.80	219.0	0.005	3,056.91	3,056.62	3,044.28	3,044.38	11.09	11.90	8.09
SD-67	CB-184	3,040.92	CDS-199.2	3,040.87	0.012	42 inch	42.0	58.05	9.0	0.006	3,056.62	3,056.30	3,043.31	3,043.16	12.20	11.93	9.18
SD-129	CB-179.5	3,052.28	MH-179	3,049.54	0.012	18 inch	18.0	2.54	27.1	0.101	3,060.58	3,056.00	3,052.88	3,050.31	6.80	4.96	11.80
SD-54	CB-182	3,043.58	MH-183	3,042.62	0.012	42 inch	42.0	37.79	193.5	0.005	3,056.60	3,056.91	3,045.49	3,044.84	9.52	10.79	7.95
SD-48	CB-180	3,045.98	CB-181	3,044.96	0.012	36 inch	36.0	33.31	205.0	0.005	3,056.28	3,056.29	3,048.10	3,047.92	7.30	8.33	7.68
SD-51	CB-181.5	3,049.73	CB-181	3,048.70	0.012	18 inch	18.0	2.96	193.5	0.005	3,056.23	3,056.29	3,050.38	3,049.32	5.00	6.09	4.30
SD-52	CB-181	3,044.66	CB-182	3,043.88	0.012	36 inch	36.0	37.39	156.5	0.005	3,056.29	3,056.60	3,046.80	3,046.64	8.63	9.72	7.88
SD-89	CB-199.1	3,051.60	MH-199	3,051.40	0.012	18 inch	18.0	3.26	38.0	0.005	3,055.82	3,056.62	3,052.29	3,052.06	2.72	3.72	4.40
SD-63	MH-199	3,048.58	CB-184	3,048.39	0.012	18 inch	18.0	5.86	38.2	0.005	3,056.62	3,056.62	3,049.53	3,049.32	6.54	6.73	4.96
SD-62	MH-198	3,050.19	MH-199	3,048.88	0.012	18 inch	18.0	2.60	260.8	0.005	3,056.82	3,056.62	3,050.80	3,049.76	5.13	6.24	4.07
SD-69	CB-51	3,003.01	MH-2	3,002.81	0.012	36 inch	36.0	24.64	41.0	0.005	3,011.00	3,017.82	3,004.61	3,004.30	4.99	12.01	7.09
SD-70	MH-2	3,000.54	MH-6	2,962.10	0.012	36 inch	36.0	24.64	151.5	0.254	3,017.82	2,970.00	3,002.14	2,964.02	14.28	4.90	29.37
SD-73	MH-6	2,962.06	OF-2	2,961.94	0.013	48	48.0	42.84	15.8	0.008	2,970.00	2,960.12	2,964.02	2,963.71	3.94	-5.82	9.02
SD-65	CB-52	3,004.00	MH-3	3,002.81	0.012	36 inch	36.0	18.20	237.8	0.005	3,010.00	3,017.75	3,005.37	3,004.19	3.00	11.94	6.62
SD-66	MH-3	3,002.51	MH-6	2,962.10	0.012	36 inch	36.0	18.20	159.2	0.254	3,017.75	2,970.00	3,003.88	2,964.02	12.24	4.90	26.83
SD-103	L.3	2,953.23	CB-60	2,917.96	0.012	36 inch	36.0	53.80	119.3	0.296	2,960.20	2,944.37	2,955.61	2,920.98	3.97	23.41	38.94
SD-104	CB-60	2,917.96	L.1	2,890.09	0.012	36 inch	36.0	54.44	80.3	0.347	2,944.37	2,899.53	2,920.36	2,893.79	23.41	6.44	41.36
SD-105	L.4	2,953.23	L.1	2,890.09	0.012	36 inch	36.0	57.47	199.6	0.316	2,960.20	2,899.53	2,955.69	2,893.79	3.97	6.44	40.65
SD-106	L.1	2,889.79	OF-3	2,889.66	0.013	48	48.0	111.91	12.8	0.010	2,899.53	2,887.90	2,892.99	2,892.63	5.74	-5.76	12.71
SD-109	CB-174	3,052.90	CB-176	3,052.25	0.012	12 inch	12.0	2.87	132.1	0.005	3,056.07	3,056.70	3,054.46	3,053.73	2.17	3.45	3.65
SD-112	CB-176	3,051.75	MH-169	3,051.40	0.012	18 inch	18.0	3.46	70.5	0.005	3,056.70	3,057.70	3,053.23	3,053.17	3.45	4.80	4.37
SD-113	CB-165	3,051.56	CB-167	3,051.16	0.012	24 inch	24.0	10.31	81.0	0.005	3,058.64	3,056.10	3,055.13	3,054.99	5.08	2.94	3.28
SD-114	CB-167	3,050.86	MH-169	3,050.53	0.012	24 inch	24.0	17.18	66.4	0.005	3,056.10	3,057.70	3,053.49	3,053.17	3.24	5.17	5.47
SD-115	CB-166	3,051.39	CB-167	3,051.16	0.012	24 inch	24.0	5.00	46.8	0.005	3,056.95	3,056.10	3,055.01	3,054.99	3.56	2.94	1.59
SD-116	CB-173	3,053.31	CB-174	3,053.20	0.012	12 inch	12.0	1.39	21.4	0.005	3,054.31	3,056.07	3,054.80	3,054.77	0.00	1.87	1.77
SD-117	MH-169	3,050.23	CB-178	3,049.57	0.012	24 inch	24.0	20.64	132.0	0.005	3,057.70	3,056.45	3,052.27	3,051.20	5.47	4.88	6.57
SD-119	CB-50	3,038.00	OF-7	3,037.59	0.012	18 inch	18.0	0.94	62.8	0.007	3,042.90	3,037.59	3,038.36	3,037.91	3.40	-1.50	3.35
SD-120	CB-49	3,037.98	OF-5	3,037.59	0.012	18 inch	18.0	3.48	59.8	0.007	3,042.90	3,037.59	3,038.69	3,038.23	3.42	-1.50	4.84
SD-110	CB-61	2,935.76	OF-8	2,928.23	0.012	12 inch	12.0	0.62	57.1	0.132	2,939.62	2,931.00	2,936.09	2,928.37	2.86	1.77	8.95
SD-123	CB-63	2,982.76	OF-9	2,982.53	0.012	12 inch	12.0	0.73	42.4	0.005	3,014.35	2,984.00	2,983.12	2,982.88	30.59	0.47	3.03
SD-30	CB-65	3,037.82	MH-38	3,012.68	0.012	18 inch	18.0	0.82	65.1	0.386	3,043.00	3,017.80	3,038.16	3,016.62	3.68	3.62	13.44
SD-30A	MH-38	3,010.14	OF-10	3,010.00	0.012	18 inch	18.0	0.82	25.5	0.005	3,017.80	3,012.00	3,016.12	3,016.12	6.16	0.50	0.46

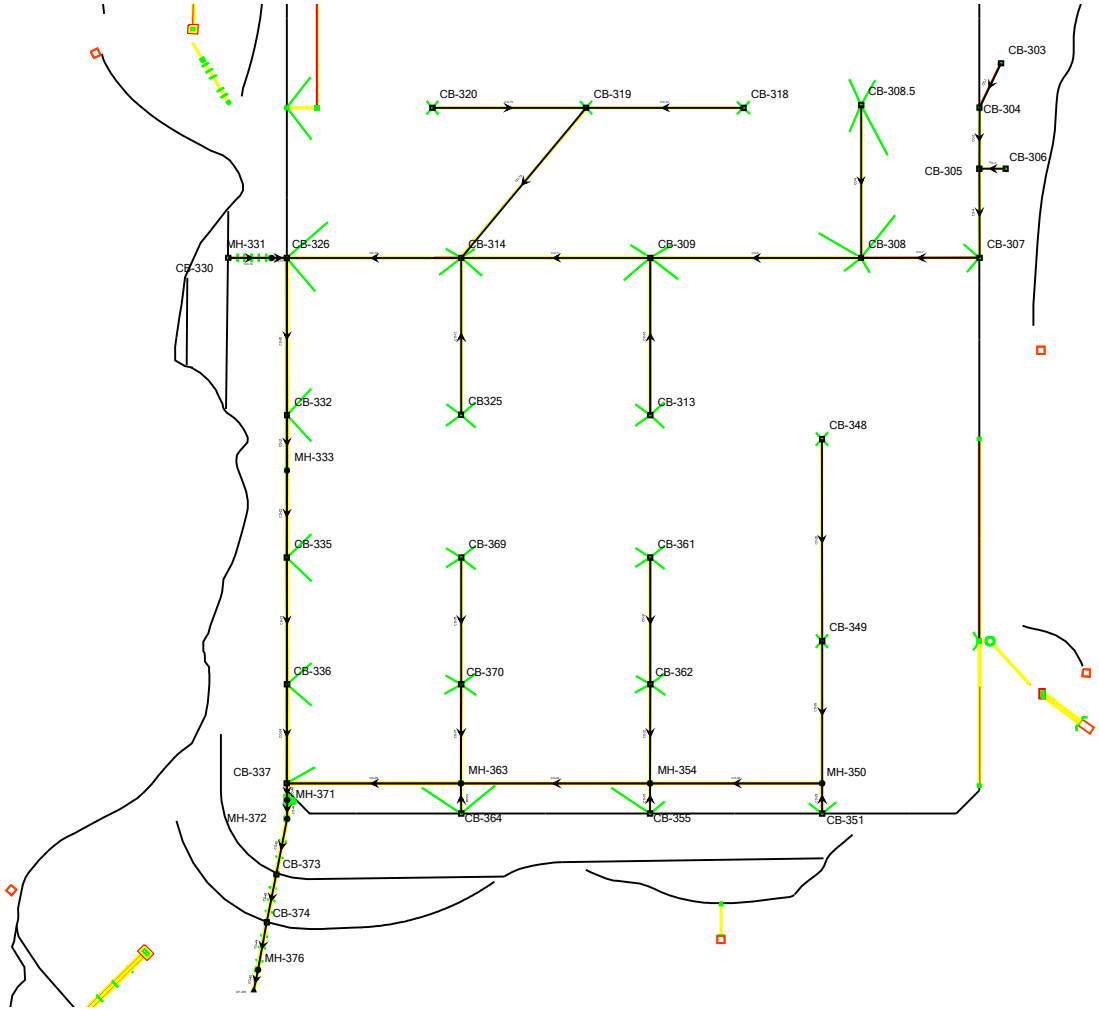
Scenario: Proposed 100-Year



FlexTable: Conduit Table (Basin200.stc)

Label	Start Node	Invert (Upstream) (ft)	Stop Node	Invert (Downstream) (ft)	Manning's n	Section Size	Diameter (in)	Flow (ft^3/s)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Cover (Start) (ft)	Cover (Stop) (ft)	Velocity (Average) (ft/s)
CO-5	CB-218	3,049.54	CB-220	3,048.17	0.012	18 inch	18.0	2.69	274.5	0.005	3,056.04	3,055.28	3,050.16	3,049.47	5.00	5.61	4.10
CO-6	CB-230	3,049.85	CB-220	3,048.88	0.012	18 inch	18.0	1.50	195.5	0.005	3,056.60	3,055.28	3,050.31	3,049.47	5.25	4.90	3.48
CO-7	CB-220	3,043.48	MH-232	3,043.44	0.013	24 inch	24.0	5.59	7.5	0.005	3,055.28	3,056.36	3,049.40	3,049.40	9.80	10.92	1.78
CO-8	MH-232	3,043.44	OF-234	3,043.00	0.013	24 inch	24.0	5.59	76.4	0.006	3,056.36	3,048.00	3,048.44	3,048.39	10.92	3.00	1.78

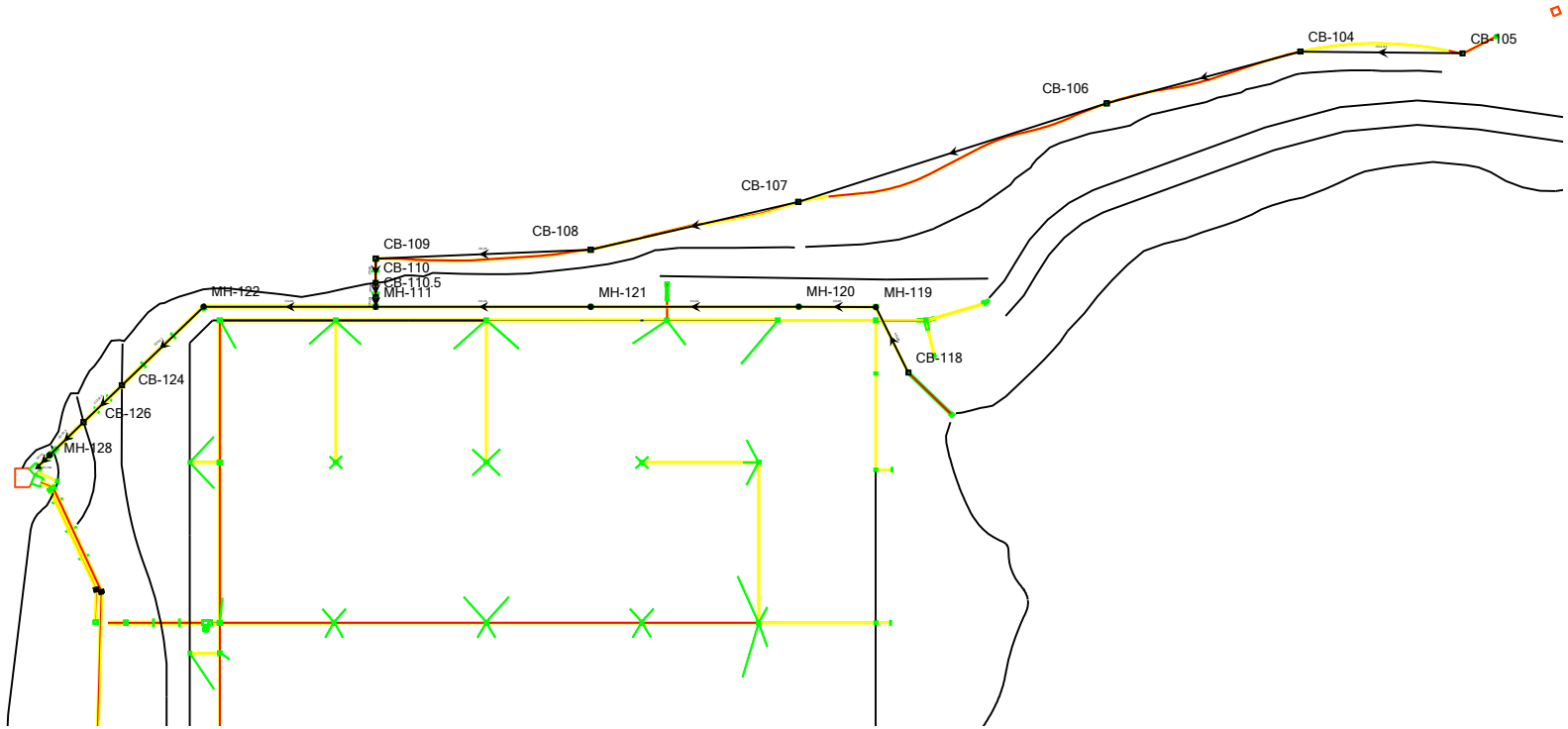
Scenario: Proposed 100-Yr



FlexTable: Conduit Table (Basin300.stc)

Label	Start Node	Invert (Upstream) (ft)	Stop Node	Invert (Downstream) (ft)	Manning's n	Section Size	Diameter (in)	Flow (ft³/s)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Cover (Start) (ft)	Cover (Stop) (ft)	Velocity (Average) (ft/s)
CO-1	CB-303	3,053.38	CB-304	3,051.31	0.012	12 inch	12.0	1.38	66.0	0.031	3,057.40	3,056.14	3,053.88	3,052.30	3.02	3.83	6.81
CO-2	CB-304	3,050.81	CB-305	3,050.40	0.012	18 inch	18.0	3.56	82.7	0.005	3,056.14	3,057.19	3,052.23	3,052.15	3.83	5.29	4.40
CO-3	CB-306	3,051.50	CB-305	3,050.40	0.012	18 inch	18.0	2.58	24.7	0.045	3,056.50	3,057.19	3,052.11	3,052.15	3.50	5.29	8.88
CO-4	CB-305	3,050.40	CB-307	3,049.79	0.012	18 inch	18.0	5.95	120.9	0.005	3,057.19	3,056.22	3,051.89	3,051.56	5.29	4.93	5.00
CO-7	CB-307	3,049.51	CB-308	3,048.71	0.012	18 inch	18.0	7.86	159.5	0.005	3,056.22	3,055.87	3,051.10	3,050.34	5.21	5.66	4.45
CO-8	CB-308.5	3,049.77	CB-308	3,048.70	0.012	18 inch	18.0	2.14	206.5	0.005	3,056.27	3,055.87	3,050.35	3,050.34	5.00	5.67	3.90
CO-9	CB-308	3,048.21	CB-309	3,046.78	0.012	24 inch	24.0	12.83	286.5	0.005	3,055.87	3,055.86	3,049.50	3,048.06	5.66	7.08	6.03
CO-10	CB-313	3,049.43	CB-309	3,048.30	0.012	18 inch	18.0	3.73	212.7	0.005	3,055.93	3,055.86	3,050.17	3,049.01	5.00	6.06	4.57
CO-11	CB-309	3,045.78	CB-314	3,044.50	0.012	36 inch	36.0	19.42	256.0	0.005	3,055.86	3,055.87	3,047.20	3,047.30	7.08	8.37	6.73
CO-12	CB325	3,049.42	CB-314	3,048.33	0.012	18 inch	18.0	3.73	212.2	0.005	3,055.92	3,055.87	3,050.16	3,049.04	5.00	6.04	4.51
CO-13	CB-319	3,048.10	CB-314	3,046.70	0.012	18 inch	18.0	9.53	265.4	0.005	3,056.07	3,055.87	3,049.84	3,047.89	6.47	7.67	5.39
CO-14	CB-318	3,049.50	CB-319	3,048.40	0.012	18 inch	18.0	3.39	211.8	0.005	3,056.06	3,056.07	3,050.68	3,050.51	5.06	6.17	4.42
CO-15	CB-320	3,049.59	CB-319	3,048.40	0.012	18 inch	18.0	3.09	207.6	0.006	3,056.09	3,056.07	3,050.63	3,050.51	5.00	6.17	4.47
CO-16	CB-314	3,044.19	CB-326	3,043.00	0.012	36 inch	36.0	34.42	235.5	0.005	3,055.87	3,056.20	3,046.46	3,046.13	8.68	10.20	7.79
CO-17	MH-331	3,050.52	CB-326	3,050.44	0.012	12 inch	12.0	1.17	17.1	0.005	3,056.65	3,056.20	3,050.99	3,050.90	5.13	4.76	3.26
CO-19	CB-330	3,085.02	MH-331	3,050.82	0.012	12 inch	12.0	1.17	56.1	0.610	3,088.94	3,056.65	3,085.48	3,050.95	2.92	4.83	18.55
CO-20	CB-326	3,042.17	CB-332	3,041.10	0.012	36 inch	36.0	36.26	214.0	0.005	3,056.20	3,056.00	3,045.52	3,044.98	11.03	11.90	5.13
CO-21	CB-332	3,041.10	MH-333	3,040.73	0.012	36 inch	36.0	37.37	73.9	0.005	3,056.00	3,057.27	3,044.77	3,044.57	11.90	13.54	5.29
CO-22	MH-333	3,040.43	CB-335	3,039.84	0.012	36 inch	36.0	37.37	117.8	0.005	3,057.27	3,056.37	3,044.35	3,044.04	13.84	13.53	5.29
CO-23	CB-335	3,039.84	CB-336	3,038.98	0.012	36 inch	36.0	38.06	172.4	0.005	3,056.37	3,056.44	3,043.81	3,043.33	13.53	14.46	5.38
CO-24	CB-336	3,038.68	CB-337	3,038.02	0.012	42 inch	42.0	38.66	132.0	0.005	3,056.44	3,056.60	3,043.21	3,043.04	14.26	15.08	4.02
CO-25	CB-348	3,049.38	CB-349	3,048.30	0.012	18 inch	18.0	4.00	274.7	0.004	3,055.88	3,055.84	3,050.21	3,049.92	5.00	6.04	4.15
CO-26	CB-349	3,048.00	MH-350	3,046.74	0.012	18 inch	18.0	7.64	191.9	0.007	3,055.84	3,056.16	3,049.78	3,048.91	6.34	7.92	4.32
CO-29	CB-351	3,052.20	MH-350	3,052.00	0.012	18 inch	18.0	1.69	37.5	0.005	3,056.18	3,056.16	3,052.69	3,052.46	2.48	2.66	3.69
CO-30	MH-350	3,046.12	MH-354	3,044.96	0.012	18 inch	18.0	9.33	232.1	0.005	3,056.16	3,056.72	3,048.52	3,046.96	8.54	10.26	5.28
CO-31	CB-361	3,049.49	CB-362	3,048.63	0.012	18 inch	18.0	3.27	171.1	0.005	3,055.99	3,056.04	3,050.18	3,049.48	5.00	5.91	4.33
CO-32	CB-362	3,048.33	MH-354	3,047.66	0.012	18 inch	18.0	5.95	132.6	0.005	3,056.04	3,056.72	3,049.29	3,048.60	6.21	7.56	5.00
CO-33	CB-355	3,051.47	MH-354	3,051.28	0.012	18 inch	18.0	2.04	37.5	0.005	3,055.97	3,056.72	3,052.01	3,051.79	3.00	3.94	3.82
CO-34	MH-354	3,044.66	MH-363	3,043.38	0.012	24 inch	24.0	17.32	256.0	0.005	3,056.72	3,056.72	3,046.42	3,045.36	10.06	11.34	6.29
CO-35	CB-369	3,049.49	CB-370	3,048.64	0.012	18 inch	18.0	3.22	171.1	0.005	3,055.99	3,056.05	3,050.17	3,049.49	5.00	5.91	4.29
CO-37	CB-370	3,048.34	MH-363	3,047.68	0.012	18 inch	18.0	5.90	132.5	0.005	3,056.05	3,056.72	3,049.30	3,048.62	6.21	7.54	4.97
CO-38	CB-364	3,051.45	MH-363	3,051.20	0.012	18 inch	18.0	2.12	37.5	0.007	3,055.95	3,056.72	3,052.00	3,051.69	3.00	4.02	4.26
CO-39	MH-363	3,043.08	CB-337	3,041.20	0.012	36 inch	36.0	25.34	235.0	0.008	3,056.72	3,056.60	3,044.70	3,043.04	10.64	12.40	8.59
CO-40	CB-337	3,037.72	MH-371	3,037.64	0.012	42 inch	42.0	61.72	14.5	0.006	3,056.60	3,056.70	3,042.08	3,042.03	15.38	15.56	6.42
CO-41	MH-371	3,037.64	MH-372	3,037.55	0.012	42 inch	42.0	61.72	18.0	0.005	3,056.70	3,056.80	3,040.41	3,040.39	15.56	15.75	8.89
CO-42	MH-372	3,037.25	CB-373	3,009.48	0.012	42 inch	42.0	61.72	78.5	0.354	3,056.80	3,024.56	3,039.71	3,012.52	16.05	11.58	42.46
CO-43	CB-373	3,009.48	CB-374	2,985.80	0.012	42 inch	42.0	62.28	67.0	0.354	3,024.56	2,997.00	3,011.95	2,988.91	11.58	7.70	42.57
CO-44	CB-374	2,985.80	MH-376	2,962.04	0.012	42 inch	42.0	64.48	64.4	0.369	2,997.00	2,967.92	2,988.32	2,966.04	7.70	2.38	43.65
CO-45	MH-376	2,961.03	OF-378	2,959.80	0.013	48 inch	48.0	64.48	29.7	0.041	2,967.92	2,965.90	2,965.84	2,965.78	2.89	2.10	5.13

Scenario: 100-Year



FlexTable: Conduit Table (Rev Offsite Storm Drain.stc)

Label	Start Node	Invert (Upstream) (ft)	Stop Node	Invert (Downstream) (ft)	Manning's n	Section Size	Diameter (in)	Flow (ft³/s)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Elevation Ground (Start) (ft)	Elevation Ground (Stop) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Cover (Start) (ft)	Cover (Stop) (ft)	Velocity (Average) (ft/s)
CO-32	MH-119	3,047.02	MH-120	3,046.50	0.012	24 inch	24.0	17.52	103.2	0.005	3,057.64	3,057.34	3,048.68	3,048.17	8.62	8.84	6.31
CO-42	MH-120	3,046.20	MH-121	3,044.78	0.012	24 inch	24.0	17.52	284.6	0.005	3,057.34	3,057.64	3,047.86	3,046.44	9.14	10.86	6.28
CO-45	MH-121	3,044.48	MH-111	3,043.00	0.012	24 inch	24.0	17.52	294.5	0.005	3,057.64	3,057.50	3,046.14	3,044.65	11.16	12.50	6.30
CO-50	MH-111	3,041.50	MH-122	3,040.33	0.012	42 inch	42.0	58.31	235.0	0.005	3,057.50	3,057.41	3,043.89	3,043.07	12.50	13.58	8.79
CO-53.1	MH-122	3,040.03	CB-124	2,998.01	0.012	42 inch	42.0	58.31	155.7	0.270	3,057.41	3,024.68	3,042.42	3,000.94	13.88	23.17	37.96
CO-53.2	CB-124	2,998.01	CB-126	2,978.32	0.012	42 inch	42.0	58.31	73.0	0.270	3,024.68	2,990.78	3,000.40	2,981.25	23.17	8.96	37.96
CO-53.3	CB-126	2,978.32	MH-128	2,962.19	0.012	42 inch	42.0	58.31	63.8	0.253	2,990.78	2,970.00	2,980.71	2,965.05	8.96	4.31	37.09
CO-72	MH-128	2,962.12	OF-130	2,961.93	0.013	42 inch	42.0	58.31	19.0	0.010	2,970.00	2,960.19	2,964.51	2,964.06	4.38	-5.24	10.83
CO-2 & 3	CB-105	3,142.71	CB-104	3,140.48	0.012	18 inch	18.0	0.79	223.5	0.010	3,151.00	3,146.24	3,143.04	3,141.66	6.79	4.26	3.70
CO-4, 5, 6 & 7	CB-104	3,140.33	CB-106	3,127.96	0.012	18 inch	18.0	7.73	276.0	0.045	3,146.24	3,135.38	3,141.41	3,129.63	4.41	5.92	12.14
CO-8-15	CB-106	3,127.66	CB-107	3,108.92	0.012	18 inch	18.0	14.75	449.4	0.042	3,135.38	3,114.38	3,129.06	3,109.79	6.22	3.96	13.92
CO-22	CB-107	3,107.98	CB-108	3,091.29	0.012	24 inch	24.0	24.48	292.0	0.057	3,114.38	3,098.87	3,109.73	3,093.79	4.40	5.58	17.81
CO-23	CB-108	3,090.99	CB-109	3,075.41	0.012	24 inch	24.0	33.07	295.5	0.053	3,098.87	3,082.68	3,092.89	3,080.66	5.88	5.27	18.63
CO-25	CB-118	3,048.38	MH-119	3,047.32	0.012	24 inch	24.0	17.52	95.4	0.011	3,058.23	3,057.64	3,049.89	3,049.05	7.85	8.32	8.84
CO-26	CB-109	3,075.11	CB-110	3,059.45	0.012	24 inch	24.0	38.76	30.3	0.516	3,082.68	3,073.27	3,077.06	3,061.90	5.57	11.82	44.96
CO-28	CB-110	3,059.45	CB-110.5	3,050.09	0.012	24 inch	24.0	40.45	21.0	0.445	3,073.27	3,060.00	3,061.40	3,052.55	11.82	7.91	43.13
CO-29	CB-110.5	3,050.09	MH-111	3,045.00	0.012	24 inch	24.0	40.79	12.1	0.422	3,060.00	3,057.50	3,052.05	3,046.11	7.91	10.50	42.43

Culvert Calculator Report
SD01-Public (12+59.60)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,228.24	ft	Headwater Depth/Height	1.24	
Computed Headwater Elev	3,228.23	ft	Discharge	16.32	cfs
Inlet Control HW Elev.	3,228.09	ft	Tailwater Elevation	3,222.44	ft
Outlet Control HW Elev.	3,228.23	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	3,225.74	ft	Downstream Invert	3,221.94	ft
Length	56.43	ft	Constructed Slope	0.067340	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	0.76	ft
Slope Type	Steep		Normal Depth	0.69	ft
Flow Regime	Supercritical		Critical Depth	1.46	ft
Velocity Downstream	14.95	ft/s	Critical Slope	0.005721	ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.012
Section Material	HDPE (Smooth Interior)	Span	2.00 ft
Section Size	24 inch	Rise	2.00 ft
Number Sections	1		

Outlet Control Properties					
Outlet Control HW Elev.	3,228.23	ft	Upstream Velocity Head	0.69	ft
Ke	0.50		Entrance Loss	0.34	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,228.09	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	3.1	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD01 (31+32.45)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,146.53	ft	Headwater Depth/Height	1.21	
Computed Headwater Elev	3,146.14	ft	Discharge	15.58	cfs
Inlet Control HW Elev.	3,145.99	ft	Tailwater Elevation	3,141.28	ft
Outlet Control HW Elev.	3,146.14	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	3,143.73	ft	Downstream Invert	3,140.78	ft
Length	44.92	ft	Constructed Slope	0.065672	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	0.77	ft
Slope Type	Steep		Normal Depth	0.68	ft
Flow Regime	Supercritical		Critical Depth	1.42	ft
Velocity Downstream	14.06	ft/s	Critical Slope	0.005527	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	HDPE (Smooth Interior)		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	3,146.14	ft	Upstream Velocity Head	0.66	ft
Ke	0.50		Entrance Loss	0.33	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,145.99	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	3.1	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD02-Public (17+60)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,189.36	ft	Headwater Depth/Height	1.12	
Computed Headwater Elev	3,189.36	ft	Discharge	24.40	cfs
Inlet Control HW Elev.	3,189.21	ft	Tailwater Elevation	3,186.59	ft
Outlet Control HW Elev.	3,189.36	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	3,186.55	ft	Downstream Invert	3,186.09	ft
Length	35.73	ft	Constructed Slope	0.012874	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.35	ft
Slope Type	Steep		Normal Depth	1.23	ft
Flow Regime	Supercritical		Critical Depth	1.68	ft
Velocity Downstream	9.02	ft/s	Critical Slope	0.004777	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	HDPE (Smooth Interior)		Span	2.50	ft
Section Size	30 inch		Rise	2.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	3,189.36	ft	Upstream Velocity Head	0.75	ft
Ke	0.50		Entrance Loss	0.37	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,189.21	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	4.9	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD02 (33+37.23)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,148.91	ft	Headwater Depth/Height	0.69	
Computed Headwater Elev	3,146.97	ft	Discharge	3.01	cfs
Inlet Control HW Elev.	3,146.81	ft	Tailwater Elevation	3,143.25	ft
Outlet Control HW Elev.	3,146.97	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	3,145.93	ft	Downstream Invert	3,142.75	ft
Length	43.34	ft	Constructed Slope	0.073373	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	0.32	ft
Slope Type	Steep		Normal Depth	0.32	ft
Flow Regime	Supercritical		Critical Depth	0.66	ft
Velocity Downstream	10.91	ft/s	Critical Slope	0.004369	ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.012
Section Material	HDPE (Smooth Interior)	Span	1.50 ft
Section Size	18 inch	Rise	1.50 ft
Number Sections	1		

Outlet Control Properties					
Outlet Control HW Elev.	3,146.97	ft	Upstream Velocity Head	0.25	ft
Ke	0.50		Entrance Loss	0.13	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,146.81	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	1.8	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD03 (38+01.54)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,125.58	ft	Headwater Depth/Height	1.48	
Computed Headwater Elev	3,125.46	ft	Discharge	36.14	cfs
Inlet Control HW Elev.	3,125.46	ft	Tailwater Elevation	3,122.25	ft
Outlet Control HW Elev.	3,125.45	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	3,121.75	ft	Downstream Invert	3,117.30	ft
Length	45.50	ft	Constructed Slope	0.097802	ft/ft

Hydraulic Profile					
Profile	CompositePressureProfileS1S2		Depth, Downstream	1.06	ft
Slope Type	N/A		Normal Depth	0.87	ft
Flow Regime	N/A		Critical Depth	2.04	ft
Velocity Downstream	18.30	ft/s	Critical Slope	0.006676	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	HDPE (Smooth Interior)		Span	2.50	ft
Section Size	30 inch		Rise	2.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	3,125.45	ft	Upstream Velocity Head	1.10	ft
Ke	0.50		Entrance Loss	0.55	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,125.46	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	4.9	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD04 (40+34.69)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,125.10	ft	Headwater Depth/Height	1.58	
Computed Headwater Elev	3,124.19	ft	Discharge	42.77	cfs
Inlet Control HW Elev.	3,124.19	ft	Tailwater Elevation	3,120.63	ft
Outlet Control HW Elev.	3,124.06	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	3,121.03	ft	Downstream Invert	3,120.13	ft
Length	44.94	ft	Constructed Slope	0.020027	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.25	ft
Slope Type	Steep		Normal Depth	1.14	ft
Flow Regime	Supercritical		Critical Depth	1.66	ft
Velocity Downstream	10.39	ft/s	Critical Slope	0.007488	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	HDPE (Smooth Interior)		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	3,124.06	ft	Upstream Velocity Head	0.92	ft
Ke	0.50		Entrance Loss	0.46	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,124.19	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	6.3	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD05

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,076.90	ft	Headwater Depth/Height	1.63	
Computed Headwater Elev	3,076.90	ft	Discharge	10.82	cfs
Inlet Control HW Elev.	3,076.90	ft	Tailwater Elevation	3,073.92	ft
Outlet Control HW Elev.	3,076.80	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	3,074.45	ft	Downstream Invert	3,071.92	ft
Length	38.05	ft	Constructed Slope	0.066491	ft/ft

Hydraulic Profile					
Profile	CompositePressureProfileS1S2		Depth, Downstream	0.71	ft
Slope Type	N/A		Normal Depth	0.63	ft
Flow Regime	N/A		Critical Depth	1.26	ft
Velocity Downstream	13.16	ft/s	Critical Slope	0.008656	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	HDPE (Smooth Interior)		Span	1.50	ft
Section Size	18 inch		Rise	1.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	3,076.80	ft	Upstream Velocity Head	0.72	ft
Ke	0.50		Entrance Loss	0.36	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,076.90	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	1.8	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD06 (56+21.82)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,055.82	ft	Headwater Depth/Height	1.40	
Computed Headwater Elev	3,055.54	ft	Discharge	33.67	cfs
Inlet Control HW Elev.	3,055.49	ft	Tailwater Elevation	3,048.80	ft
Outlet Control HW Elev.	3,055.54	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	3,052.04	ft	Downstream Invert	3,048.30	ft
Length	47.80	ft	Constructed Slope	0.078243	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.06	ft
Slope Type	Steep		Normal Depth	0.89	ft
Flow Regime	Supercritical		Critical Depth	1.97	ft
Velocity Downstream	16.93	ft/s	Critical Slope	0.006171	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	HDPE (Smooth Interior)		Span	2.50	ft
Section Size	30 inch		Rise	2.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	3,055.54	ft	Upstream Velocity Head	1.02	ft
Ke	0.50		Entrance Loss	0.51	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,055.49	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	4.9	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD07 (59+66.37)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,078.66	ft	Headwater Depth/Height	1.46	
Computed Headwater Elev	3,078.17	ft	Discharge	9.94	cfs
Inlet Control HW Elev.	3,078.16	ft	Tailwater Elevation	3,072.10	ft
Outlet Control HW Elev.	3,078.17	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	3,075.98	ft	Downstream Invert	3,071.60	ft
Length	40.30	ft	Constructed Slope	0.108685	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	0.58	ft
Slope Type	Steep		Normal Depth	0.53	ft
Flow Regime	Supercritical		Critical Depth	1.22	ft
Velocity Downstream	15.65	ft/s	Critical Slope	0.007789	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	HDPE (Smooth Interior)		Span	1.50	ft
Section Size	18 inch		Rise	1.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	3,078.17	ft	Upstream Velocity Head	0.65	ft
Ke	0.50		Entrance Loss	0.33	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,078.16	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	1.8	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD08 (70+82.70)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,071.37	ft	Headwater Depth/Height	1.16	
Computed Headwater Elev	3,070.13	ft	Discharge	14.71	cfs
Inlet Control HW Elev.	3,070.00	ft	Tailwater Elevation	3,067.06	ft
Outlet Control HW Elev.	3,070.13	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	3,067.81	ft	Downstream Invert	3,066.56	ft
Length	38.54	ft	Constructed Slope	0.032434	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	0.90	ft
Slope Type	Steep		Normal Depth	0.80	ft
Flow Regime	Supercritical		Critical Depth	1.38	ft
Velocity Downstream	10.74	ft/s	Critical Slope	0.005315	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	HDPE (Smooth Interior)		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	3,070.13	ft	Upstream Velocity Head	0.63	ft
Ke	0.50		Entrance Loss	0.31	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,070.00	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	3.1	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD09 (73+01.11)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,067.18	ft	Headwater Depth/Height	1.29	
Computed Headwater Elev	3,066.86	ft	Discharge	139.02	cfs
Inlet Control HW Elev.	3,066.69	ft	Tailwater Elevation	3,061.57	ft
Outlet Control HW Elev.	3,066.86	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	3,062.35	ft	Downstream Invert	3,060.21	ft
Length	42.00	ft	Constructed Slope	0.050952	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.65	ft
Slope Type	Steep		Normal Depth	1.27	ft
Flow Regime	Supercritical		Critical Depth	2.61	ft
Velocity Downstream	15.63	ft/s	Critical Slope	0.004944	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	HDPE (Smooth Interior)		Span	3.50	ft
Section Size	42 inch		Rise	3.50	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	3,066.86	ft	Upstream Velocity Head	1.27	ft
Ke	0.50		Entrance Loss	0.63	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,066.69	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	19.2	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD10 (79+71.02)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,094.50	ft	Headwater Depth/Height	0.45	
Computed Headwater Elev	3,091.98	ft	Discharge	1.38	cfs
Inlet Control HW Elev.	3,091.87	ft	Tailwater Elevation	309.45	ft
Outlet Control HW Elev.	3,091.98	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	3,091.30	ft	Downstream Invert	3,088.95	ft
Length	44.90	ft	Constructed Slope	0.052339	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	0.23	ft
Slope Type	Steep		Normal Depth	0.23	ft
Flow Regime	Supercritical		Critical Depth	0.44	ft
Velocity Downstream	7.81	ft/s	Critical Slope	0.004180	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	HDPE (Smooth Interior)		Span	1.50	ft
Section Size	18 inch		Rise	1.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	3,091.98	ft	Upstream Velocity Head	0.16	ft
Ke	0.50		Entrance Loss	0.08	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,091.87	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	1.8	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD11 (83+06.52)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,084.33	ft	Headwater Depth/Height	1.23	
Computed Headwater Elev	3,083.23	ft	Discharge	16.02	cfs
Inlet Control HW Elev.	3,083.11	ft	Tailwater Elevation	3,079.68	ft
Outlet Control HW Elev.	3,083.23	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	3,080.77	ft	Downstream Invert	3,079.18	ft
Length	41.00	ft	Constructed Slope	0.038780	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	0.90	ft
Slope Type	Steep		Normal Depth	0.79	ft
Flow Regime	Supercritical		Critical Depth	1.44	ft
Velocity Downstream	11.66	ft/s	Critical Slope	0.005641	ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.012
Section Material	HDPE (Smooth Interior)	Span	2.00 ft
Section Size	24 inch	Rise	2.00 ft
Number Sections	1		

Outlet Control Properties					
Outlet Control HW Elev.	3,083.23	ft	Upstream Velocity Head	0.68	ft
Ke	0.50		Entrance Loss	0.34	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,083.11	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	3.1	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD12 (86+18.61)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,067.78	ft	Headwater Depth/Height	1.77	
Computed Headwater Elev	3,067.78	ft	Discharge	23.58	cfs
Inlet Control HW Elev.	3,067.78	ft	Tailwater Elevation	3,061.67	ft
Outlet Control HW Elev.	3,067.54	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	3,064.25	ft	Downstream Invert	3,061.17	ft
Length	60.40	ft	Constructed Slope	0.050993	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.02	ft
Slope Type	Steep		Normal Depth	0.91	ft
Flow Regime	Supercritical		Critical Depth	1.72	ft
Velocity Downstream	14.71	ft/s	Critical Slope	0.008551	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	HDPE (Smooth Interior)		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	3,067.54	ft	Upstream Velocity Head	1.04	ft
Ke	0.50		Entrance Loss	0.52	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,067.78	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	3.1	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD13 (89+63.56)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,055.89	ft	Headwater Depth/Height	1.66	
Computed Headwater Elev	3,055.43	ft	Discharge	11.04	cfs
Inlet Control HW Elev.	3,055.43	ft	Tailwater Elevation	3,051.33	ft
Outlet Control HW Elev.	3,055.32	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	3,052.94	ft	Downstream Invert	3,049.13	ft
Length	45.00	ft	Constructed Slope	0.084667	ft/ft

Hydraulic Profile					
Profile	CompositePressureProfileS1S2		Depth, Downstream	0.66	ft
Slope Type	N/A		Normal Depth	0.60	ft
Flow Regime	N/A		Critical Depth	1.27	ft
Velocity Downstream	14.85	ft/s	Critical Slope	0.008895	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	HDPE (Smooth Interior)		Span	1.50	ft
Section Size	18 inch		Rise	1.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	3,055.32	ft	Upstream Velocity Head	0.74	ft
Ke	0.50		Entrance Loss	0.37	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,055.43	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	1.8	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD14 (95+06.72)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,073.91	ft	Headwater Depth/Height	1.57	
Computed Headwater Elev	3,073.67	ft	Discharge	21.39	cfs
Inlet Control HW Elev.	3,073.67	ft	Tailwater Elevation	3,068.73	ft
Outlet Control HW Elev.	3,073.58	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	3,070.54	ft	Downstream Invert	3,068.23	ft
Length	43.70	ft	Constructed Slope	0.052860	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	0.99	ft
Slope Type	Steep		Normal Depth	0.85	ft
Flow Regime	Supercritical		Critical Depth	1.66	ft
Velocity Downstream	13.79	ft/s	Critical Slope	0.007490	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	HDPE (Smooth Interior)		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	3,073.58	ft	Upstream Velocity Head	0.92	ft
Ke	0.50		Entrance Loss	0.46	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,073.67	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	3.1	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD15 (101+17.00)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,083.96	ft	Headwater Depth/Height	0.88	
Computed Headwater Elev	3,082.39	ft	Discharge	4.54	cfs
Inlet Control HW Elev.	3,082.26	ft	Tailwater Elevation	3,079.60	ft
Outlet Control HW Elev.	3,082.39	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	3,081.08	ft	Downstream Invert	3,079.10	ft
Length	40.10	ft	Constructed Slope	0.049377	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	0.45	ft
Slope Type	Steep		Normal Depth	0.43	ft
Flow Regime	Supercritical		Critical Depth	0.82	ft
Velocity Downstream	10.13	ft/s	Critical Slope	0.004771	ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.012
Section Material	HDPE (Smooth Interior)	Span	1.50 ft
Section Size	18 inch	Rise	1.50 ft
Number Sections	1		

Outlet Control Properties					
Outlet Control HW Elev.	3,082.39	ft	Upstream Velocity Head	0.33	ft
Ke	0.50		Entrance Loss	0.16	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,082.26	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	1.8	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD16 (103+20.95)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,082.06	ft	Headwater Depth/Height	0.68	
Computed Headwater Elev	3,080.22	ft	Discharge	2.92	cfs
Inlet Control HW Elev.	3,080.09	ft	Tailwater Elevation	3,076.98	ft
Outlet Control HW Elev.	3,080.22	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	3,079.20	ft	Downstream Invert	3,077.00	ft
Length	43.97	ft	Constructed Slope	0.050034	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	0.35	ft
Slope Type	Steep		Normal Depth	0.34	ft
Flow Regime	Supercritical		Critical Depth	0.65	ft
Velocity Downstream	9.41	ft/s	Critical Slope	0.004361	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	HDPE (Smooth Interior)		Span	1.50	ft
Section Size	18 inch		Rise	1.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	3,080.22	ft	Upstream Velocity Head	0.25	ft
Ke	0.50		Entrance Loss	0.12	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,080.09	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	1.8	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD17 (107+36.02)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,069.12	ft	Headwater Depth/Height	1.15	
Computed Headwater Elev	3,068.20	ft	Discharge	25.27	cfs
Inlet Control HW Elev.	3,068.01	ft	Tailwater Elevation	3,063.75	ft
Outlet Control HW Elev.	3,068.20	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	3,065.33	ft	Downstream Invert	3,062.81	ft
Length	46.70	ft	Constructed Slope	0.053961	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	0.98	ft
Slope Type	Steep		Normal Depth	0.84	ft
Flow Regime	Supercritical		Critical Depth	1.71	ft
Velocity Downstream	14.13	ft/s	Critical Slope	0.004882	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	HDPE (Smooth Interior)		Span	2.50	ft
Section Size	30 inch		Rise	2.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	3,068.20	ft	Upstream Velocity Head	0.77	ft
Ke	0.50		Entrance Loss	0.39	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,068.01	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	4.9	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
SD20 (123+23.61)

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,083.14	ft	Headwater Depth/Height	3.02	
Computed Headwater Elev	3,083.13	ft	Discharge	16.88	cfs
Inlet Control HW Elev.	3,083.13	ft	Tailwater Elevation	3,071.80	ft
Outlet Control HW Elev.	3,082.23	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	3,078.60	ft	Downstream Invert	3,071.30	ft
Length	52.64	ft	Constructed Slope	0.138678	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	0.73	ft
Slope Type	Steep		Normal Depth	0.66	ft
Flow Regime	Supercritical		Critical Depth	1.44	ft
Velocity Downstream	19.90	ft/s	Critical Slope	0.019150	ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.012
Section Material	HDPE (Smooth Interior)	Span	1.50 ft
Section Size	18 inch	Rise	1.50 ft
Number Sections	1		

Outlet Control Properties					
Outlet Control HW Elev.	3,082.23	ft	Upstream Velocity Head	1.46	ft
Ke	0.50		Entrance Loss	0.73	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,083.13	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	1.8	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

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BASIN 100

RUN DATE 11/9/2009
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 10 MIN.
6 HOUR RAINFALL 3.6 INCHES
BASIN AREA 22.5 ACRES
RUNOFF COEFFICIENT 0.52
PEAK DISCHARGE 71.27 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 10	DISCHARGE (CFS) = 2.5
TIME (MIN) = 20	DISCHARGE (CFS) = 2.6
TIME (MIN) = 30	DISCHARGE (CFS) = 2.7
TIME (MIN) = 40	DISCHARGE (CFS) = 2.7
TIME (MIN) = 50	DISCHARGE (CFS) = 2.8
TIME (MIN) = 60	DISCHARGE (CFS) = 2.9
TIME (MIN) = 70	DISCHARGE (CFS) = 3
TIME (MIN) = 80	DISCHARGE (CFS) = 3.1
TIME (MIN) = 90	DISCHARGE (CFS) = 3.3
TIME (MIN) = 100	DISCHARGE (CFS) = 3.4
TIME (MIN) = 110	DISCHARGE (CFS) = 3.6
TIME (MIN) = 120	DISCHARGE (CFS) = 3.7
TIME (MIN) = 130	DISCHARGE (CFS) = 4
TIME (MIN) = 140	DISCHARGE (CFS) = 4.1
TIME (MIN) = 150	DISCHARGE (CFS) = 4.5
TIME (MIN) = 160	DISCHARGE (CFS) = 4.7
TIME (MIN) = 170	DISCHARGE (CFS) = 5.2
TIME (MIN) = 180	DISCHARGE (CFS) = 5.5
TIME (MIN) = 190	DISCHARGE (CFS) = 6.3
TIME (MIN) = 200	DISCHARGE (CFS) = 6.9
TIME (MIN) = 210	DISCHARGE (CFS) = 8.4
TIME (MIN) = 220	DISCHARGE (CFS) = 9.6
TIME (MIN) = 230	DISCHARGE (CFS) = 14.1
TIME (MIN) = 240	DISCHARGE (CFS) = 19.5
TIME (MIN) = 250	DISCHARGE (CFS) = 71.27
TIME (MIN) = 260	DISCHARGE (CFS) = 11.3
TIME (MIN) = 270	DISCHARGE (CFS) = 7.5
TIME (MIN) = 280	DISCHARGE (CFS) = 5.9
TIME (MIN) = 290	DISCHARGE (CFS) = 4.9
TIME (MIN) = 300	DISCHARGE (CFS) = 4.3
TIME (MIN) = 310	DISCHARGE (CFS) = 3.8
TIME (MIN) = 320	DISCHARGE (CFS) = 3.5
TIME (MIN) = 330	DISCHARGE (CFS) = 3.2
TIME (MIN) = 340	DISCHARGE (CFS) = 3
TIME (MIN) = 350	DISCHARGE (CFS) = 2.8
TIME (MIN) = 360	DISCHARGE (CFS) = 2.6
TIME (MIN) = 370	DISCHARGE (CFS) = 0

DETENTION BASIN 100

5x4 (Top of Pipe Elev.: 3015.5')								
	Perforations		Top of Riser					
Elevation (ft)	Delta Elevation (ft)	Q (cfs)	Delta Elevation (ft)	H/R	Cscw	Q_{weir} (cfs)	$Q_{orifice}$ (cfs)	Q (cfs) 50% Debris Blockage
3010	0.0	0.00	-5.5	N/A	N/A	0.00	0.00	0.00
3010.5	0.5	0.67	-5.0	N/A	N/A	0.00	0.00	0.33
3011	1.0	0.95	-4.5	N/A	N/A	0.00	0.00	0.47
3011.5	1.5	1.16	-4.0	N/A	N/A	0.00	0.00	0.58
3012	2.0	2.01	-3.5	N/A	N/A	0.00	0.00	1.00
3012.5	2.5	2.44	-3.0	N/A	N/A	0.00	0.00	1.22
3013	3.0	3.46	-2.5	N/A	N/A	0.00	0.00	1.73
3013.5	3.5	4.05	-2.0	N/A	N/A	0.00	0.00	2.03
3014	4.0	4.54	-1.5	N/A	N/A	0.00	0.00	2.27
3014.5	4.5	4.98	-1.0	N/A	N/A	0.00	0.00	2.49
3015	5.0	5.38	-0.5	N/A	N/A	0.00	0.00	2.69
3015.5	5.5	5.75	0.0	N/A	N/A	0.00	0.00	2.87
3016	6.0	6.09	0.5	N/A	3.31	21.04	68.09	13.57
3016.5	6.5	6.42	1.0	N/A	3.34	60.17	96.30	33.29
3017	7.0	6.72	1.5	N/A	3.38	111.74	117.94	59.23
3017.5	7.5	7.02	2.0	N/A	3.42	173.89	136.19	71.60
3018	8.0	7.30	2.5	N/A	3.45	245.60	152.26	79.78

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method
Hydrograph File Import Option Used For 1 node(s)

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
100-YEAR	HYG	100	3.487		4.1667	71.27		
DET.BASIN 100IN	POND	100	3.487		4.1700	70.07		
DET.BASIN 100OUT	POND	100	3.221	R	4.3100	18.20	3016.12	2.340
*OUT 20	JCT	100	3.221	R	4.3100	18.20		

Culvert Calculator Report
Basin 100

Solve For: Headwater Elevation

3006.15 < 3016.12'
OK ✓

Culvert Summary					
Allowable HW Elevation	3,016.12	ft	Headwater Depth/Height	0.72	
Computed Headwater Elev	3,006.15	ft	Discharge	18.20	cfs
Inlet Control HW Elev.	3,005.95	ft	Tailwater Elevation	3,004.31	ft
Outlet Control HW Elev.	3,006.15	ft	Control Type	Entrance Control	

Grades					
Upstream Invert	3,004.00	ft	Downstream Invert	3,002.81	ft
Length	237.84	ft	Constructed Slope	0.005003	ft/ft

Hydraulic Profile					
Profile	CompositeS1S2		Depth, Downstream	1.50	ft
Slope Type	Steep		Normal Depth	1.24	ft
Flow Regime	N/A		Critical Depth	1.37	ft
Velocity Downstream	5.15	ft/s	Critical Slope	0.003505	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Concrete		Span	3.00	ft
Section Size	36 inch		Rise	3.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	3,006.15	ft	Upstream Velocity Head	0.52	ft
Ke	0.50		Entrance Loss	0.26	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,005.95	ft	Flow Control	Unsubmerged	
Inlet Type	Square edge w/headwall		Area Full	7.1	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

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BASIN 200

RUN DATE 11/10/2009
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 12 MIN.
6 HOUR RAINFALL 3.6 INCHES
BASIN AREA 2.7 ACRES
RUNOFF COEFFICIENT 0.44
PEAK DISCHARGE 6.37 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 12	DISCHARGE (CFS) = 0.3
TIME (MIN) = 24	DISCHARGE (CFS) = 0.3
TIME (MIN) = 36	DISCHARGE (CFS) = 0.3
TIME (MIN) = 48	DISCHARGE (CFS) = 0.3
TIME (MIN) = 60	DISCHARGE (CFS) = 0.3
TIME (MIN) = 72	DISCHARGE (CFS) = 0.3
TIME (MIN) = 84	DISCHARGE (CFS) = 0.3
TIME (MIN) = 96	DISCHARGE (CFS) = 0.3
TIME (MIN) = 108	DISCHARGE (CFS) = 0.4
TIME (MIN) = 120	DISCHARGE (CFS) = 0.4
TIME (MIN) = 132	DISCHARGE (CFS) = 0.4
TIME (MIN) = 144	DISCHARGE (CFS) = 0.4
TIME (MIN) = 156	DISCHARGE (CFS) = 0.5
TIME (MIN) = 168	DISCHARGE (CFS) = 0.5
TIME (MIN) = 180	DISCHARGE (CFS) = 0.6
TIME (MIN) = 192	DISCHARGE (CFS) = 0.6
TIME (MIN) = 204	DISCHARGE (CFS) = 0.8
TIME (MIN) = 216	DISCHARGE (CFS) = 0.9
TIME (MIN) = 228	DISCHARGE (CFS) = 1.3
TIME (MIN) = 240	DISCHARGE (CFS) = 1.8
TIME (MIN) = 252	DISCHARGE (CFS) = 6.37
TIME (MIN) = 264	DISCHARGE (CFS) = 1
TIME (MIN) = 276	DISCHARGE (CFS) = 0.7
TIME (MIN) = 288	DISCHARGE (CFS) = 0.5
TIME (MIN) = 300	DISCHARGE (CFS) = 0.4
TIME (MIN) = 312	DISCHARGE (CFS) = 0.4
TIME (MIN) = 324	DISCHARGE (CFS) = 0.3
TIME (MIN) = 336	DISCHARGE (CFS) = 0.3
TIME (MIN) = 348	DISCHARGE (CFS) = 0.3
TIME (MIN) = 360	DISCHARGE (CFS) = 0.3
TIME (MIN) = 372	DISCHARGE (CFS) = 0

DETENTION BASIN 200							
24" Riser (Top of Pipe Elev.: 3048.40')							
	Perforations		Top of Riser				
Elevation (ft)	Delta Elevation (ft)	Q (cfs)	Delta Elevation (ft)	H/R	Q_{weir} (cfs)	$Q_{orifice}$ (cfs)	Q (cfs) 50% Debris Blockage
3042.9	0.0	0.00	-5.5	0.00	0.00	0.00	0.00
3043.4	0.5	0.07	-5.0	0.00	0.00	0.00	0.04
3043.9	1.0	0.11	-4.5	0.00	0.00	0.00	0.05
3044.4	1.5	0.13	-4.0	0.00	0.00	0.00	0.06
3044.9	2.0	0.15	-3.5	0.00	0.00	0.00	0.07
3045.4	2.5	0.17	-3.0	0.00	0.00	0.00	0.08
3045.9	3.0	0.85	-2.5	0.00	0.00	0.00	0.43
3046.4	3.5	1.14	-2.0	0.00	0.00	0.00	0.57
3046.9	4.0	1.37	-1.5	0.00	0.00	0.00	0.68
3047.4	4.5	1.56	-1.0	0.00	0.00	0.00	0.78
3047.9	5.0	1.73	-0.5	0.00	0.00	0.00	0.86
3048.4	5.5	1.88	0.0	0.00	0.00	0.00	0.94
3048.9	6.0	2.03	0.5	0.50	7.44	10.70	4.73
3049.4	6.5	2.16	1.0	1.00	12.75	15.13	7.46
3049.9	7.0	2.28	1.5	1.50	15.81	18.53	9.05
3050.4	7.5	2.40	2.0	2.00	17.77	21.39	10.09

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method
Hydrograph File Import Option Used For 1 node(s)

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
100-YEAR	HYG	100	.357		4.2000	6.37		
DET.BASIN 200IN	POND	100	.357		4.2000	6.37		
DET.BASIN 200OUT	POND	100	.356		4.3800	.94	3048.39	.204
*OUT 20	JCT	100	.356		4.3800	.94		

Culvert Calculator Report
Basin 200

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	3,048.39	ft	Headwater Depth/Height	0.37	
Computed Headwater Elev	3,038.53	ft	Discharge	0.94	cfs
Inlet Control HW Elev.	3,038.47	ft	Tailwater Elevation	3,038.34	ft
Outlet Control HW Elev.	3,038.53	ft	Control Type	Entrance Control	

3038.53 < 3048.39 ' OK ✓

Grades					
Upstream Invert	3,037.98	ft	Downstream Invert	3,037.59	ft
Length	59.82	ft	Constructed Slope	0.006520	ft/ft

Hydraulic Profile					
Profile	CompositeS1S2		Depth, Downstream	0.75	ft
Slope Type	Steep		Normal Depth	0.32	ft
Flow Regime	N/A		Critical Depth	0.36	ft
Velocity Downstream	1.06	ft/s	Critical Slope	0.004216	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.012	
Section Material	Concrete		Span	1.50	ft
Section Size	18 inch		Rise	1.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	3,038.53	ft	Upstream Velocity Head	0.13	ft
Ke	0.50		Entrance Loss	0.06	ft

Inlet Control Properties					
Inlet Control HW Elev.	3,038.47	ft	Flow Control	Unsubmerged	
Inlet Type	Square edge w/headwall		Area Full	1.8	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

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BASIN 300

RUN DATE 11/11/2009
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 15 MIN.
6 HOUR RAINFALL 3.6 INCHES
BASIN AREA 30 ACRES
RUNOFF COEFFICIENT 0.48
PEAK DISCHARGE 68.41 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 15	DISCHARGE (CFS) = 3.1
TIME (MIN) = 30	DISCHARGE (CFS) = 3.2
TIME (MIN) = 45	DISCHARGE (CFS) = 3.4
TIME (MIN) = 60	DISCHARGE (CFS) = 3.5
TIME (MIN) = 75	DISCHARGE (CFS) = 3.8
TIME (MIN) = 90	DISCHARGE (CFS) = 3.9
TIME (MIN) = 105	DISCHARGE (CFS) = 4.3
TIME (MIN) = 120	DISCHARGE (CFS) = 4.5
TIME (MIN) = 135	DISCHARGE (CFS) = 4.9
TIME (MIN) = 150	DISCHARGE (CFS) = 5.2
TIME (MIN) = 165	DISCHARGE (CFS) = 6
TIME (MIN) = 180	DISCHARGE (CFS) = 6.5
TIME (MIN) = 195	DISCHARGE (CFS) = 8
TIME (MIN) = 210	DISCHARGE (CFS) = 9.1
TIME (MIN) = 225	DISCHARGE (CFS) = 13.3
TIME (MIN) = 240	DISCHARGE (CFS) = 17.6
TIME (MIN) = 255	DISCHARGE (CFS) = 68.41
TIME (MIN) = 270	DISCHARGE (CFS) = 10.7
TIME (MIN) = 285	DISCHARGE (CFS) = 7.1
TIME (MIN) = 300	DISCHARGE (CFS) = 5.6
TIME (MIN) = 315	DISCHARGE (CFS) = 4.7
TIME (MIN) = 330	DISCHARGE (CFS) = 4.1
TIME (MIN) = 345	DISCHARGE (CFS) = 3.6
TIME (MIN) = 360	DISCHARGE (CFS) = 3.3
TIME (MIN) = 375	DISCHARGE (CFS) = 0

DETENTION BASIN 300

5'x4' (Top of Pipe Elev.: 2964.5')								
	Perforations		Top of Riser					
Elevation (ft)	Delta Elevation (ft)	Q (cfs)	Delta Elevation (ft)	H/R	Cscw	Q_{weir} (cfs)	$Q_{orifice}$ (cfs)	Q (cfs) 50% Debris Blockage
2959	0.0	0.00	-5.5	N/A	N/A	0.00	0.00	0.00
2959.5	0.5	0.67	-5.0	N/A	N/A	0.00	0.00	0.33
2960	1.0	0.95	-4.5	N/A	N/A	0.00	0.00	0.47
2960.5	1.5	1.16	-4.0	N/A	N/A	0.00	0.00	0.58
2961	2.0	2.01	-3.5	N/A	N/A	0.00	0.00	1.00
2961.5	2.5	2.44	-3.0	N/A	N/A	0.00	0.00	1.22
2962	3.0	3.46	-2.5	N/A	N/A	0.00	0.00	1.73
2962.5	3.5	4.05	-2.0	N/A	N/A	0.00	0.00	2.03
2963	4.0	4.54	-1.5	N/A	N/A	0.00	0.00	2.27
2963.5	4.5	4.98	-1.0	N/A	N/A	0.00	0.00	2.49
2964	5.0	5.38	-0.5	N/A	N/A	0.00	0.00	2.69
2964.5	5.5	5.75	0.0	N/A	3.27	0.00	0.00	2.87
2965	6.0	6.09	0.5	N/A	3.31	21.04	68.09	13.57
2965.5	6.5	6.42	1.0	N/A	3.34	60.17	96.30	33.29
2966	7.0	6.72	1.5	N/A	3.38	111.74	117.94	59.23
2966.5	7.5	7.02	2.0	N/A	3.42	173.89	136.19	71.60
2967	8.0	7.30	2.5	N/A	3.45	245.60	152.26	79.78
2967.5	8.5	7.57	3.0	N/A	3.49	326.25	166.80	87.18
2968	9.0	7.84	3.5	N/A	3.52	415.41	180.16	94.00

MASTER DESIGN STORM SUMMARY

Hydrograph Queue Only Network

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method
Hydrograph File Import Option Used For 1 node(s)

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
100-YEAR	HYG	100	4.294		4.2500	68.41		
DET.BASIN 300IN	POND	100	4.294		4.2500	68.41		
DET.BASIN 300OUT	POND	100	4.293		4.3500	47.66	2965.78	2.226
*OUT 20	JCT	100	4.293		4.3500	47.66		

Culvert Calculator Report
Basin 300

Solve For: Headwater Elevation

Culvert Summary				
Allowable HW Elevation	2,965.78 ft	Headwater Depth/Height	1.30	
Computed Headwater Elev	2,957.12 ft	Discharge	47.66	cfs
Inlet Control HW Elev.	2,956.58 ft	Tailwater Elevation	2,891.59	ft
Outlet Control HW Elev.	2,957.12 ft	Control Type	Entrance Control	

2957.12 < 2965.78
OK ✓

Grades				
Upstream Invert	2,953.23 ft	Downstream Invert	2,890.09	ft
Length	199.60 ft	Constructed Slope	0.316333	ft/ft

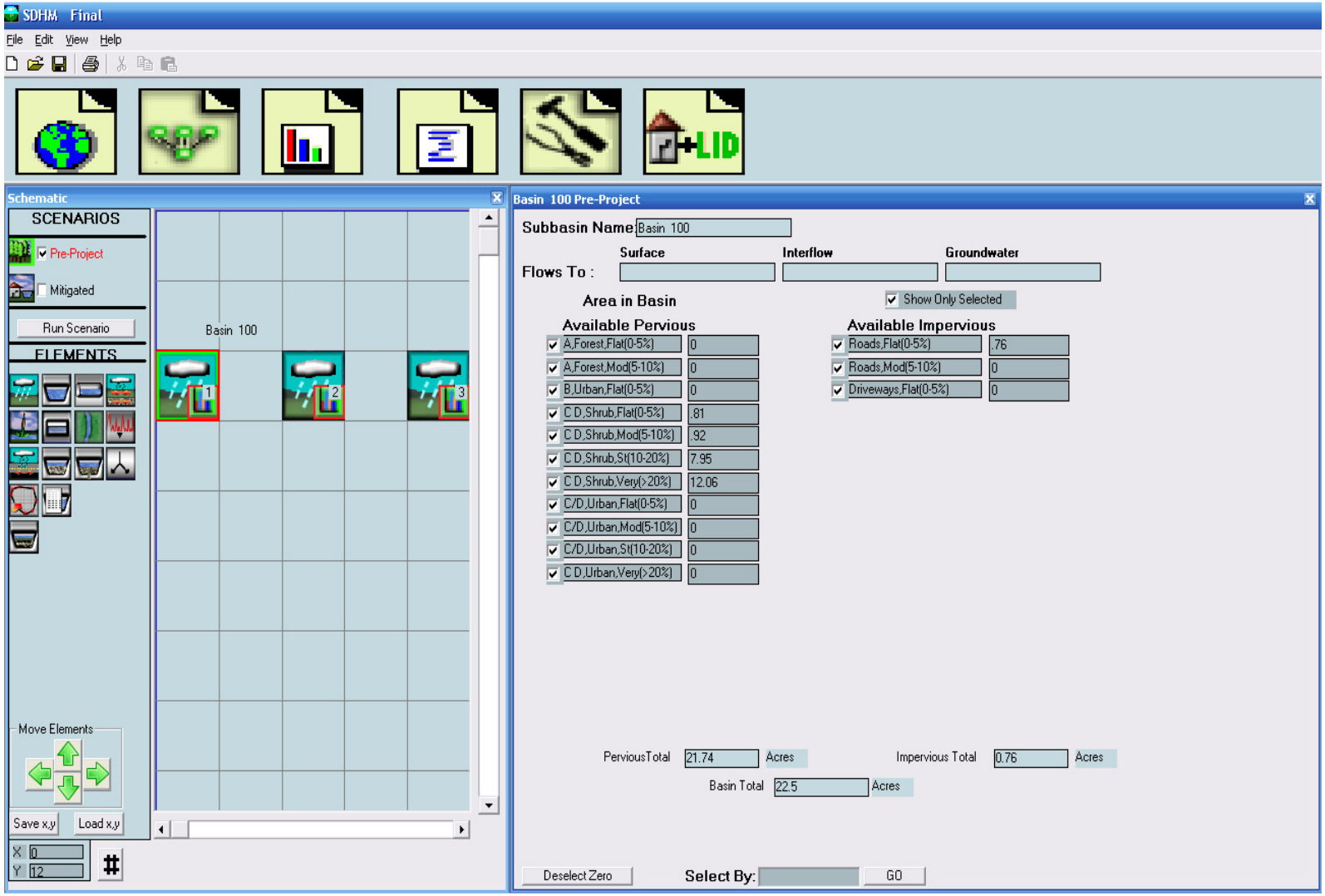
Hydraulic Profile				
Profile	S2	Depth, Downstream	0.69	ft
Slope Type	Steep	Normal Depth	0.69	ft
Flow Regime	Supercritical	Critical Depth	2.25	ft
Velocity Downstream	38.51 ft/s	Critical Slope	0.005239	ft/ft

Section				
Section Shape	Circular	Mannings Coefficient	0.012	
Section Material	Concrete	Span	3.00	ft
Section Size	36 inch	Rise	3.00	ft
Number Sections	1			

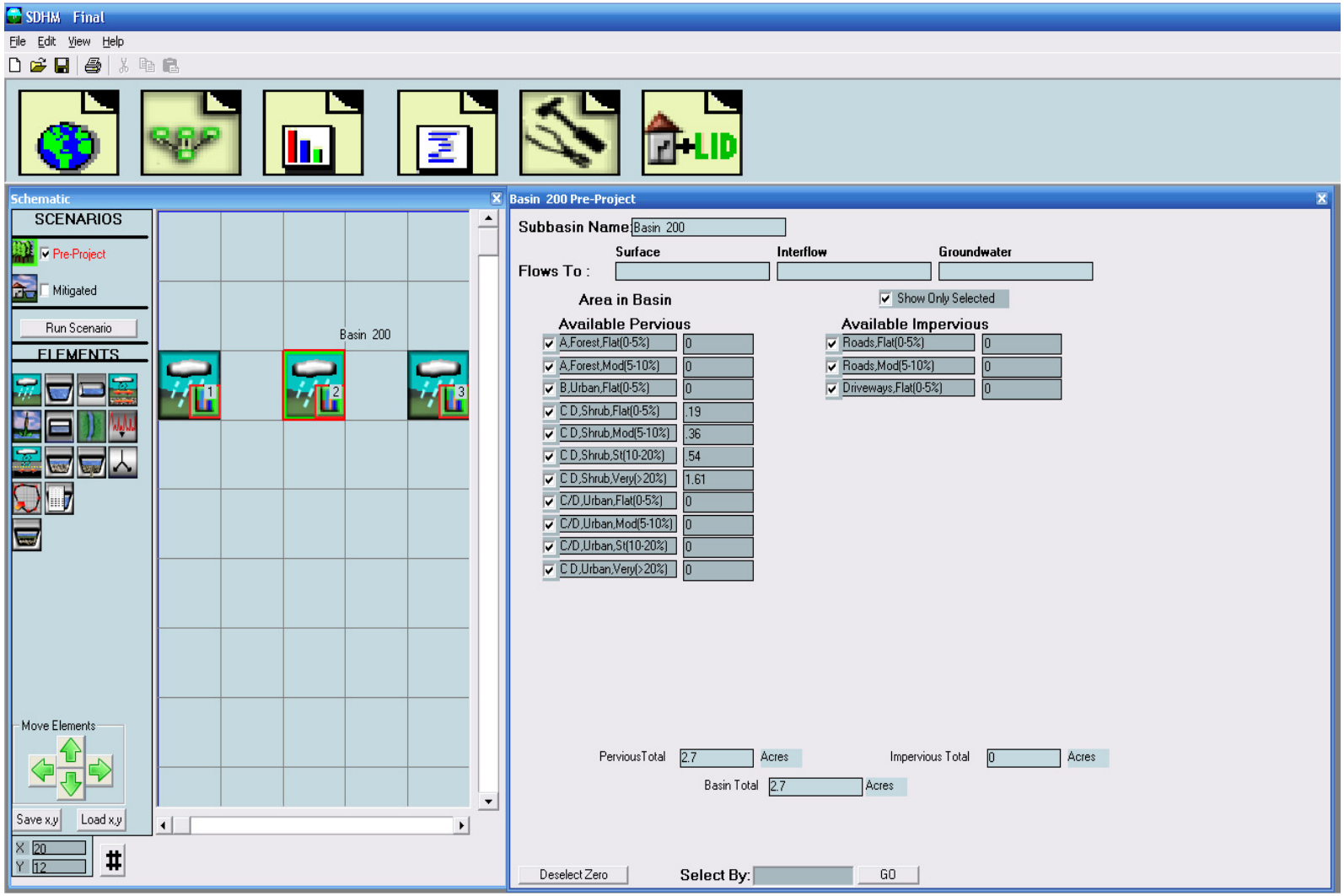
Outlet Control Properties				
Outlet Control HW Elev.	2,957.12 ft	Upstream Velocity Head	1.09	ft
Ke	0.50	Entrance Loss	0.55	ft

Inlet Control Properties				
Inlet Control HW Elev.	2,956.58 ft	Flow Control	Transition	
Inlet Type	Square edge w/headwall	Area Full	7.1	ft²
K	0.00980	HDS 5 Chart	1	
M	2.00000	HDS 5 Scale	1	
C	0.03980	Equation Form	1	
Y	0.67000			

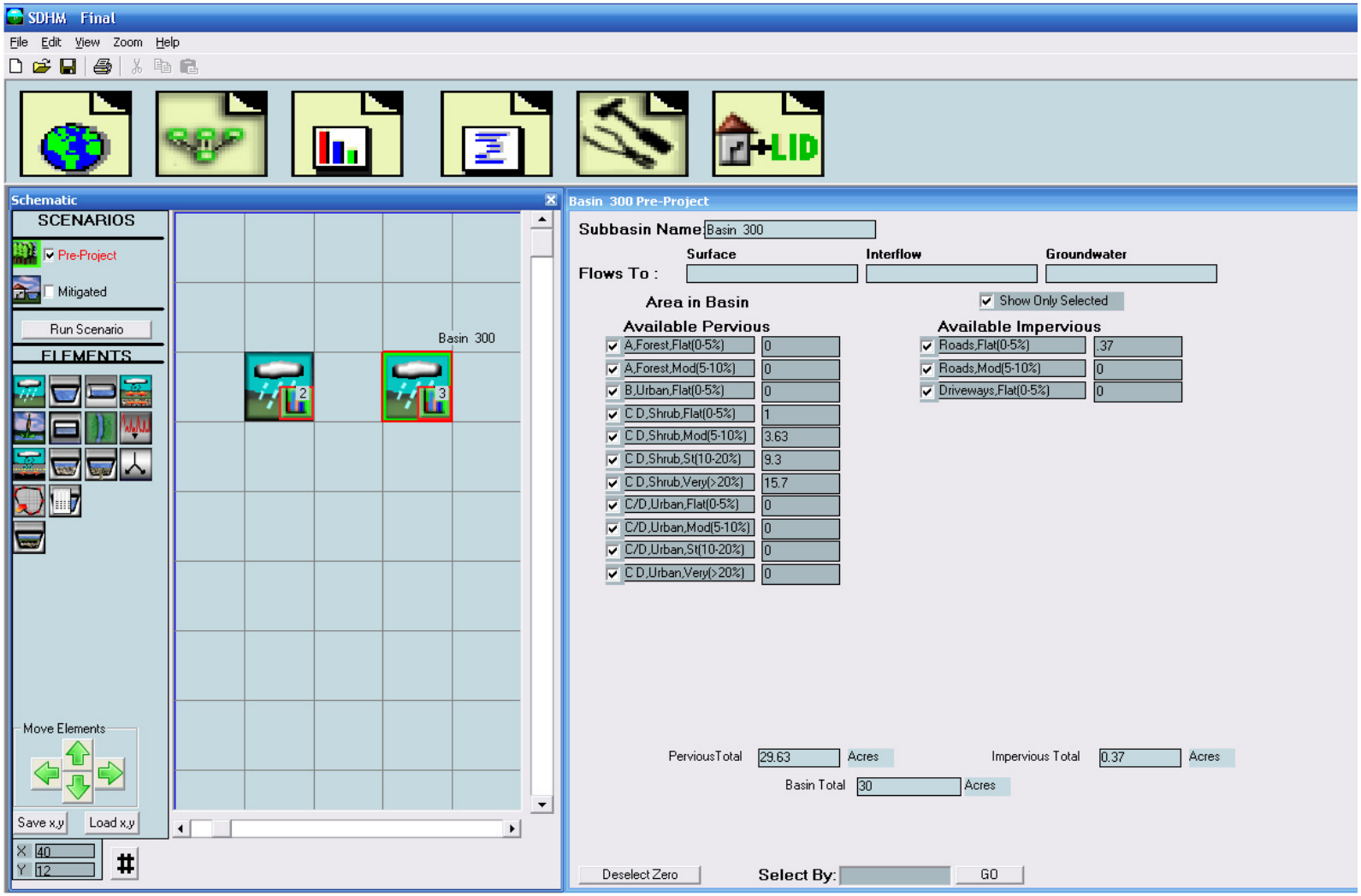
EXISTING CONDITIONS BASIN 100



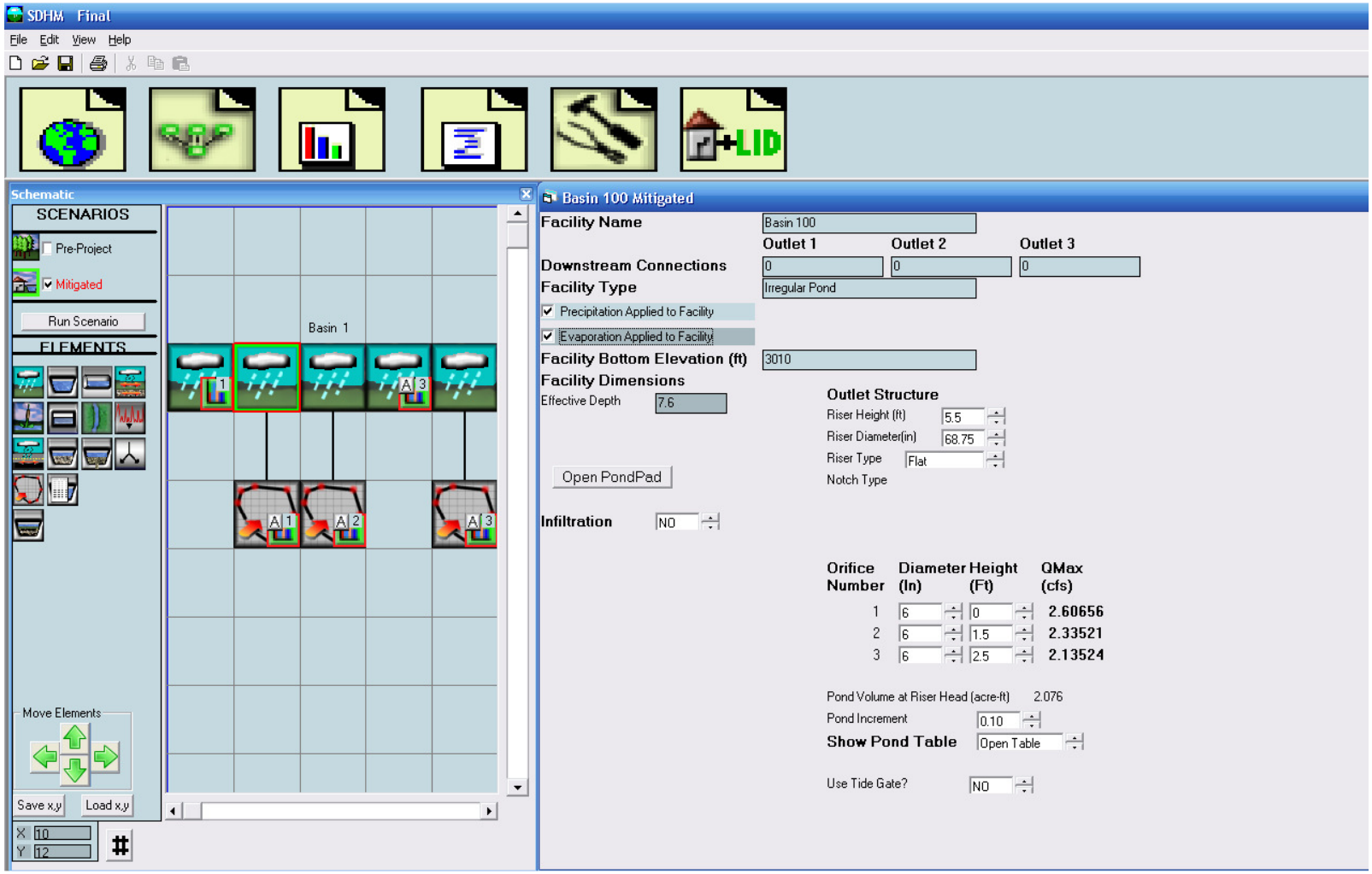
EXISTING CONDITIONS BASIN 200



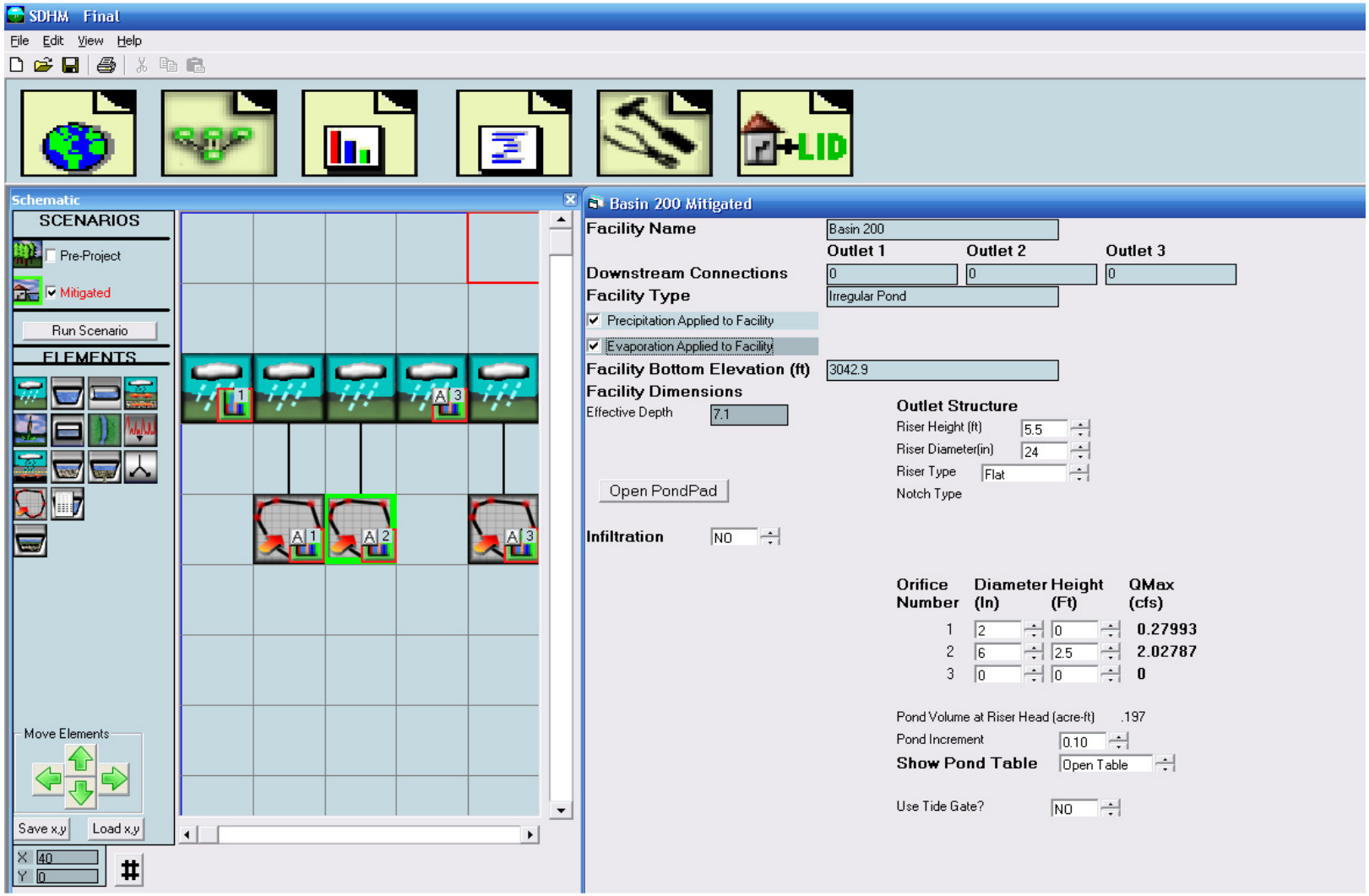
EXISTING CONDITIONS BASIN 300



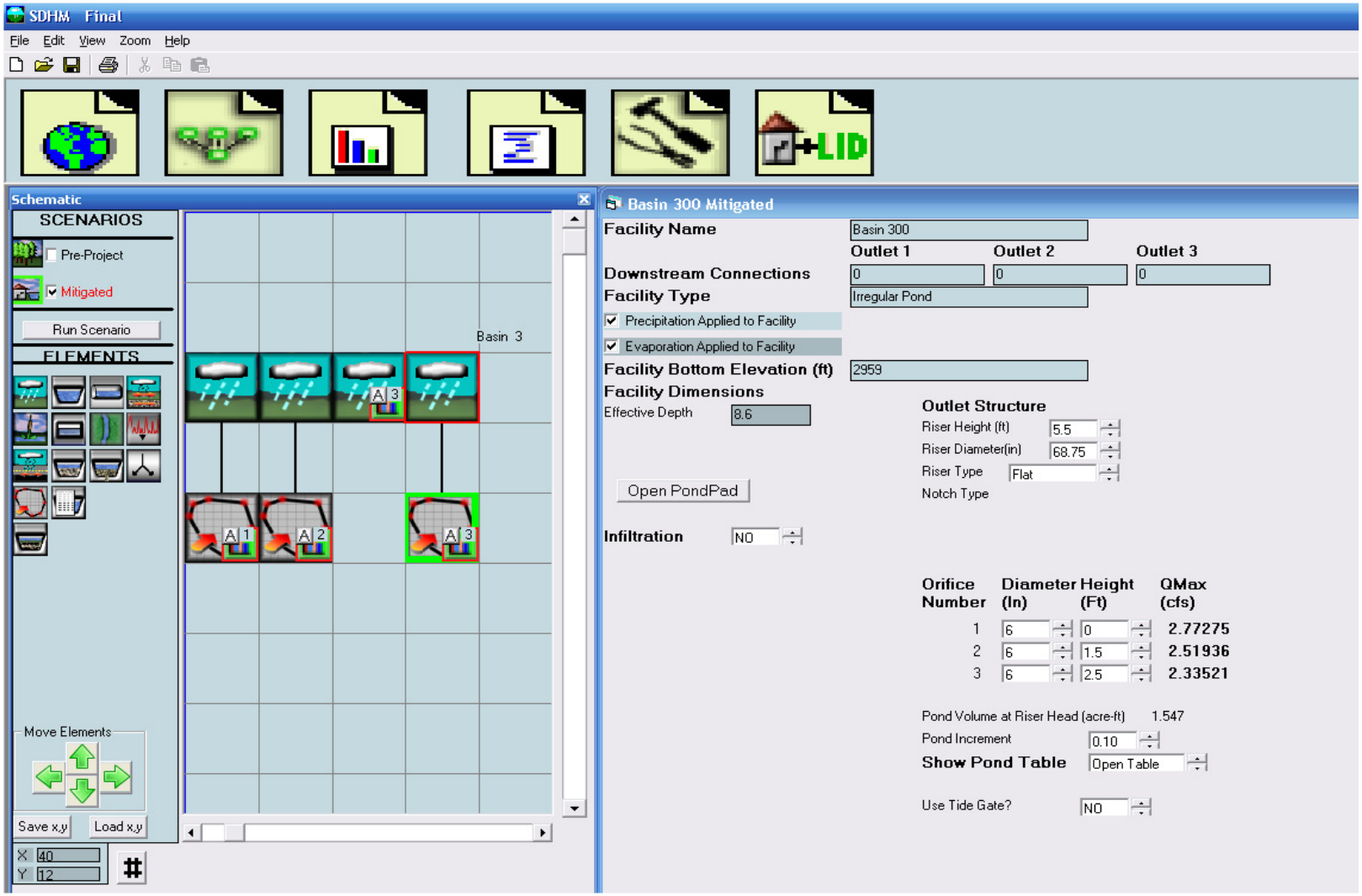
DETENTION BASIN 100



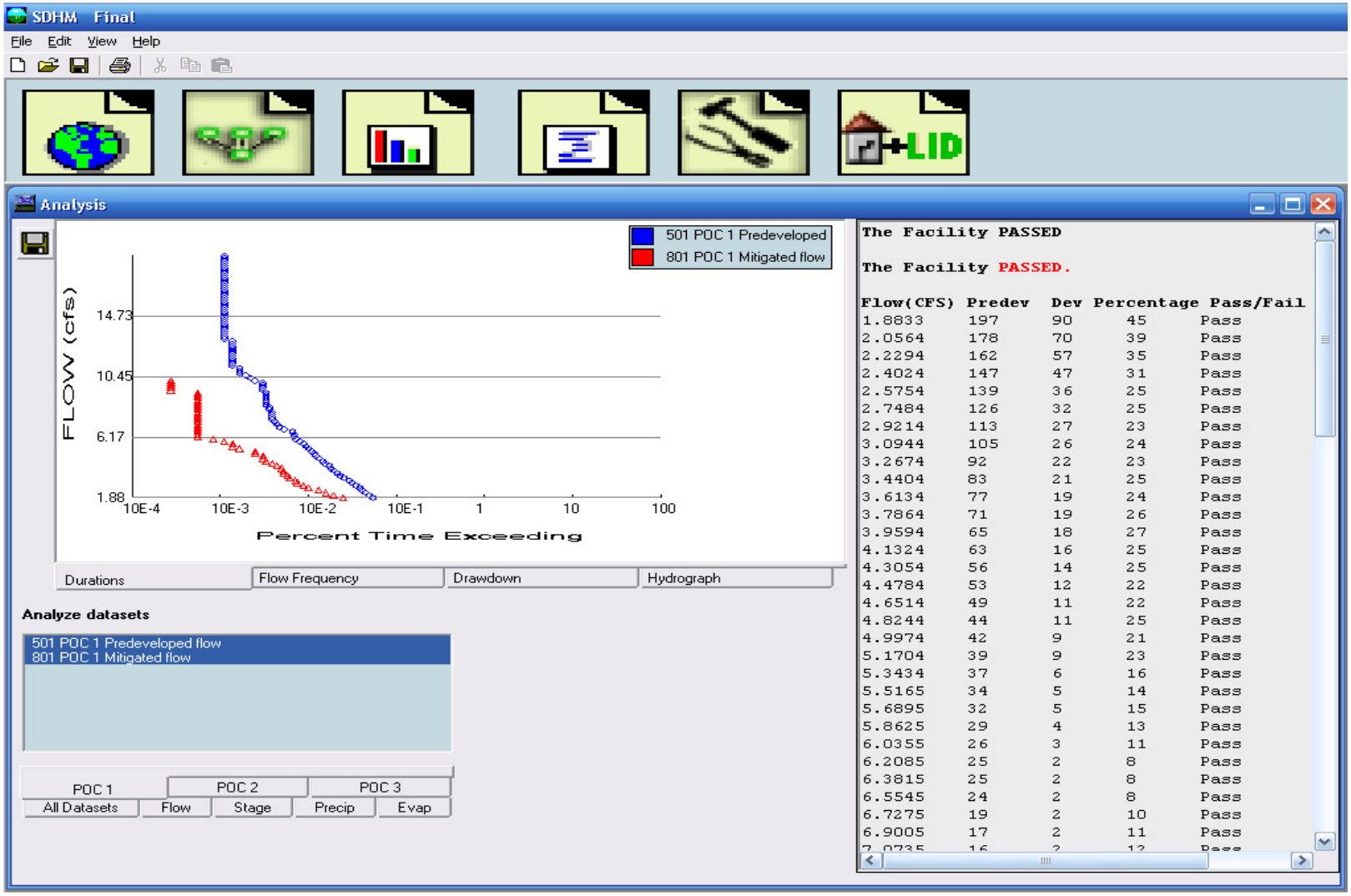
DETENTION BASIN 200



DETENTION BASIN 300

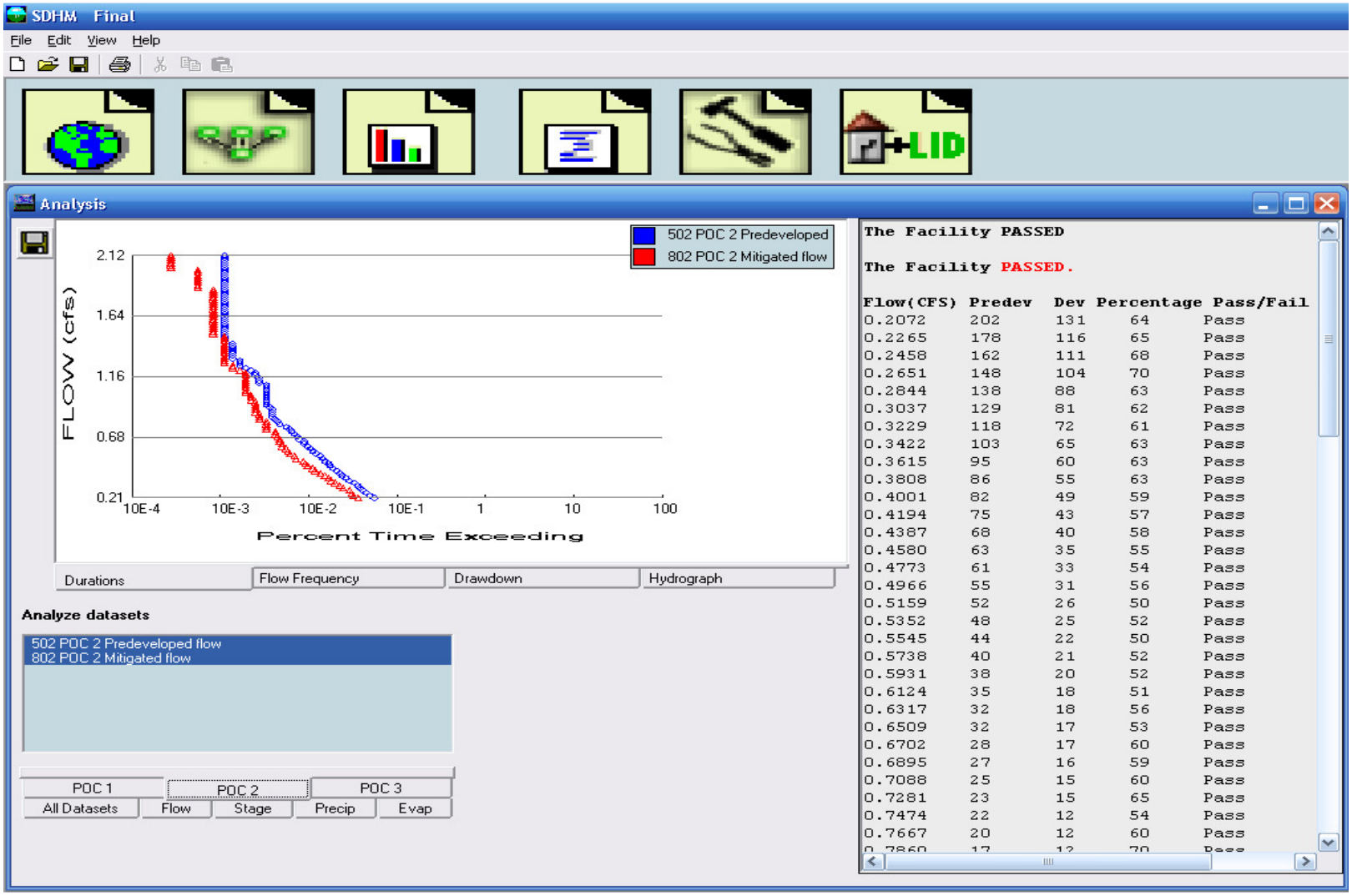


POC BASIN 100

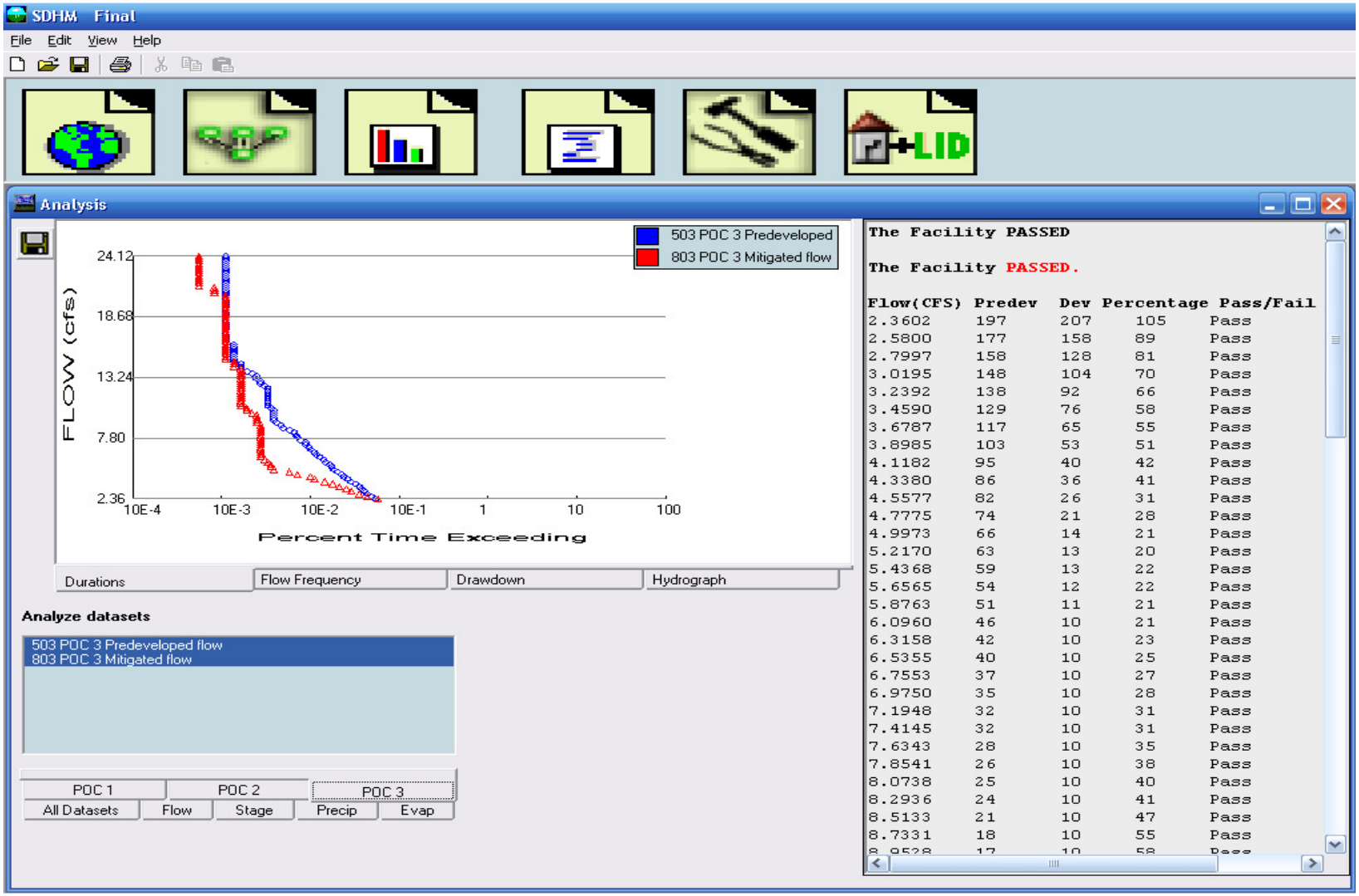


Flow(CFS)	Predev	Dev	Percentage	Pass/Fail
1.8833	197	90	45	Pass
2.0564	178	70	39	Pass
2.2294	162	57	35	Pass
2.4024	147	47	31	Pass
2.5754	139	36	25	Pass
2.7484	126	32	25	Pass
2.9214	113	27	23	Pass
3.0944	105	26	24	Pass
3.2674	92	22	23	Pass
3.4404	83	21	25	Pass
3.6134	77	19	24	Pass
3.7864	71	19	26	Pass
3.9594	65	18	27	Pass
4.1324	63	16	25	Pass
4.3054	56	14	25	Pass
4.4784	53	12	22	Pass
4.6514	49	11	22	Pass
4.8244	44	11	25	Pass
4.9974	42	9	21	Pass
5.1704	39	9	23	Pass
5.3434	37	6	16	Pass
5.5165	34	5	14	Pass
5.6895	32	5	15	Pass
5.8625	29	4	13	Pass
6.0355	26	3	11	Pass
6.2085	25	2	8	Pass
6.3815	25	2	8	Pass
6.5545	24	2	8	Pass
6.7275	19	2	10	Pass
6.9005	17	2	11	Pass

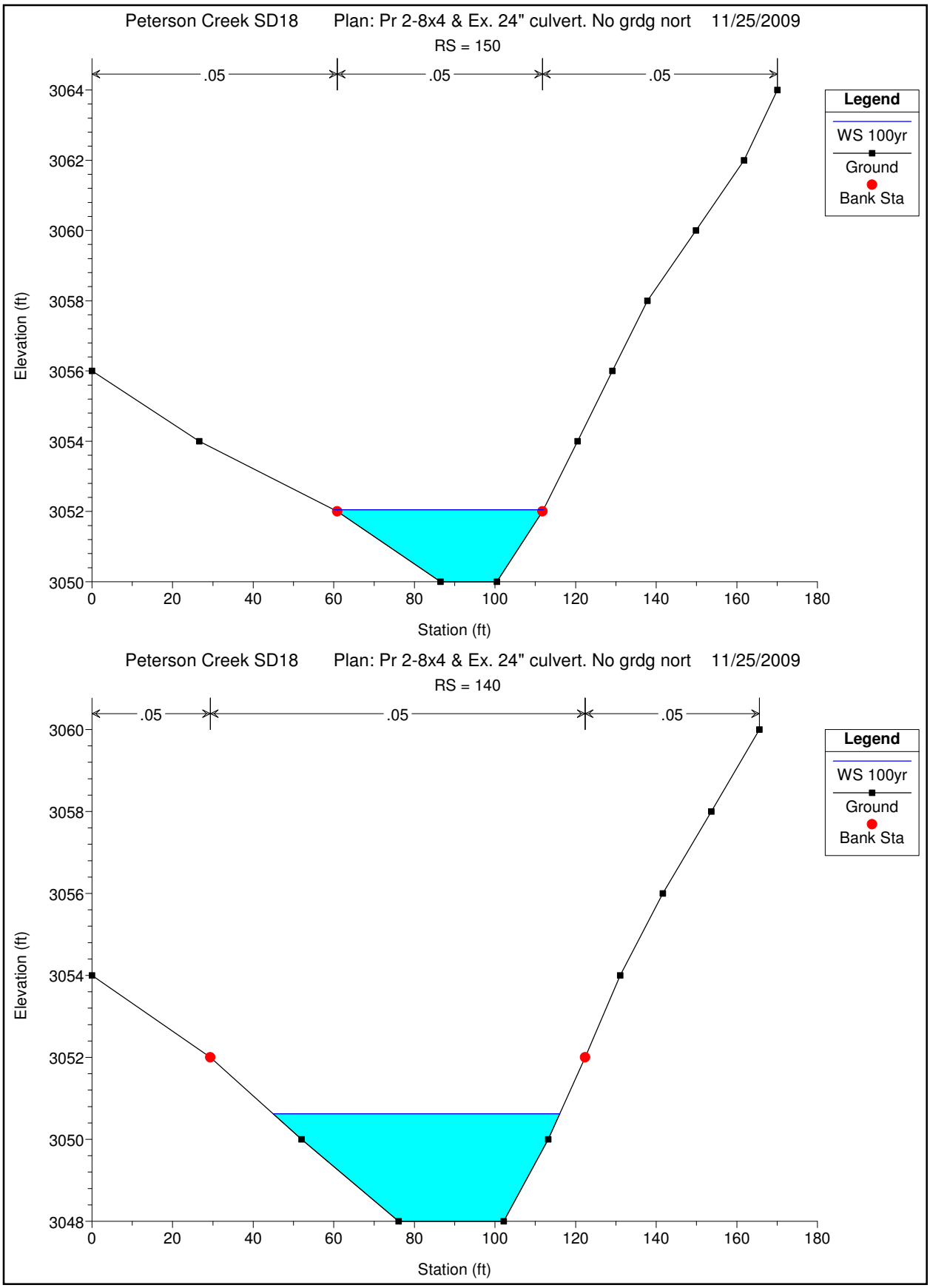
POC BASIN 200

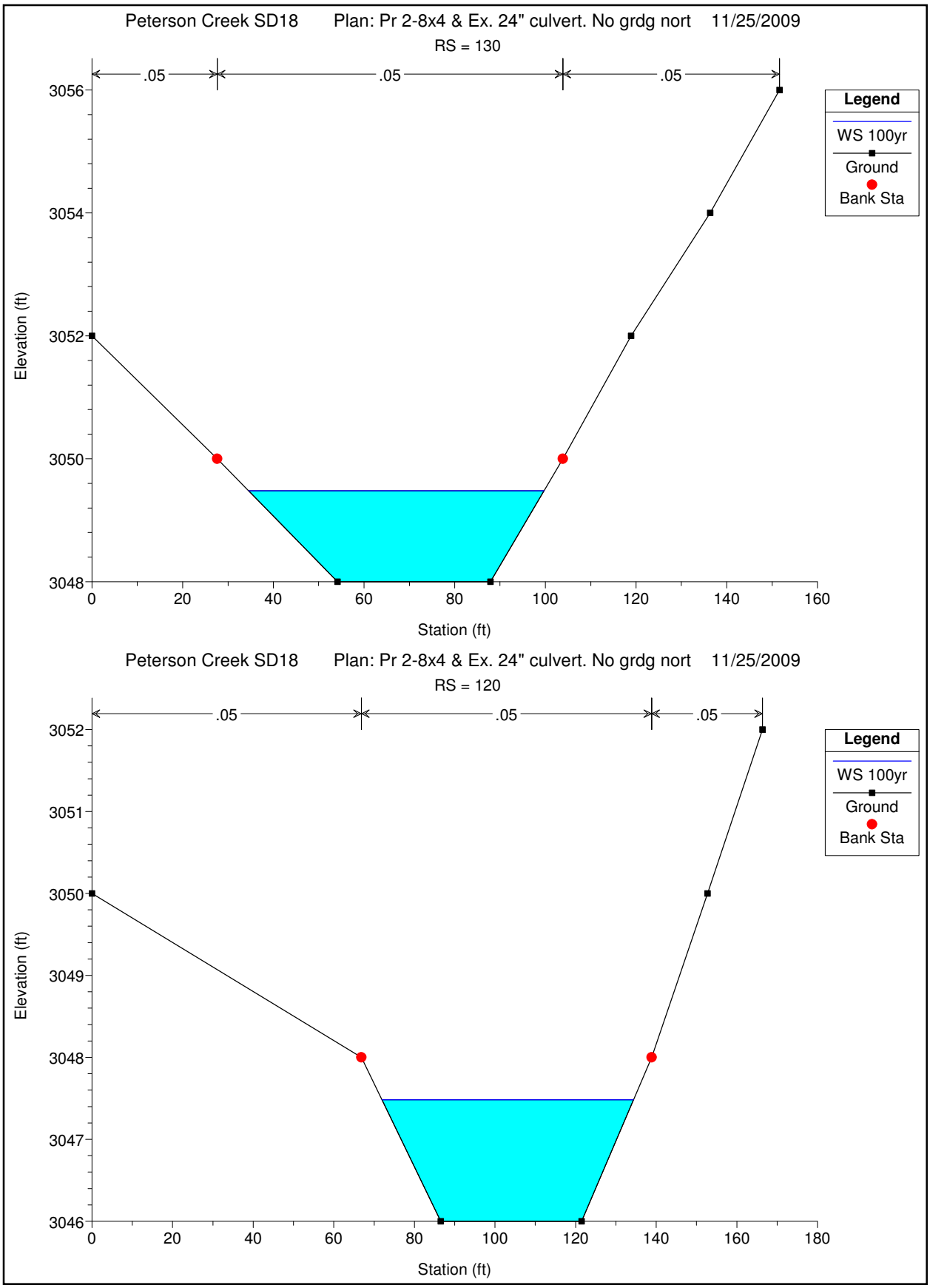


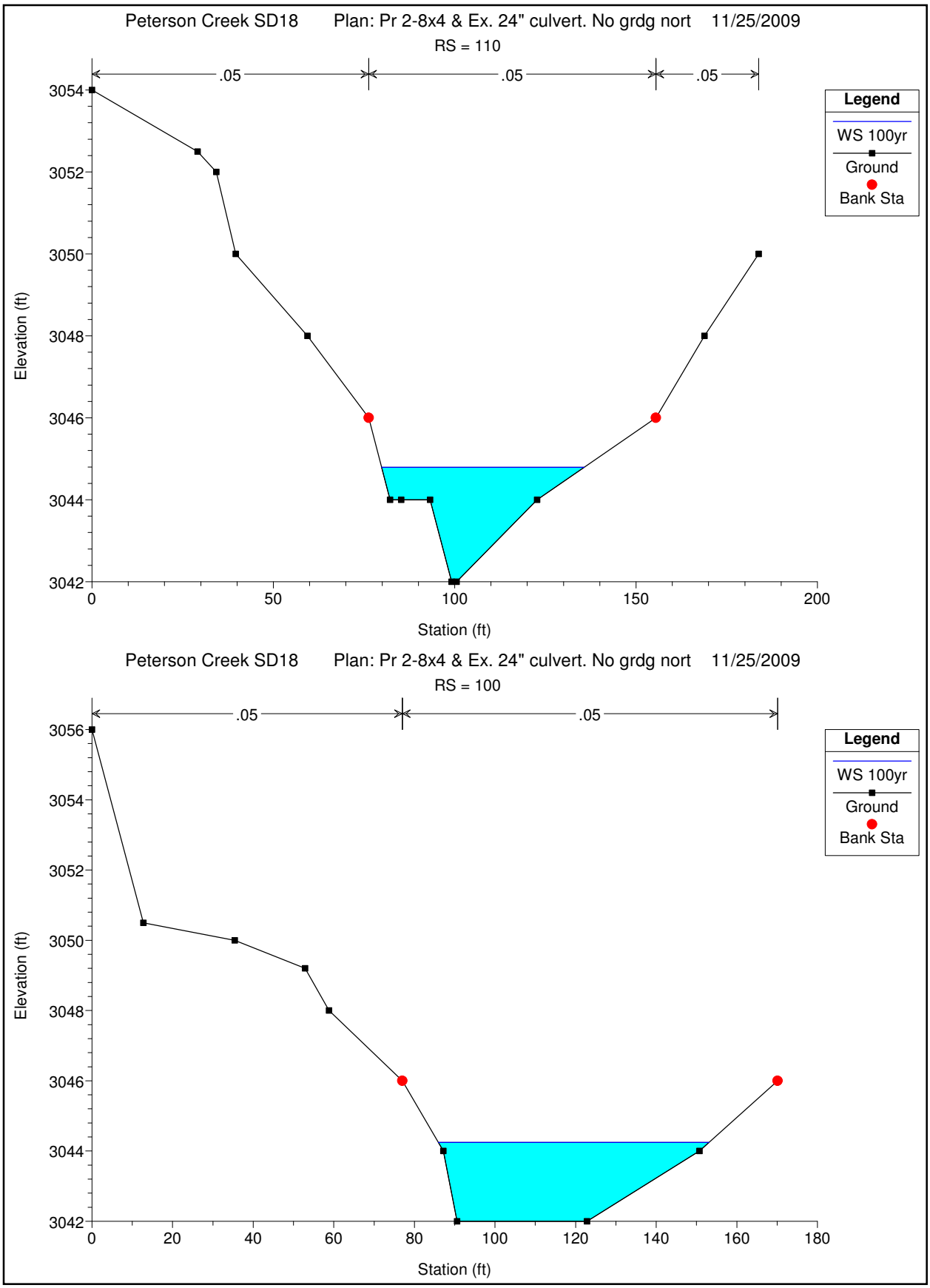
POC BASIN 300

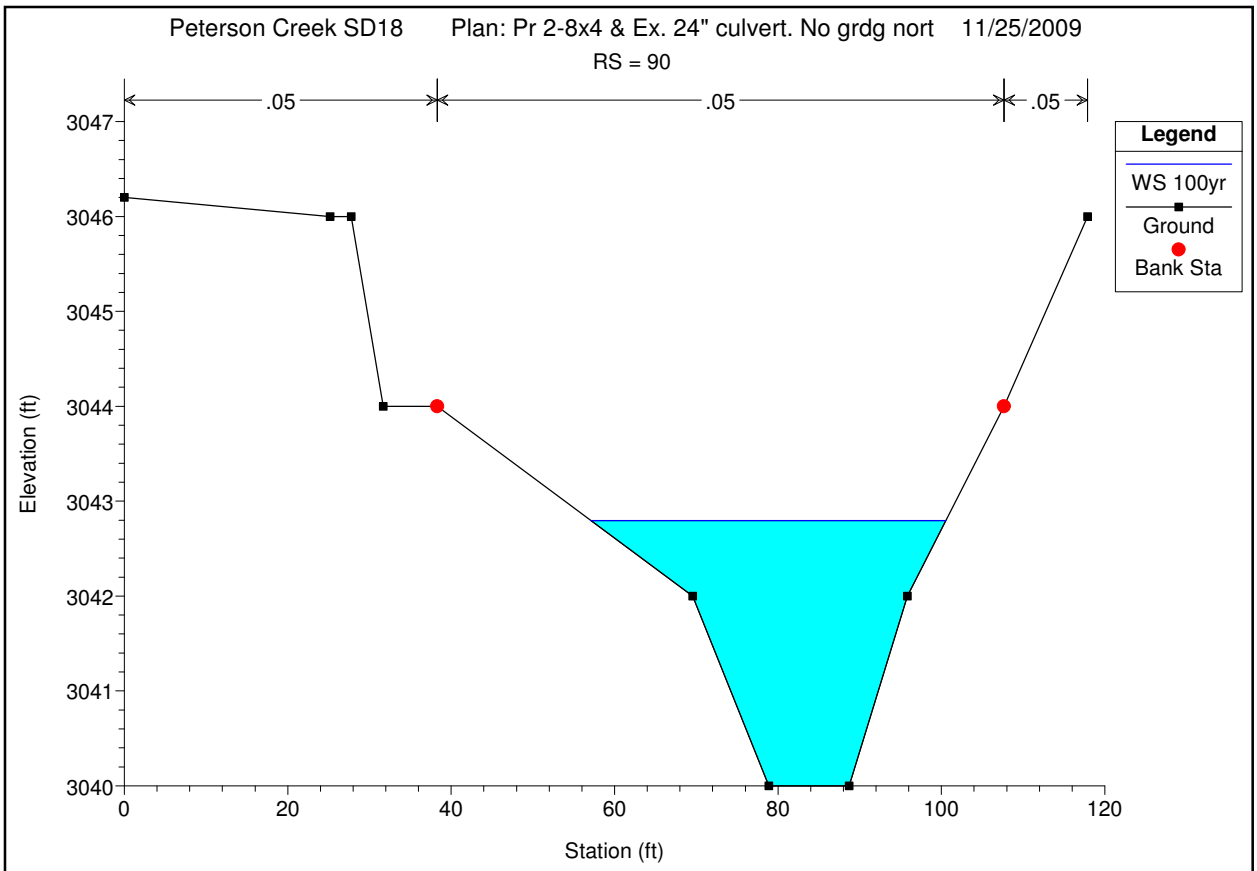


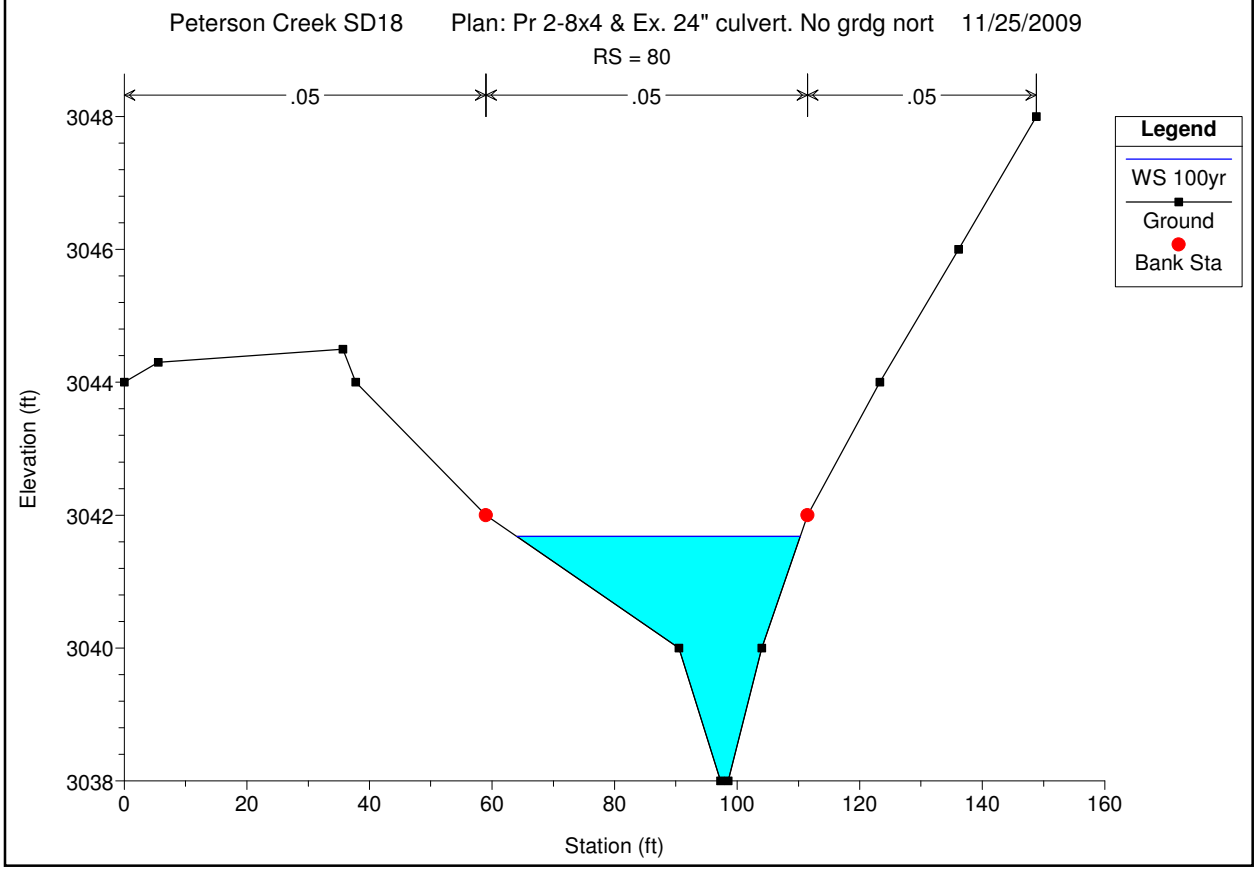
HEC-RAS CALCULATIONS

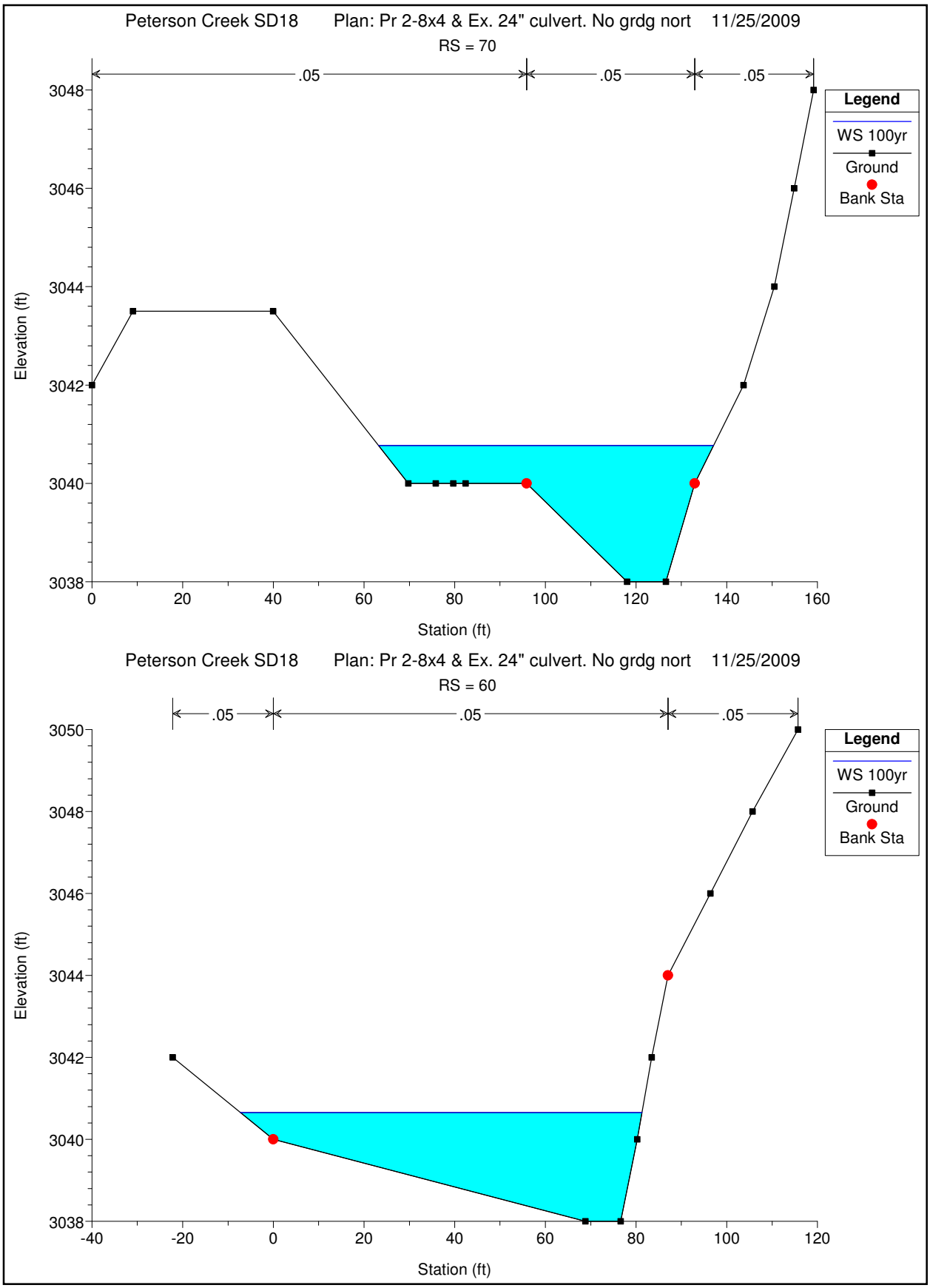

Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 150
.05
.05
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
3064
3062
3060
3058
3056
3054
3052
3050
0
20
40
60
80
100
120
140
160
180
Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 140
.05
.05
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
3060
3058
3056
3054
3052
3050
3048
0
20
40
60
80
100
120
140
160
180

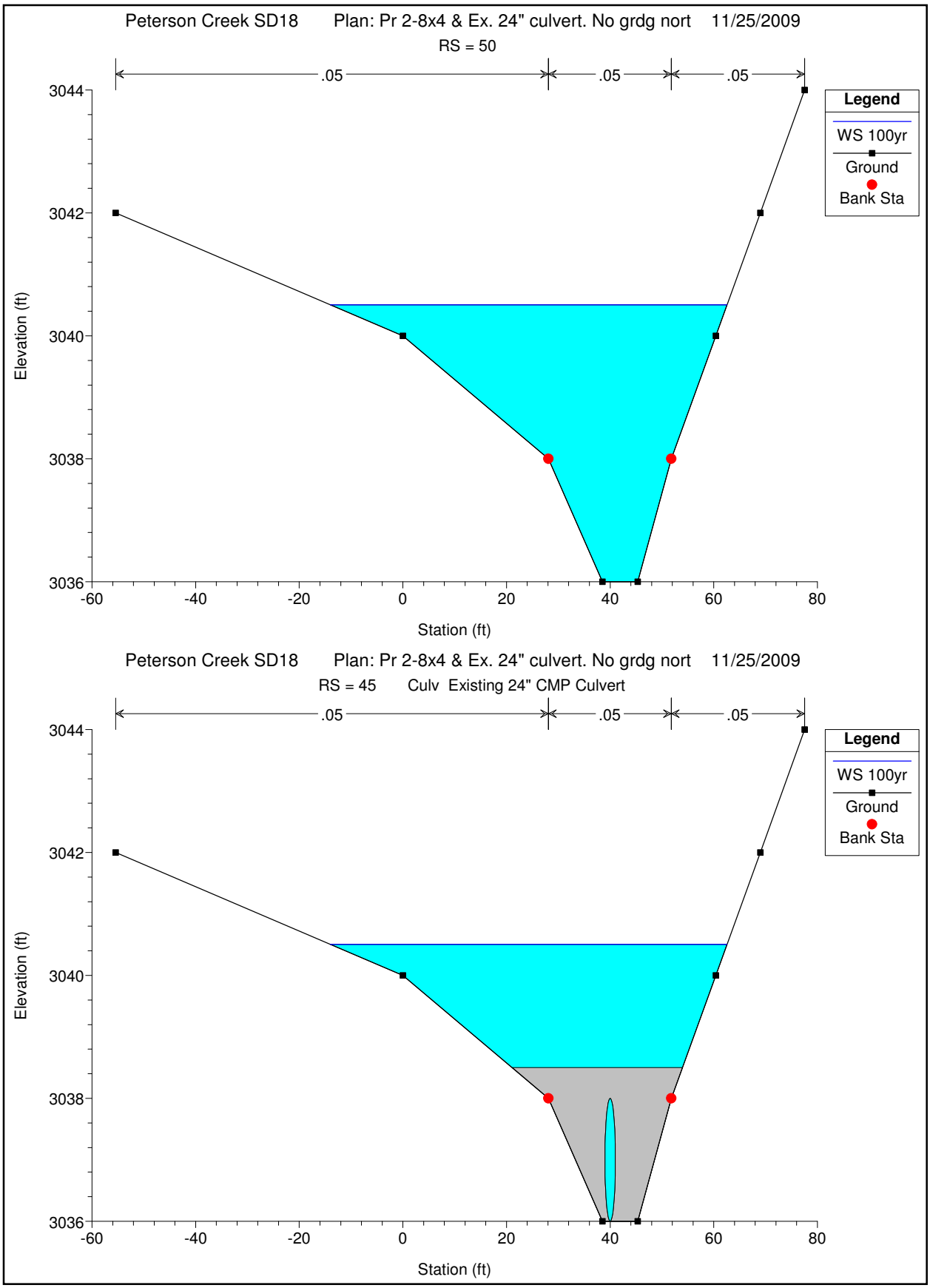

Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 130
.05
.05
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
3056
3054
3052
3050
3048
0
20
40
60
80
100
120
140
160
Station (ft)
Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 120
.05
.05
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
3052
3051
3050
3049
3048
3047
3046
0
20
40
60
80
100
120
140
160
180
Station (ft)

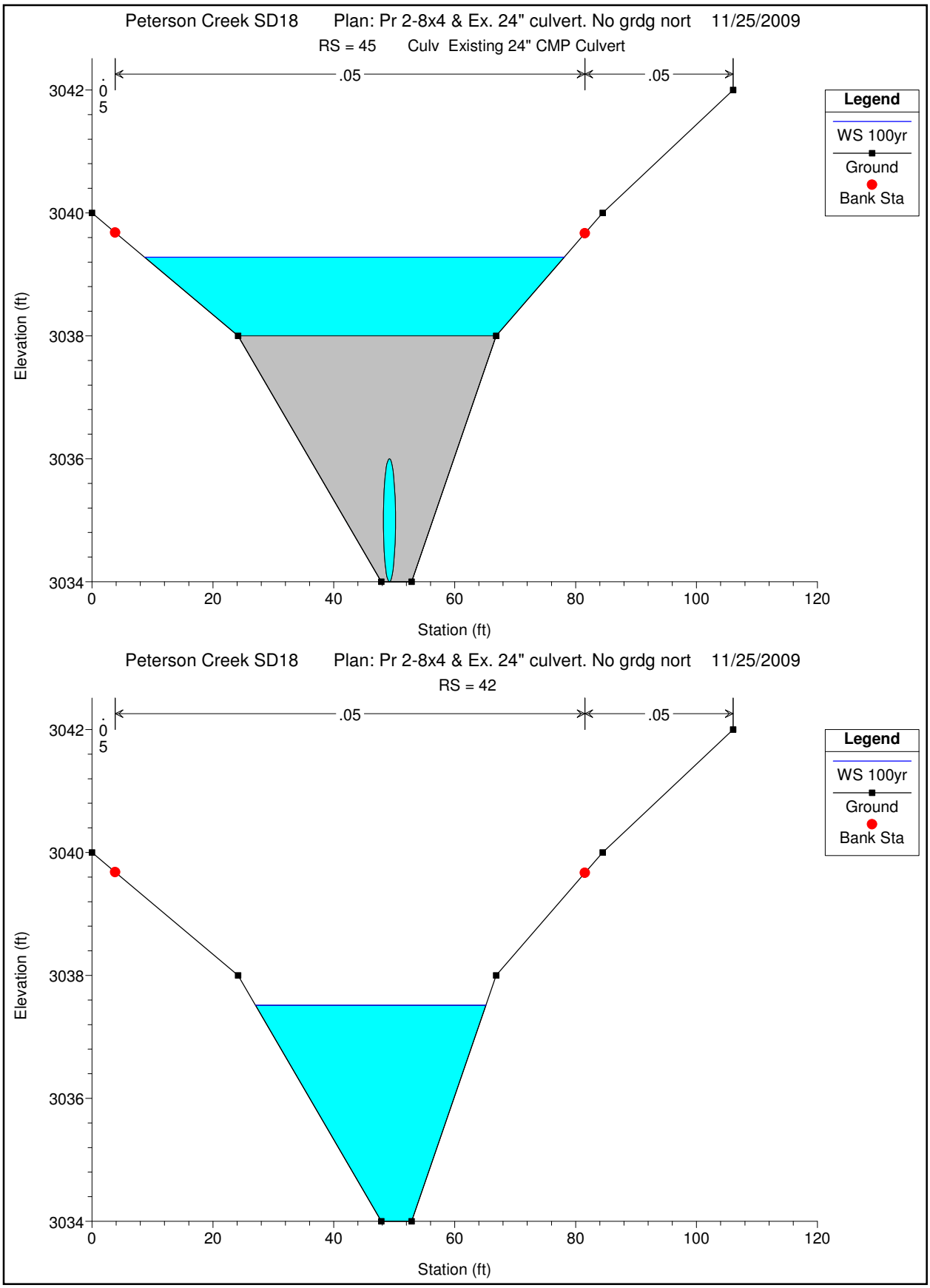

Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 110
.05
.05
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
3054
3052
3050
3048
3046
3044
3042
0
50
100
150
200
Station (ft)
Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 100
.05
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
3056
3054
3052
3050
3048
3046
3044
3042
0
20
40
60
80
100
120
140
160
180
Station (ft)

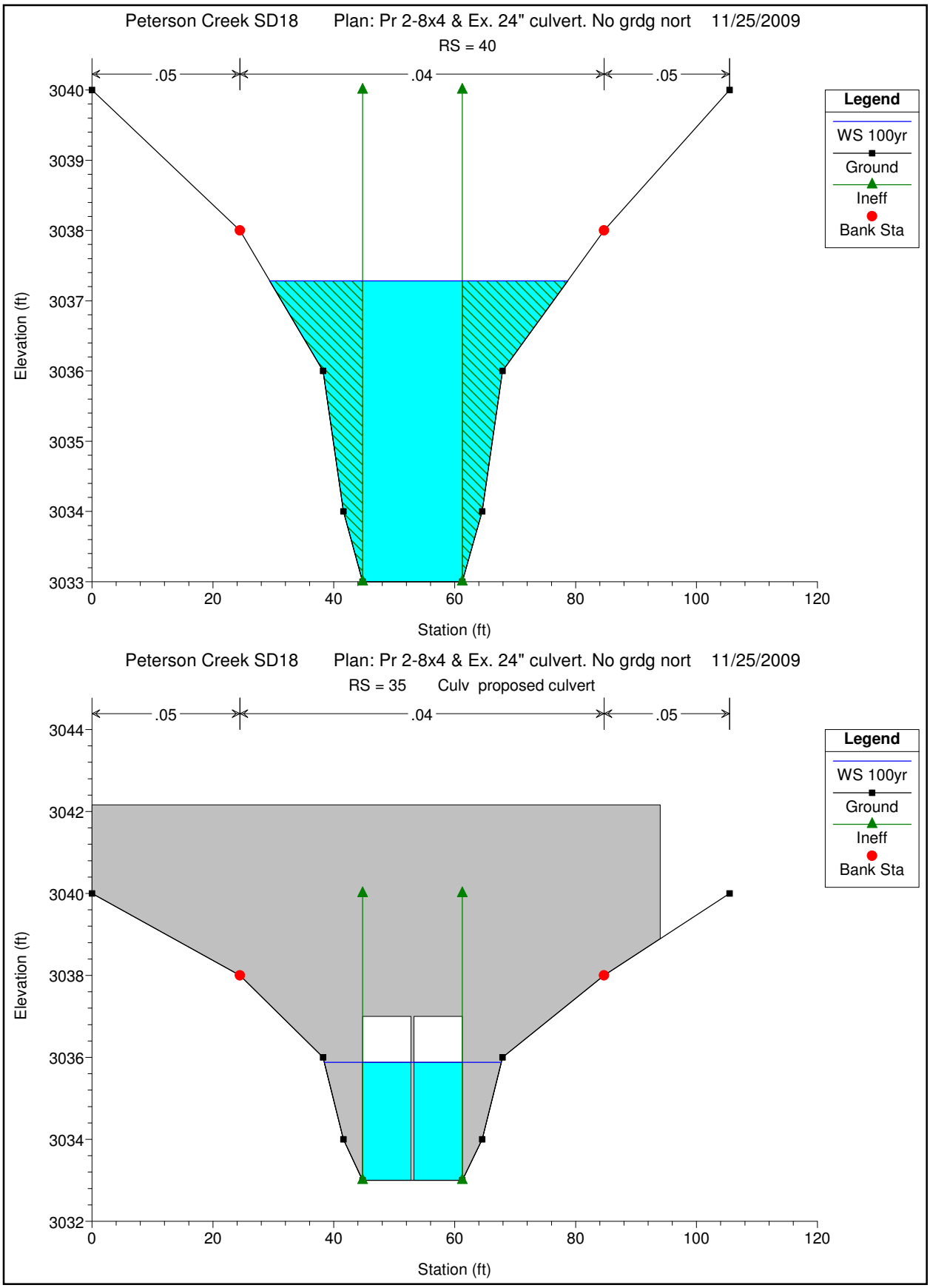

Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 90
.05
.05
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
3047
3046
3045
3044
3043
3042
3041
3040
0
20
40
60
80
100
120

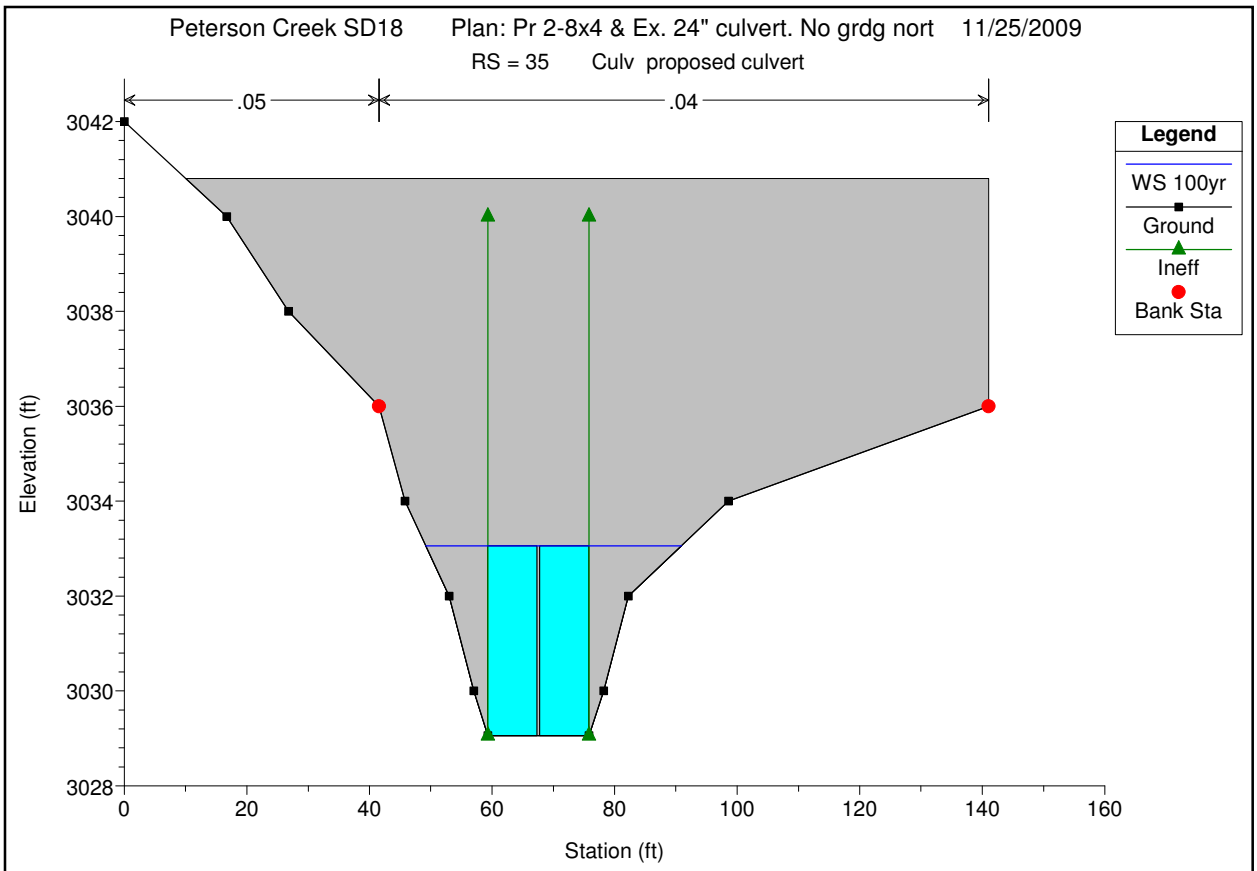

Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 80
.05
.05
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
3048
3046
3044
3042
3040
3038
0
20
40
60
80
100
120
140
160

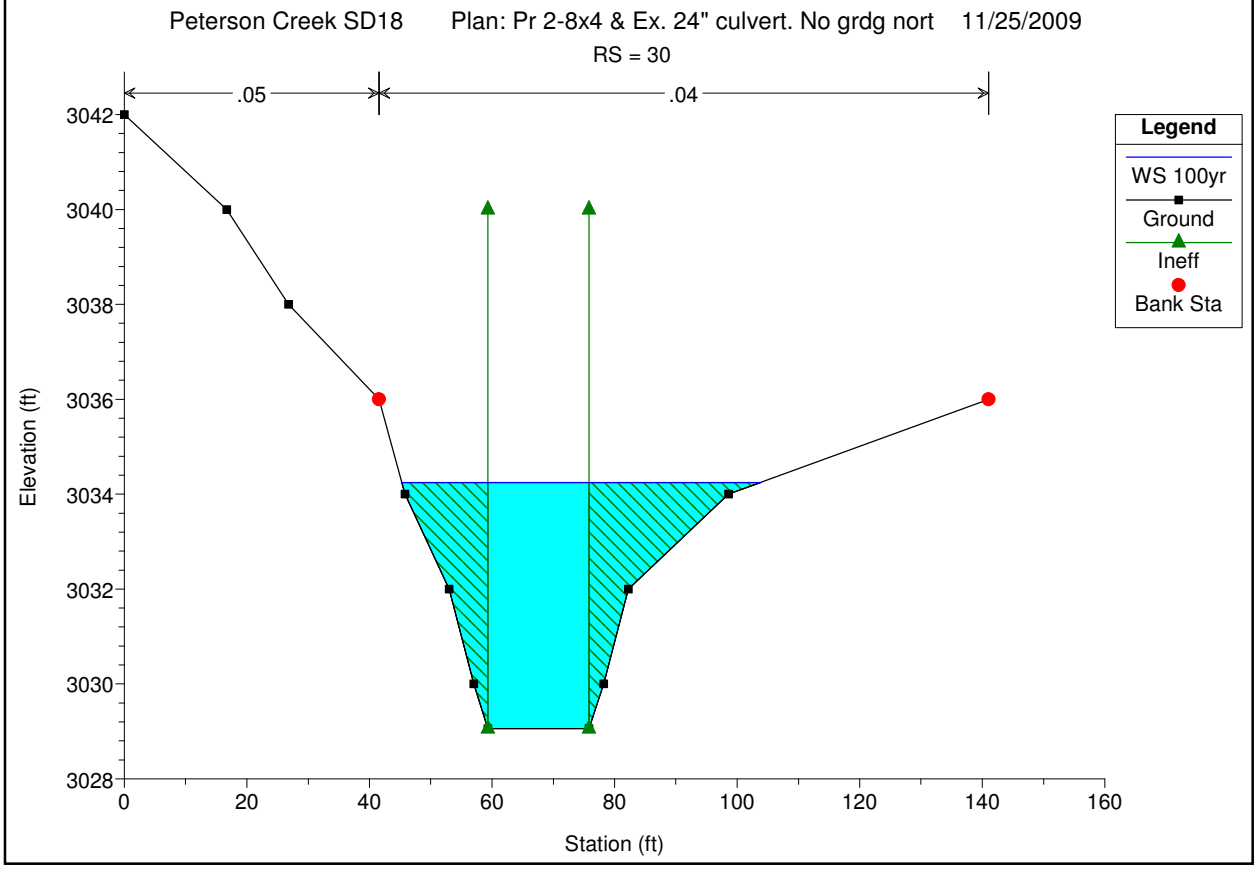

Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 70
.05
.05
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
3048
3046
3044
3042
3040
3038
0
20
40
60
80
100
120
140
160
Station (ft)
Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 60
.05
.05
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
3050
3048
3046
3044
3042
3040
3038
-40
-20
0
20
40
60
80
100
120
Station (ft)

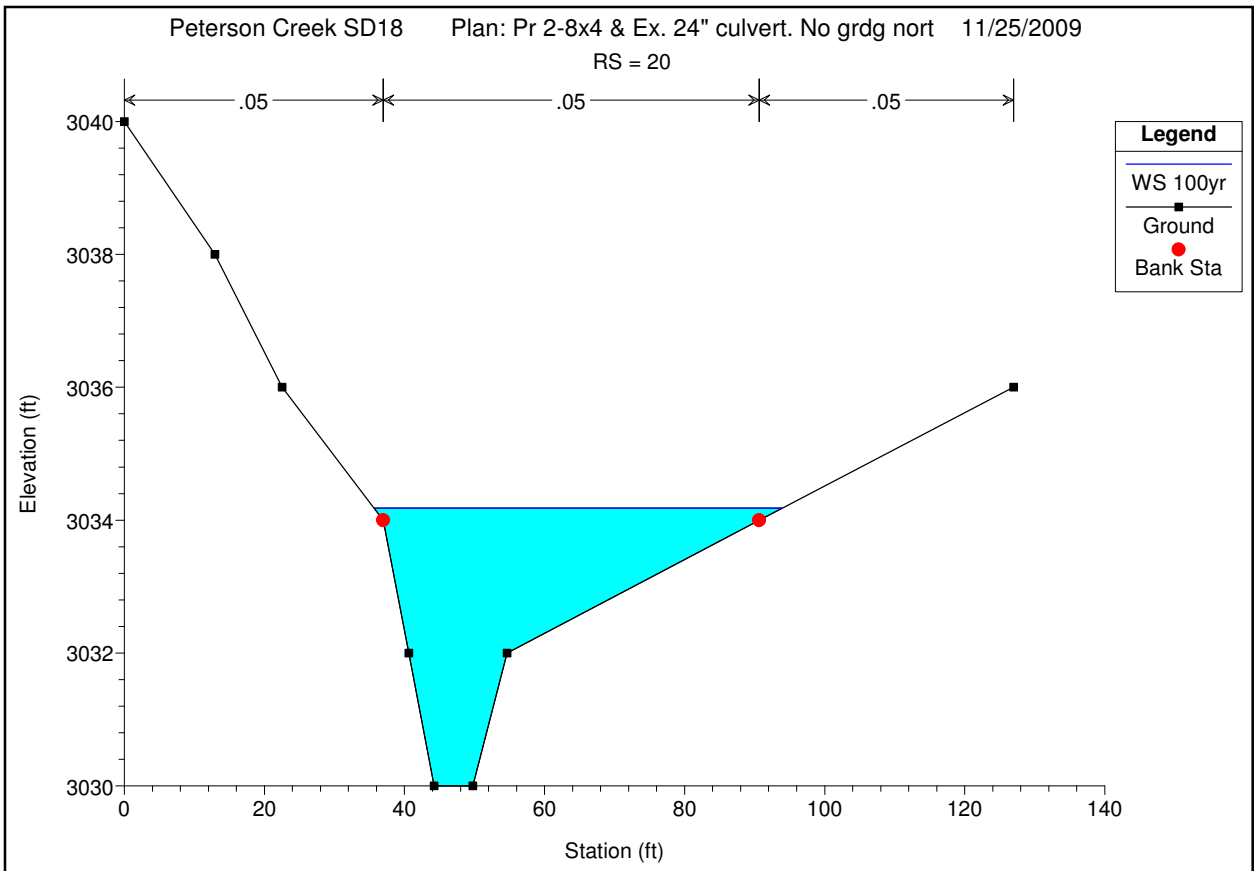

Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 50
.05
.05
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
3044
3042
3040
3038
3036
-60
-40
-20
0
20
40
60
80
Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 45 Culv Existing 24" CMP Culvert
.05
.05
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
3044
3042
3040
3038
3036
-60
-40
-20
0
20
40
60
80

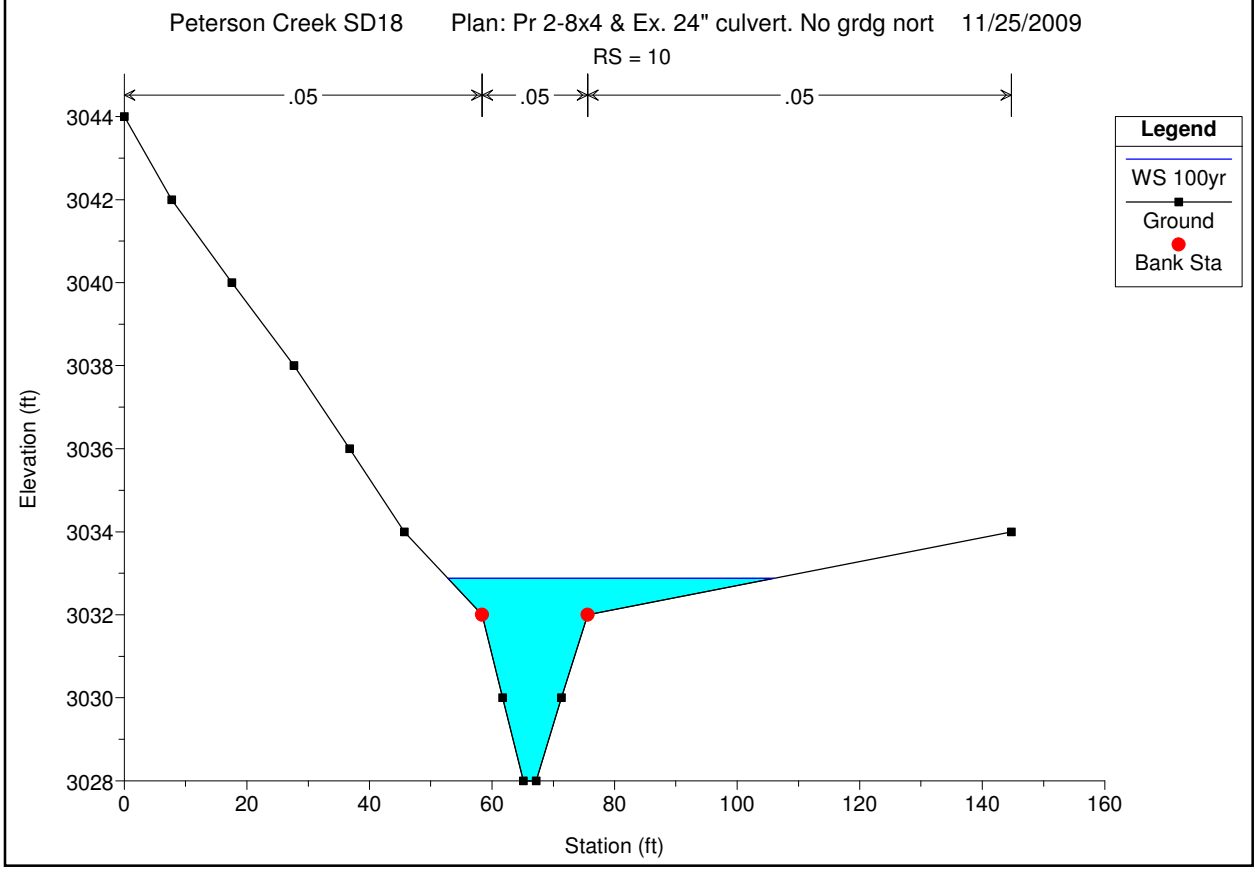

Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 45 Culv Existing 24" CMP Culvert
.05
.05
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
3042
3040
3038
3036
3034
0
20
40
60
80
100
120
Station (ft)
Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 42
.05
.05
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
3042
3040
3038
3036
3034
0
20
40
60
80
100
120
Station (ft)


Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 40
.05
.04
.05
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
3040
3039
3038
3037
3036
3035
3034
3033
0
20
40
60
80
100
120
Station (ft)
Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 35 Culv proposed culvert
.05
.04
.05
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
3044
3042
3040
3038
3036
3034
3032
0
20
40
60
80
100
120
Station (ft)


Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 35 Culv proposed culvert
.05
.04
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
3042
3040
3038
3036
3034
3032
3030
3028
0
20
40
60
80
100
120
140
160
Station (ft)

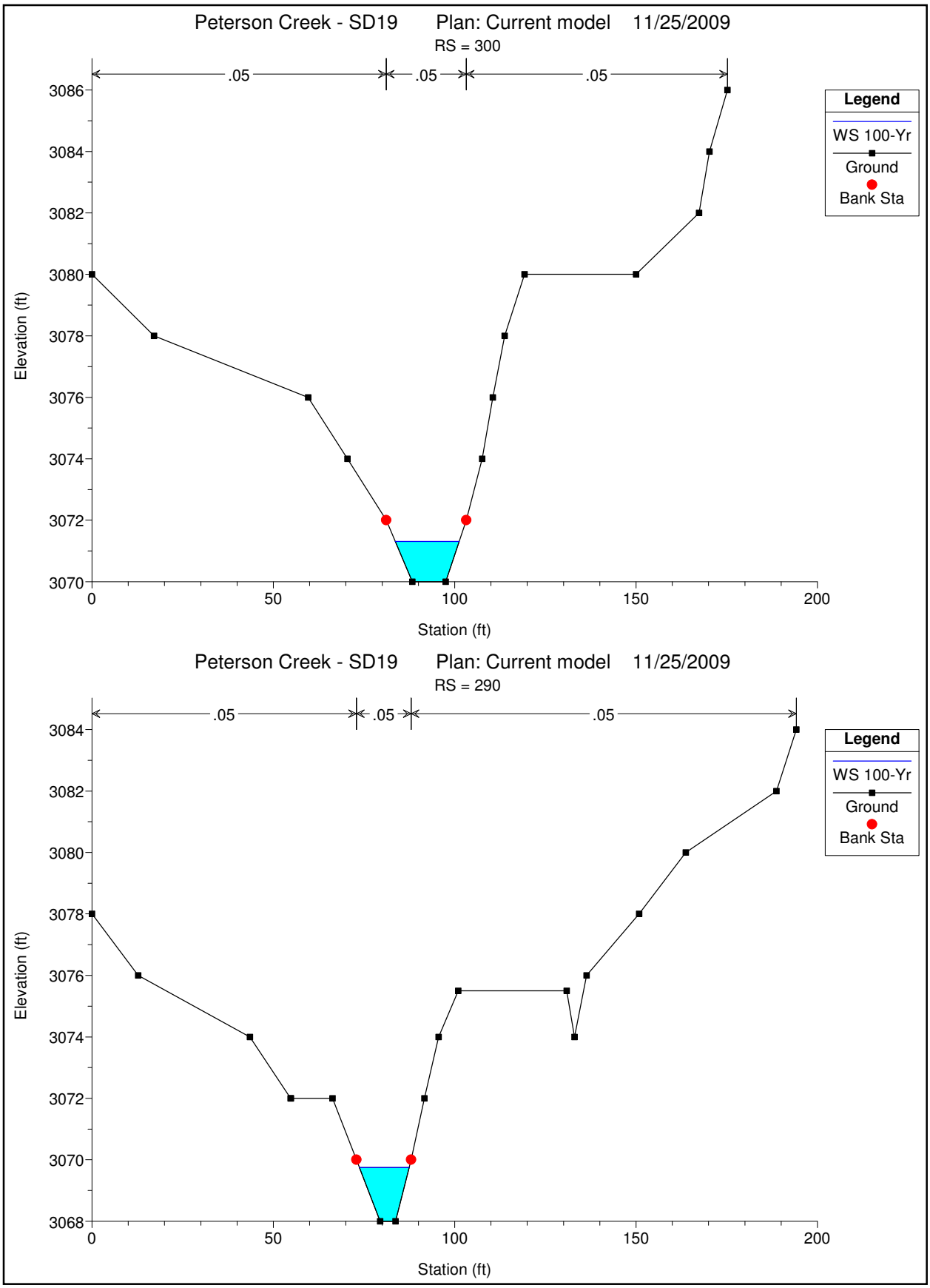

Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 30
.05
.04
Legend
WS 100yr
Ground
Ineff
Bank Sta
Elevation (ft)
3042
3040
3038
3036
3034
3032
3030
3028
0
20
40
60
80
100
120
140
160
Station (ft)

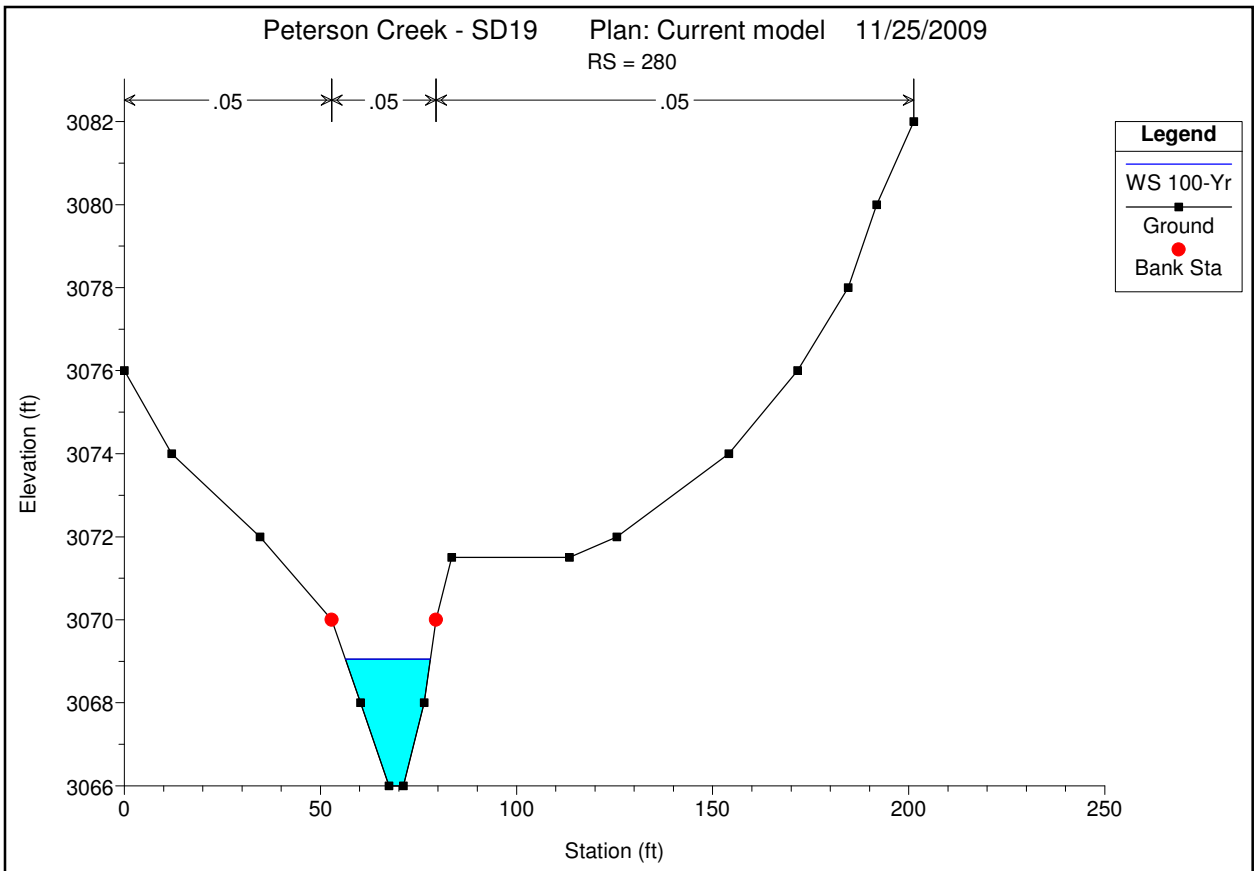

Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 20
.05
.05
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
3040
3038
3036
3034
3032
3030
0
20
40
60
80
100
120
140
Station (ft)

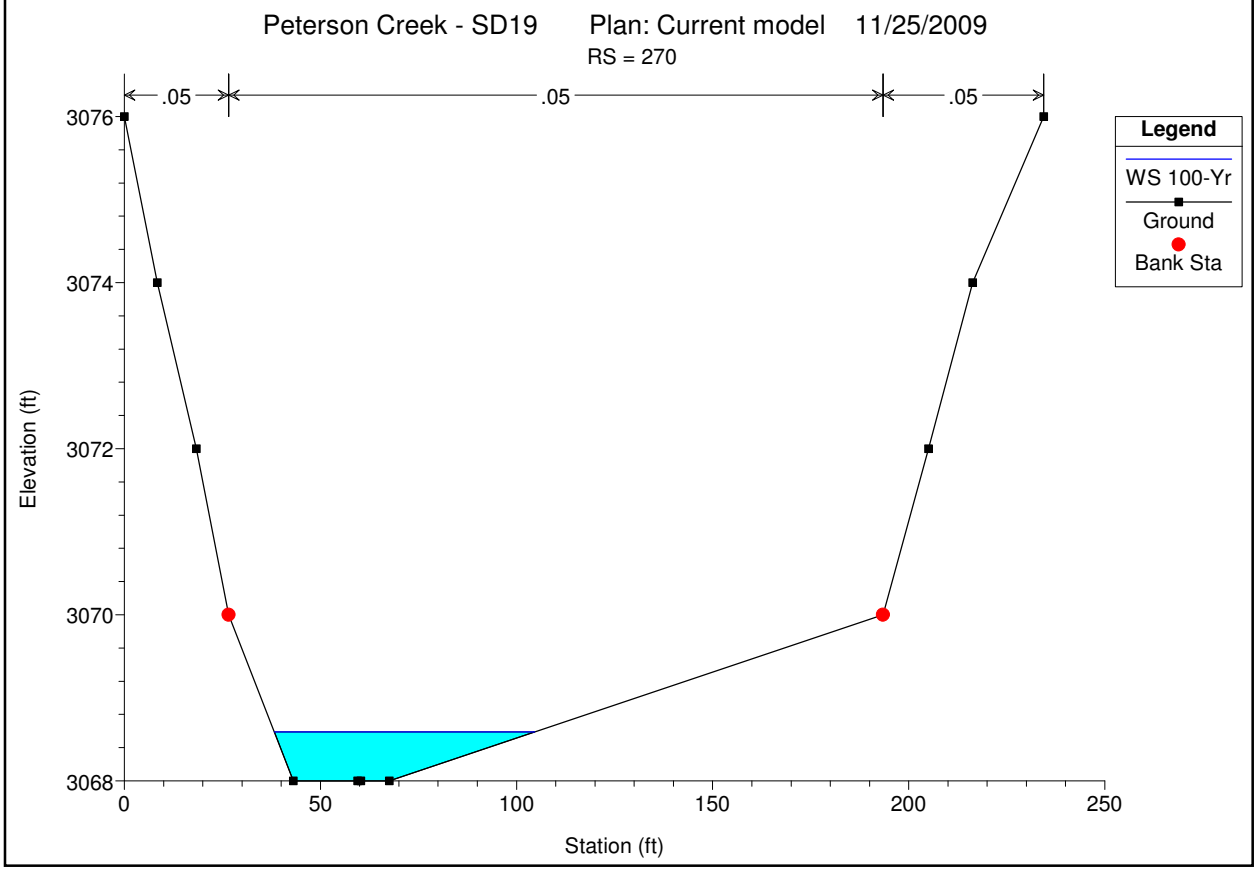

Peterson Creek SD18 Plan: Pr 2-8x4 & Ex. 24" culvert. No grdg nort 11/25/2009
RS = 10
.05
.05
.05
Legend
WS 100yr
Ground
Bank Sta
Elevation (ft)
3044
3042
3040
3038
3036
3034
3032
3030
3028
0
20
40
60
80
100
120
140
160
Station (ft)

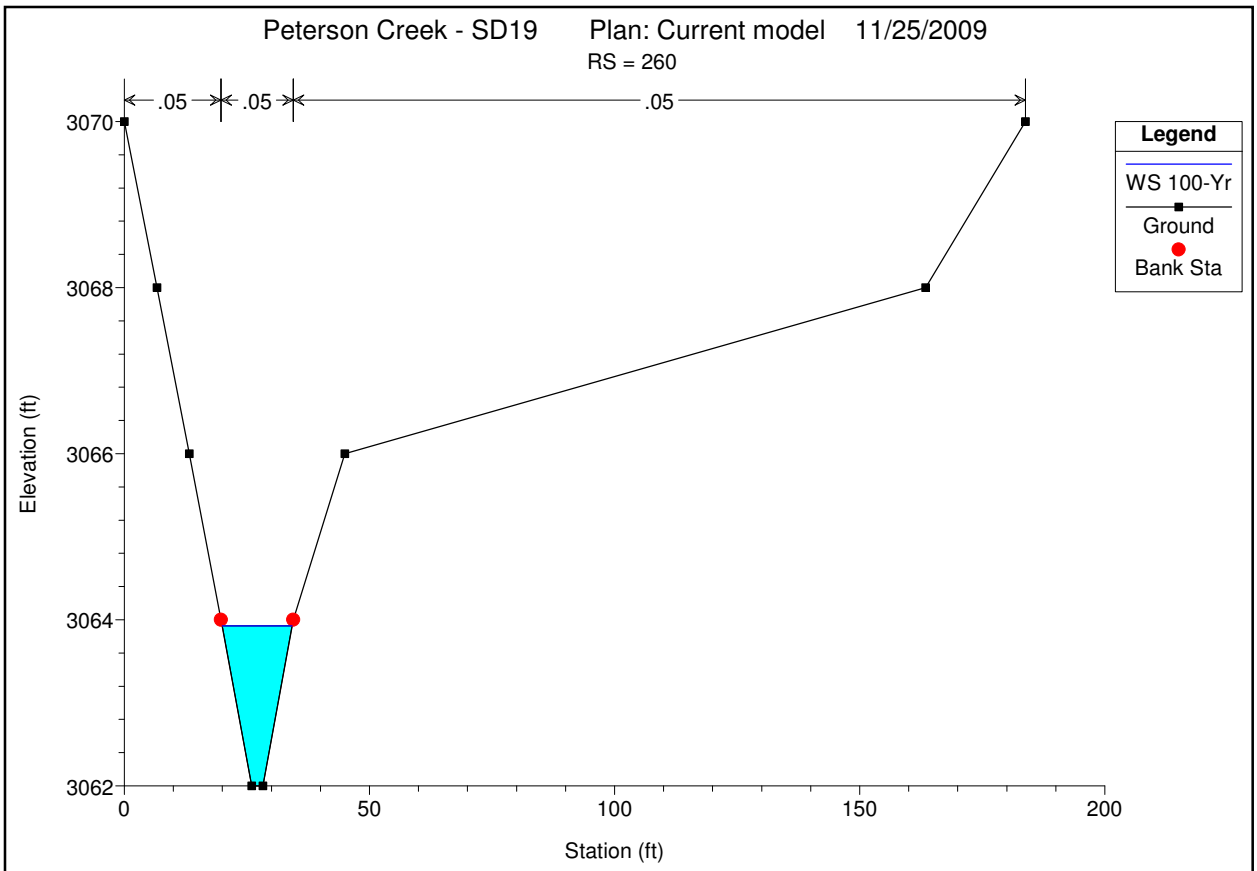
HEC-RAS Plan: 8x4 & 24" River: River #1 Reach: Reach #1 Profile: 100yr

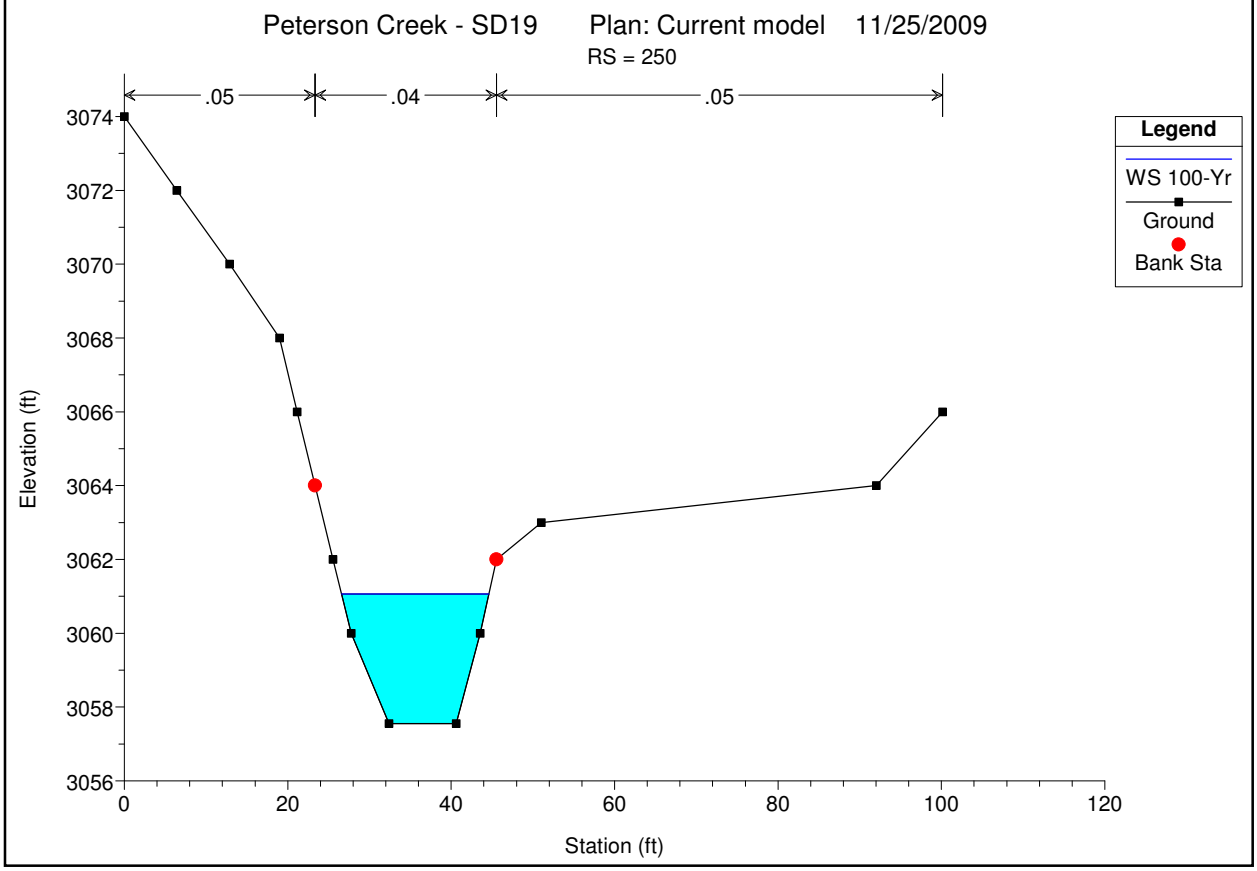
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach #1	150	100yr	443.80	3050.00	3052.05	3052.05	3052.72	0.033842	6.57	67.55	52.06	1.01
Reach #1	140	100yr	443.80	3048.00	3050.62		3050.81	0.006168	3.45	128.57	71.12	0.45
Reach #1	130	100yr	443.80	3048.00	3049.48	3049.48	3050.05	0.035909	6.07	73.10	65.16	1.01
Reach #1	120	100yr	443.80	3046.00	3047.48	3047.48	3048.07	0.035464	6.15	72.13	62.42	1.01
Reach #1	110	100yr	443.80	3042.00	3044.79	3044.79	3045.44	0.035642	6.42	69.10	55.84	1.02
Reach #1	100	100yr	443.80	3042.00	3044.25		3044.49	0.009114	3.96	112.00	67.20	0.54
Reach #1	90	100yr	443.80	3040.00	3042.80	3042.80	3043.55	0.033283	6.95	63.88	43.45	1.01
Reach #1	80	100yr	443.80	3038.00	3041.68	3041.68	3042.41	0.034643	6.84	64.84	46.20	1.02
Reach #1	70	100yr	443.80	3038.00	3040.77		3041.14	0.012163	5.17	98.36	73.89	0.64
Reach #1	60	100yr	443.80	3038.00	3040.65		3040.81	0.005422	3.14	143.09	88.53	0.42
Reach #1	50	100yr	443.80	3036.00	3040.51	3039.02	3040.69	0.002854	3.81	149.22	76.57	0.34
Reach #1	45		Culvert									
Reach #1	42	100yr	443.80	3034.00	3037.52		3038.05	0.015967	5.86	75.77	38.11	0.73
Reach #1	40	100yr	443.80	3033.00	3037.28	3035.84	3037.90	0.004108	6.28	70.67	49.31	0.53
Reach #1	35		Culvert									
Reach #1	30	100yr	443.80	3029.06	3034.25	3031.90	3034.67	0.002169	5.18	85.60	58.58	0.40
Reach #1	20	100yr	443.80	3030.00	3034.18		3034.51	0.011165	4.57	97.36	58.24	0.60
Reach #1	10	100yr	443.80	3028.00	3032.88	3032.88	3033.72	0.016704	7.62	69.48	53.19	0.76

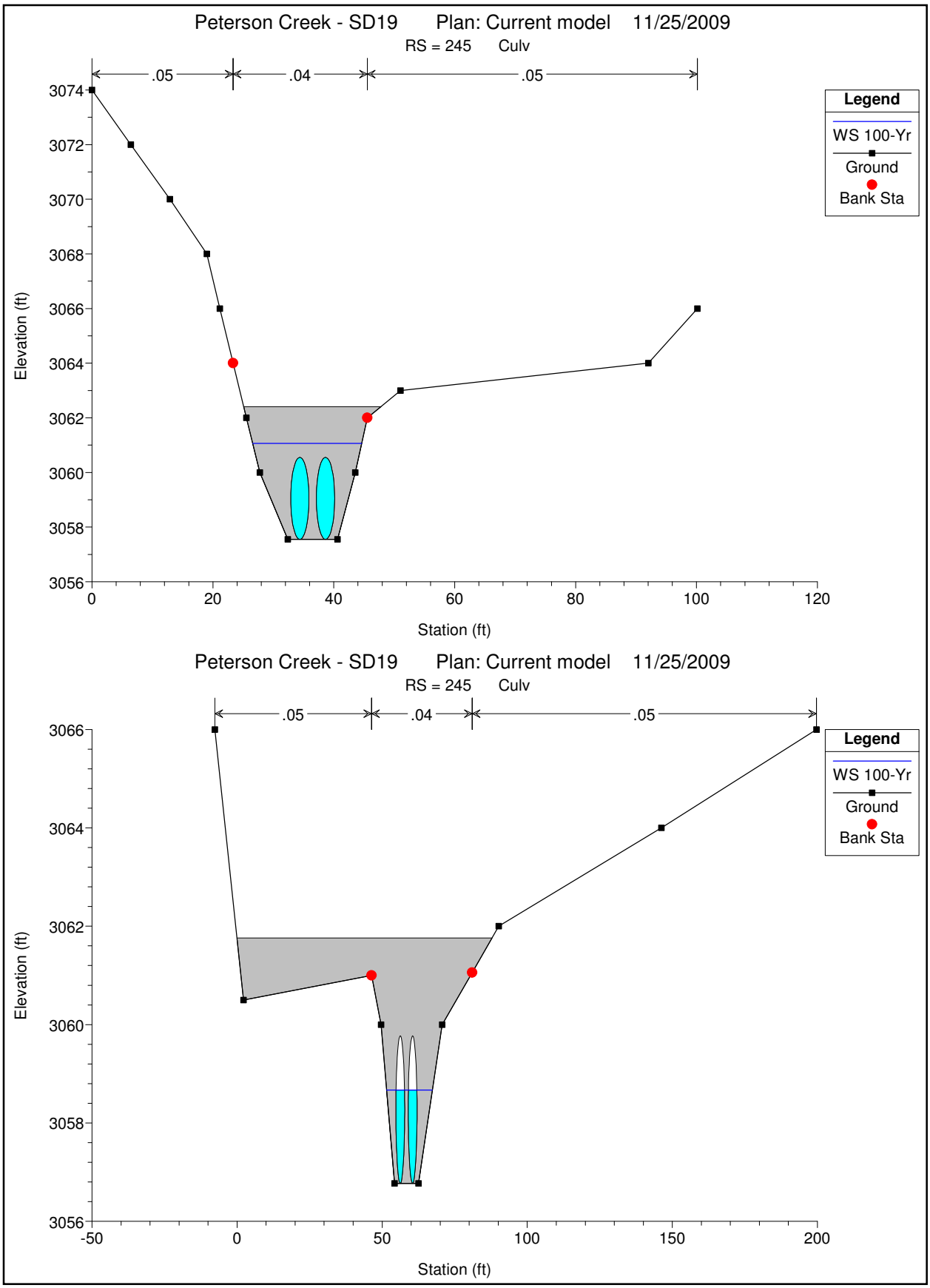

Peterson Creek - SD19 Plan: Current model 11/25/2009
RS = 300
.05
.05
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
3086
3084
3082
3080
3078
3076
3074
3072
3070
0
50
100
150
200
Peterson Creek - SD19 Plan: Current model 11/25/2009
RS = 290
.05
.05
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
3084
3082
3080
3078
3076
3074
3072
3070
3068
0
50
100
150
200

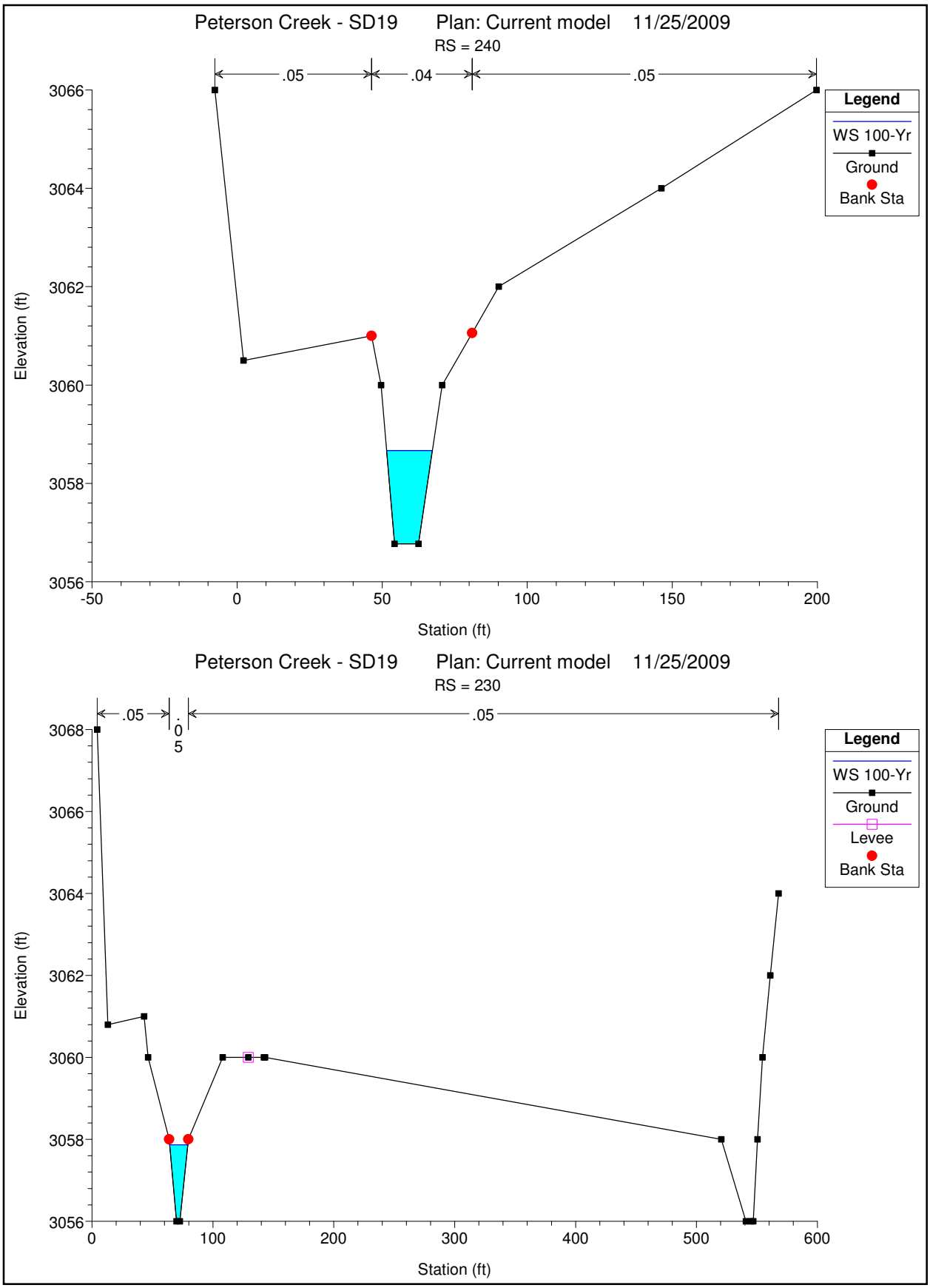

Peterson Creek - SD19 Plan: Current model 11/25/2009
RS = 280
.05
.05
.05
3082
3080
3078
3076
3074
3072
3070
3068
3066
Elevation (ft)
0
50
100
150
200
250
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta

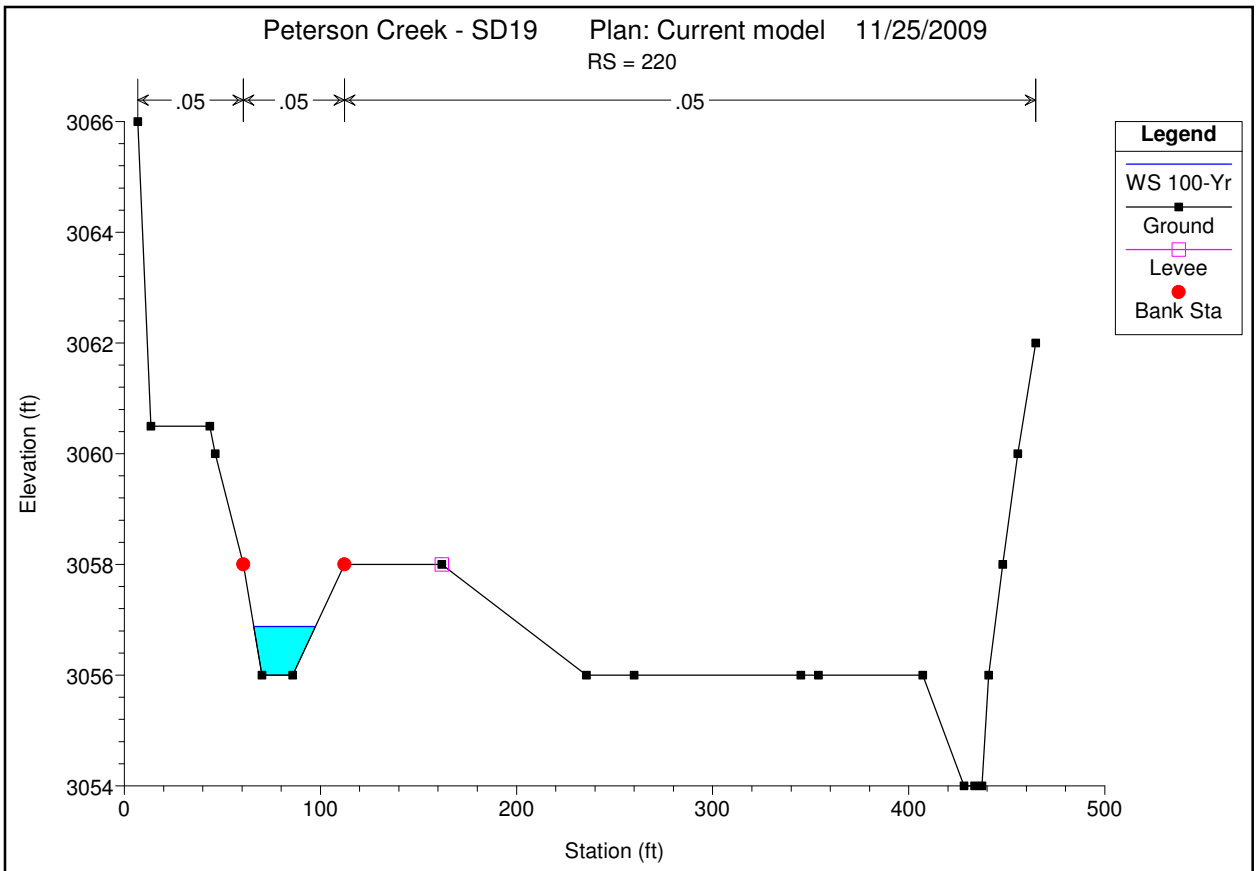

Peterson Creek - SD19 Plan: Current model 11/25/2009
RS = 270
.05
.05
.05
3076
3074
3072
3070
3068
Elevation (ft)
0
50
100
150
200
250
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta

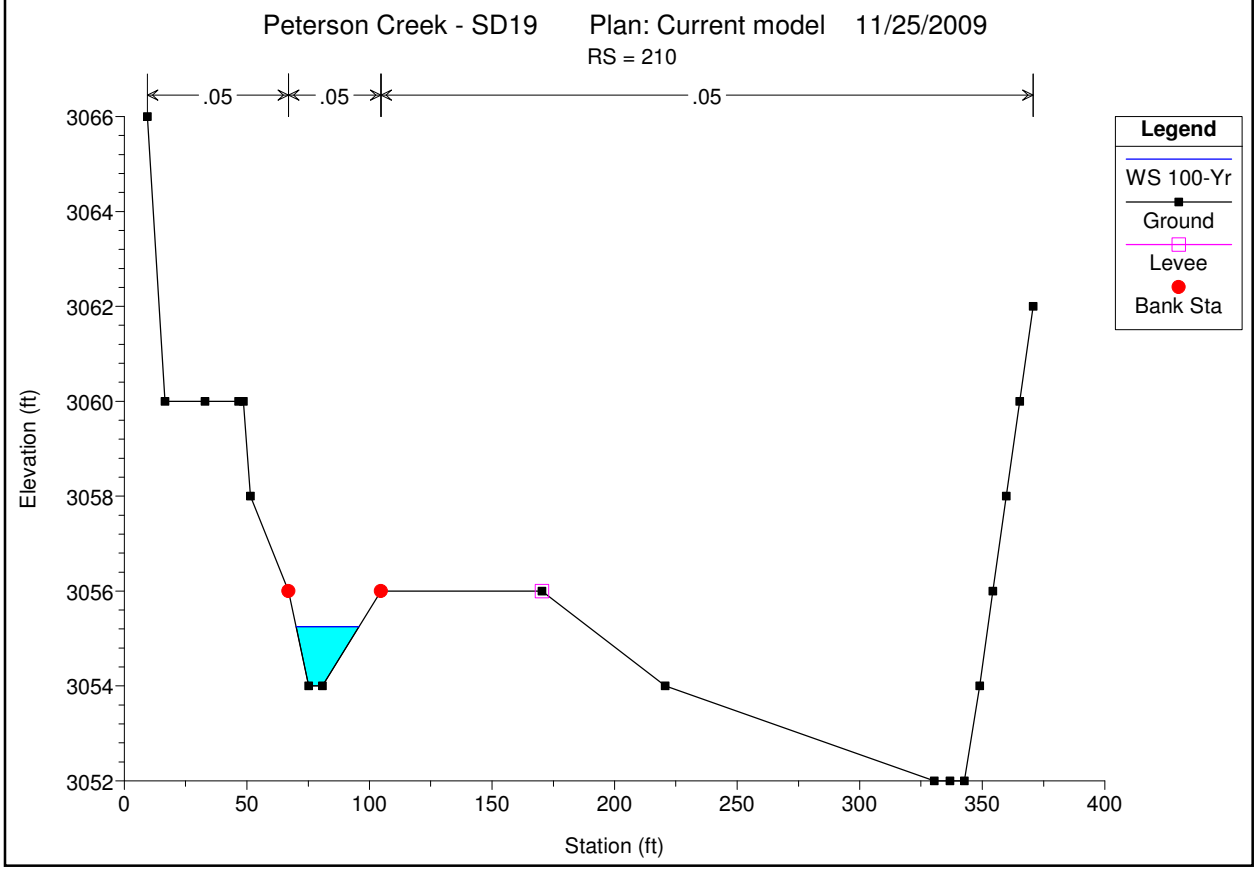

Peterson Creek - SD19 Plan: Current model 11/25/2009
RS = 260
.05
.05
.05
3070
3068
3066
3064
3062
Elevation (ft)
0
50
100
150
200
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta

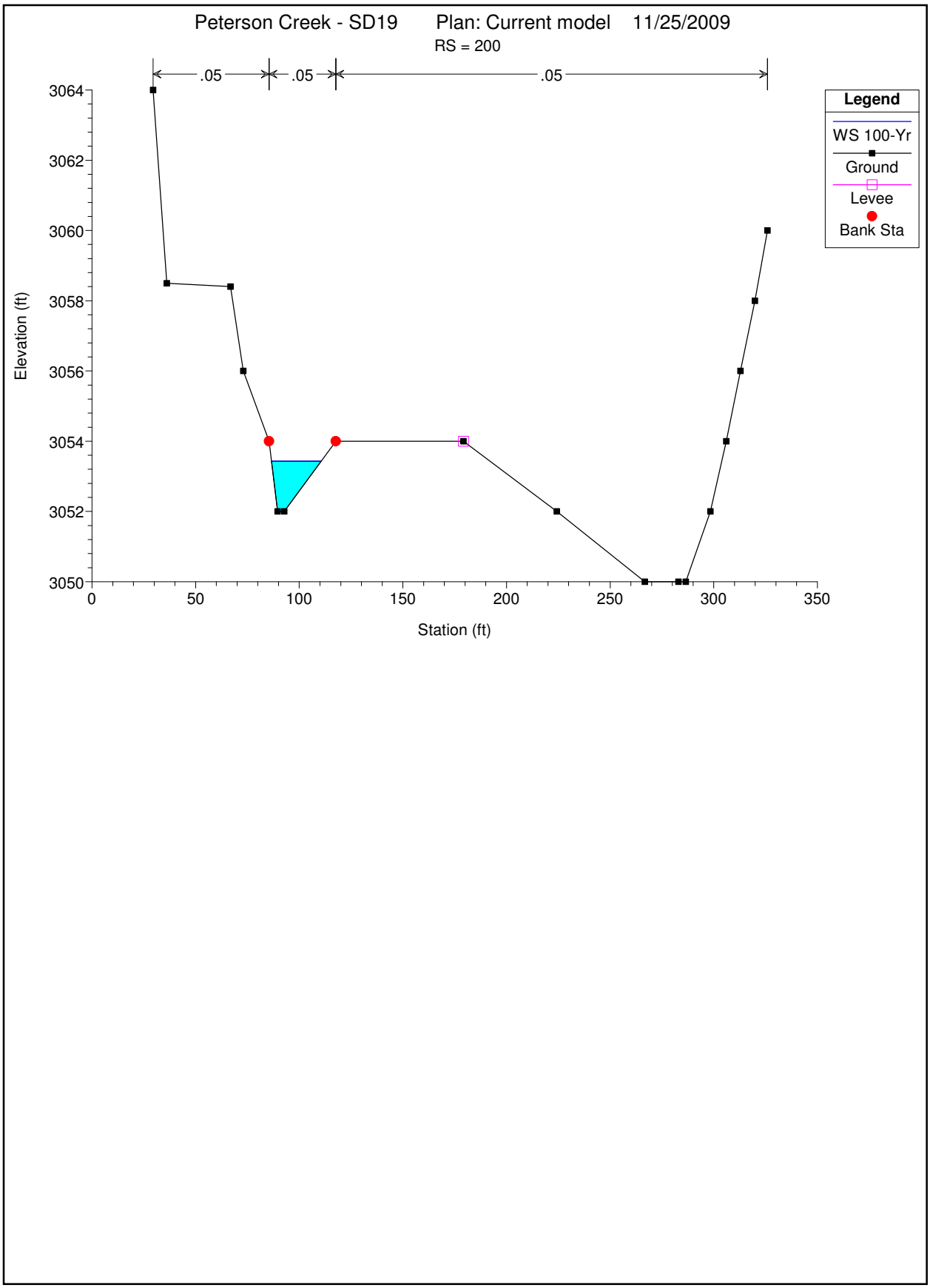

Peterson Creek - SD19 Plan: Current model 11/25/2009
RS = 250
.05
.04
.05
3074
3072
3070
3068
3066
3064
3062
3060
3058
3056
Elevation (ft)
0
20
40
60
80
100
120
Station (ft)
Legend
WS 100-Yr
Ground
Bank Sta


Peterson Creek - SD19 Plan: Current model 11/25/2009
RS = 245 Culv
.05
.04
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
3074
3072
3070
3068
3066
3064
3062
3060
3058
3056
0
20
40
60
80
100
120
Peterson Creek - SD19 Plan: Current model 11/25/2009
RS = 245 Culv
.05
.04
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
3066
3064
3062
3060
3058
3056
-50
0
50
100
150
200


Peterson Creek - SD19 Plan: Current model 11/25/2009
RS = 240
.05
.04
.05
Legend
WS 100-Yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
3066
3064
3062
3060
3058
3056
-50
0
50
100
150
200
Peterson Creek - SD19 Plan: Current model 11/25/2009
RS = 230
.05
.05
Legend
WS 100-Yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
3068
3066
3064
3062
3060
3058
3056
0
100
200
300
400
500
600


Peterson Creek - SD19 Plan: Current model 11/25/2009
RS = 220
.05
.05
.05
Legend
WS 100-Yr
Ground
Levee
Bank Sta
Elevation (ft)
3066
3064
3062
3060
3058
3056
3054
0
100
200
300
400
500
Station (ft)

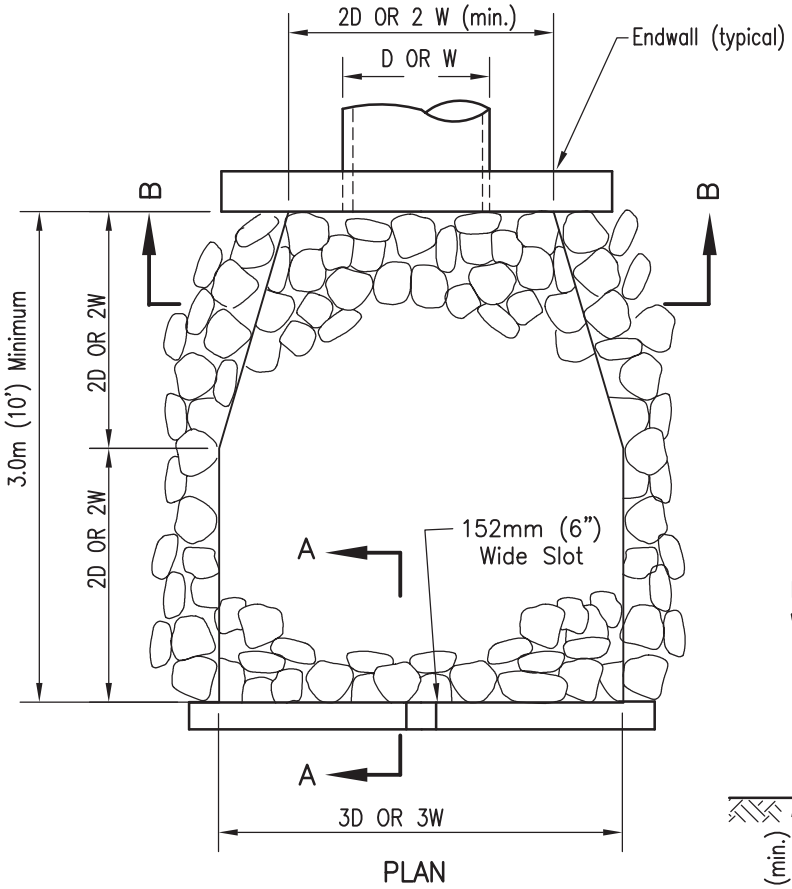

Peterson Creek - SD19 Plan: Current model 11/25/2009
RS = 210
.05
.05
.05
Legend
WS 100-Yr
Ground
Levee
Bank Sta
Elevation (ft)
3066
3064
3062
3060
3058
3056
3054
3052
0
50
100
150
200
250
300
350
400
Station (ft)


Peterson Creek - SD19 Plan: Current model 11/25/2009
RS = 200
.05
.05
.05
Legend
WS 100-Yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
3064
3062
3060
3058
3056
3054
3052
3050
0
50
100
150
200
250
300
350

HEC-RAS Plan: SDB039600 River: River #1 Reach: Reach #1 Profile: 100-Yr

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach #1	300	100-Yr	96.21	3070.00	3071.31	3071.28	3071.78	0.035277	5.48	17.54	17.61	0.97
Reach #1	290	100-Yr	96.21	3068.00	3069.75	3069.75	3070.33	0.037476	6.11	15.76	13.77	1.01
Reach #1	280	100-Yr	96.21	3066.00	3069.05		3069.15	0.003145	2.42	39.79	21.67	0.31
Reach #1	270	100-Yr	96.21	3068.00	3068.59	3068.59	3068.79	0.049409	3.60	26.72	66.35	1.00
Reach #1	260	100-Yr	96.21	3062.00	3063.93	3063.93	3064.49	0.037402	6.03	15.97	14.26	1.00
Reach #1	250	100-Yr	96.21	3057.55	3061.07	3059.01	3061.13	0.000962	2.02	47.52	18.04	0.22
Reach #1	245		Culvert									
Reach #1	240	100-Yr	96.21	3056.77	3058.67		3058.94	0.008564	4.22	22.77	15.76	0.62
Reach #1	230	100-Yr	96.21	3056.00	3057.87	3057.84	3058.39	0.035310	5.82	16.52	14.95	0.98
Reach #1	220	100-Yr	96.21	3056.00	3056.88	3056.88	3057.21	0.042717	4.64	20.73	31.45	1.01
Reach #1	210	100-Yr	96.21	3054.00	3055.25	3055.25	3055.63	0.039532	4.91	19.60	25.69	0.99
Reach #1	200	100-Yr	96.21	3052.00	3053.44	3053.42	3053.81	0.037209	4.94	19.48	23.97	0.97

CULVERT AND RIPRAP SIZING SUMMARY TABLE

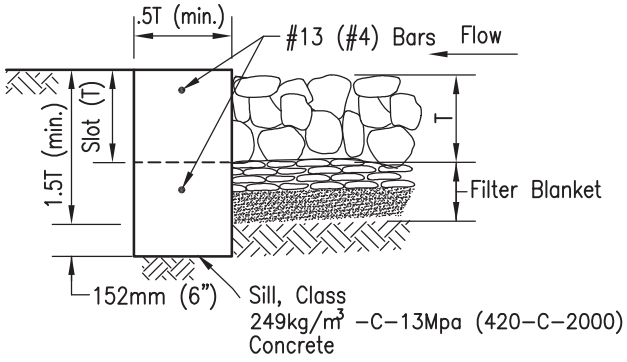


PLAN

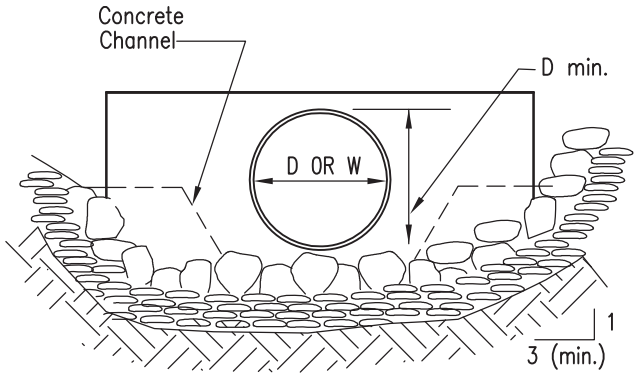
Design Velocity m/sec (ft/sec)*	Rock Classification	T (min)
1.8–3 (6–10)	No. 2 Backing	320mm (1.1ft)
3–3.7 (10–12)	220 kg (1/4 ton)	823mm (2.7ft)
3.7–4.3 (12–14)	450 kg (1/2 ton)	1.1m (3.5ft)
4.3–4.9 (14–16)	900 kg (1 ton)	1.3m (4.4ft)
4.9–5.5 (16–18)	1.8 tonne (2 ton)	1.6m (5.4ft)

*over 5.5 mps (18 fps) requires special design

D = Pipe Diameter
W = Bottom Width of Channel



SECTION A–A



SECTION B–B

NOTES

1. Plans shall specify:
   A) Rock Class and thickness (T).
   B) Filter material, number of layers and thickness.
2. Rip rap shall be either quarry stone or broken concrete (if shown on the plans.) Cobbles are not acceptable.
3. Rip rap shall be placed over filter blanket which may be either granular material or filter fabric (woven filter slit film fabric shall not be used).
4. See Regional Supplement Amendments for selection of filter blanket.
5. Rip rap energy dissipators shall be designated as either Type 1 or Type 2. Type 1 shall be with concrete sill; Type 2 shall be without sill.

Revision	By	Approved	Date
ORIGINAL		Kercheval	12/75
Add Metric		T. Stanton	03/03
Add Rip Rap Table		S. Brady	04/06
Edited		T. Stanton	02/09

SAN DIEGO REGIONAL STANDARD DRAWING

RIP RAP ENERGY DISSIPATER

RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE

Chairperson R.C.E. 19246 Date 04/27/2006

DRAWING NUMBER D–40

Culvert and Rip Rap Sizing Summary Table

	SD01	SD02	SD03	SD04	SD05	SD06	SD07	SD08	SD09	SD10	SD11	SD12	SD13	SD14	SD15	SD16	SD17	SD18	SD19	SD20	SD01-P	SD02-P
Culvert Data	**[3]31+32.45**	**[1]33+37.23**	**[1]38+01.54**	**[3]40+34.69**	**N/A**	**[3]56+21.82**	**[2]59+66.37**	**[1]70+82.70**	**[1]73+01.11**	**[2]79+71.02**	**[3]83+06.52**	**[1]86+36.04**	**[2]89+63.56**	**[3]95+06.72**	**[2]101+17.00**	**[2]103+20.95**	**[4]107+36.02**	**[1]115+38.09**	**[1]120+15.30**	**[1]123+23.61**	**[3]12+59.60**	**[3]17+60**
Tributary Area (acres)	8.20	1.50	19.02	22.51	5.41	17.72	4.97	7.70	121.89	0.69	8.43	12.87	5.52	11.26	2.27	1.46	13.81	N/A	N/A	11.71	8.59	19.35
cfs/acre ratio	1.9	N/A	1.9	1.9	2.0	1.9	2.0	N/A	N/A	2.0	1.9	N/A	2.0	1.9	2.0	2.0	1.8	N/A	N/A	N/A	1.9	1.9
Discharge (cfs)	15.58	3.01	36.14	42.77	10.82	33.67	9.94	14.71	139.02	1.38	16.02	23.58	11.04	21.39	4.54	2.92	25.27	443.80	96.21	16.88	16.32	24.40
Quantity of Culverts	1	1	1	2	1	1	1	1	2	1	1	1	1	1	1	1	1	2	2	1	1	1
Diameter (in.)	24	18	30	24	18	30	18	24	42	18	24	24	18	24	18	18	30	NA	36	18	24	30
Diameter (ft.)	2	1.5	2.5	2	1.5	2.5	1.5	2	3.5	1.5	2	2	1.5	2	1.5	1.5	2.5	8x4	3.0	1.5	2	2.5
Velocity (fps)	14.06	10.65	18.30	10.39	13.16	16.93	15.65	10.74	15.63	7.52	11.66	14.71	14.85	13.79	10.13	9.41	14.13	5.18	4.22	19.90	14.95	9.02
Tailwater Depth (ft)	0.54	0.36	0.67	0.63	0.43	0.68	0.41	0.56	1.36	0.34	0.56	0.88	0.42	0.57	0.39	0.37	0.67	5.19	1.9	0.43	0.7	0.75
y_n, Culvert Normal Depth (ft)	0.68	0.29	0.87	1.14	0.63	0.89	0.53	0.80	1.27	0.22	0.79	0.91	0.60	0.85	0.43	0.34	0.84	2.25	1.95	0.66	0.69	1.23
D', Adjusted Culvert Rise (ft)	1.34	0.90	1.69	1.57	1.07	1.70	1.02	1.40	2.39	0.86	1.40	1.46	1.05	1.43	0.97	0.92	1.67	#VALUE!	2.48	1.08	1.35	1.87
D_{50}, Riprap size (ft)	0.97	0.28	1.75	2.58	1.02	1.57	1.02	0.81	3.28	0.11	0.92	0.92	1.08	1.28	0.40	0.25	1.11	#VALUE!	1.37	1.79	0.79	0.82
Edge of Road Elev. (ft)	3147.53	3149.91	3126.58	3126.10	3077.90	3056.82	3079.66	3072.37	3068.18	3095.50	3085.33	3068.78	3056.89	3074.91	3084.96	3083.06	3070.12	3042.16	3062.41	3084.14	3229.24	3190.36
Allowable Headwater Elev.	3146.53	3148.91	3125.58	3125.10	3076.90	3055.82	3078.66	3071.37	3067.18	3094.50	3084.33	3067.78	3055.89	3073.91	3083.96	3082.06	3069.12	3041.16	3061.41	3083.14	3228.24	3189.36
Computed Headwater Elev (ft)	3146.14	3146.86	3125.46	3124.19	3076.90	3055.54	3078.17	3070.13	3066.86	3091.92	3083.23	3067.78	3055.43	3073.67	3082.39	3080.22	3068.20	3037.28	3061.07	3083.13	3228.23	3189.36
Freeboard From Edge of Road (ft)	1.39	3.05	1.12	1.91	1.00	1.28	1.49	2.24	1.32	3.58	2.10	1.00	1.46	1.24	2.57	2.84	1.92	4.88	1.34	1.01	1.01	1.00
Rip Rap Per D-40				T=2.7' 1/2 Ton	N/A				T=4.4 1 Ton	T=1.1 No. 2						T=1.1 No. 2		T=1.1 No. 2	T=1.1 No. 2			T=1.1' No. 2
[5]Rip Rap Per Mod. RSD D-40	T=2.5' Light L=10'	T=1.5' Light L=10'	T=3.7' 1/2 Ton L=20'		N/A	T=3.7' 1/2 Ton L=17.5'	T=2.5' Light L=10'	T=2.0' Light L=10'			T=2.5' Light L=10'	T=2.5' Light L=12'	T=2.5' Light L=10'	T=3.7' 1/2 Ton L=14'	T=1.5' Light L=10'		T=2.5' Light L=15'			T=3.7' 1/2 Ton L=12'	T=2.0' Light L=10'	

(1) Rational Method Analyses used to calculate peak discharge
(2) Peak discharge calculated using 2.0 cfs/acre ratio
(3) Peak discharge calculated using 1.9 cfs/acre ratio
(4) Peak discharge calculated using 1.8 cfs/acre ratio
(5) HEC-14 used to calculate D_{50} for selection of rock class in Modified RSD D-40. Rock classification selection taken from CALTrans Gradation Table 5-1.

APPENDIX C: MAPS & EXHIBITS

Existing Hydrology Map

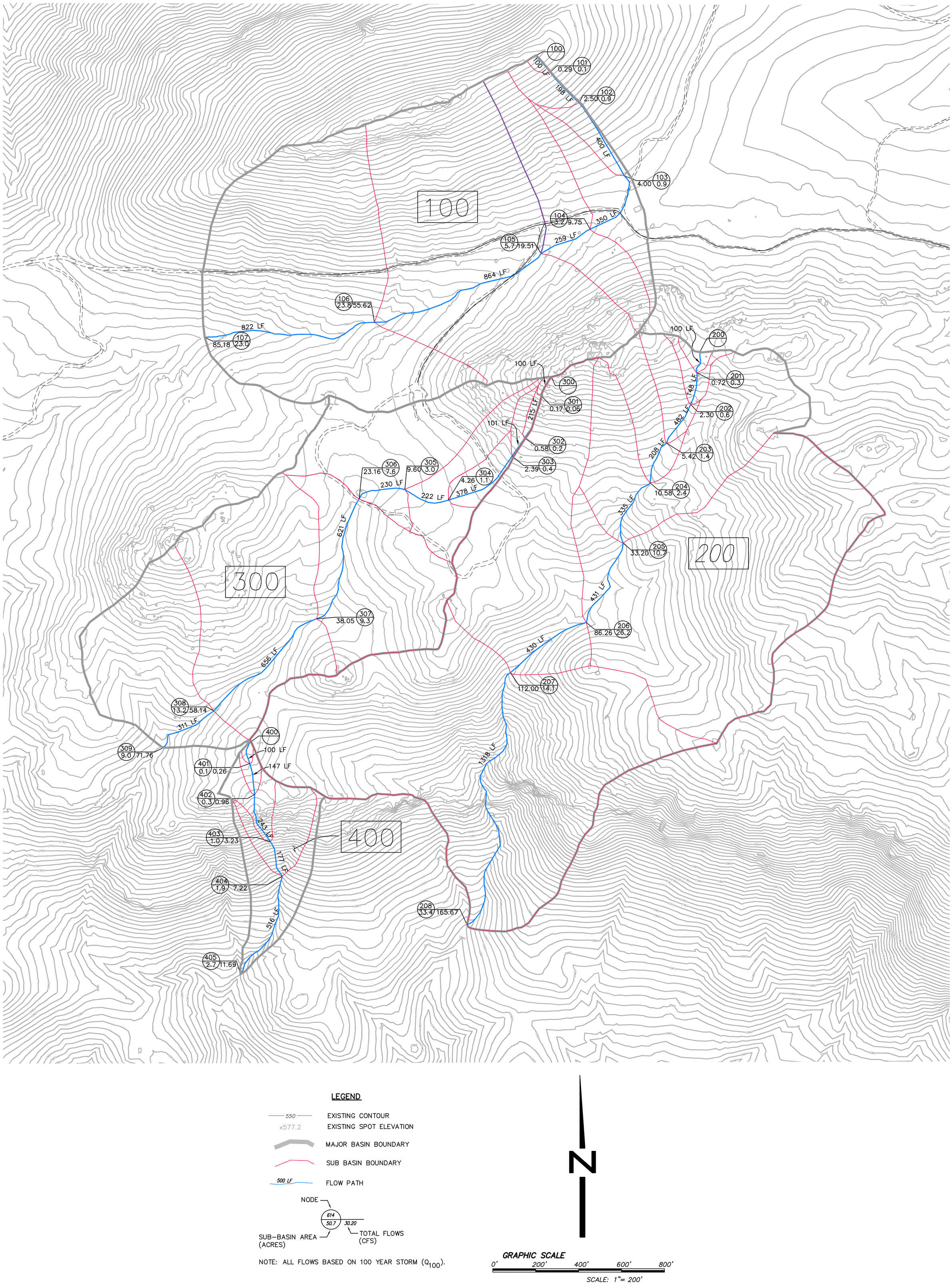
Proposed Hydrology Map

Proposed Access Road Hydrology Map

Peterson Creek HEC-RAS Exhibits

BERKEBILE
XREFS: *EXTO, EXPN, EXMA, PRPN, 36X48S, PR-HH-MRM, PRUT, PRTO*

DATE: 11/23/09 TIME: 5:15:00 PM DRAWING NAME: EXHY FINAL.DWG
SERVER: PAGE SETUP: ---- LAYOUT: Layout1
PATH: N:\SDB039600\CADD\USFS\HH DESIGNER: ### PROJ. MGR: ###



LEGEND

- 550 — EXISTING CONTOUR
- x577.2 — EXISTING SPOT ELEVATION
- MAJOR BASIN BOUNDARY
- SUB BASIN BOUNDARY
- 500 LF — FLOW PATH
- NODE: 614 / 50.7 (SUB-BASIN AREA (ACRES)) / 30.20 (TOTAL FLOWS (CFS))

NOTE: ALL FLOWS BASED ON 100 YEAR STORM (Q_{100}).

N

GRAPHIC SCALE
0' 200' 400' 600' 800'
SCALE: 1"= 200'

JOB NUMBER SDB039600
SCALE VERTICAL: 1"= N/A HORIZONTAL: 1"= 200'
SHEET NUMBER 1 OF 1 SHEETS

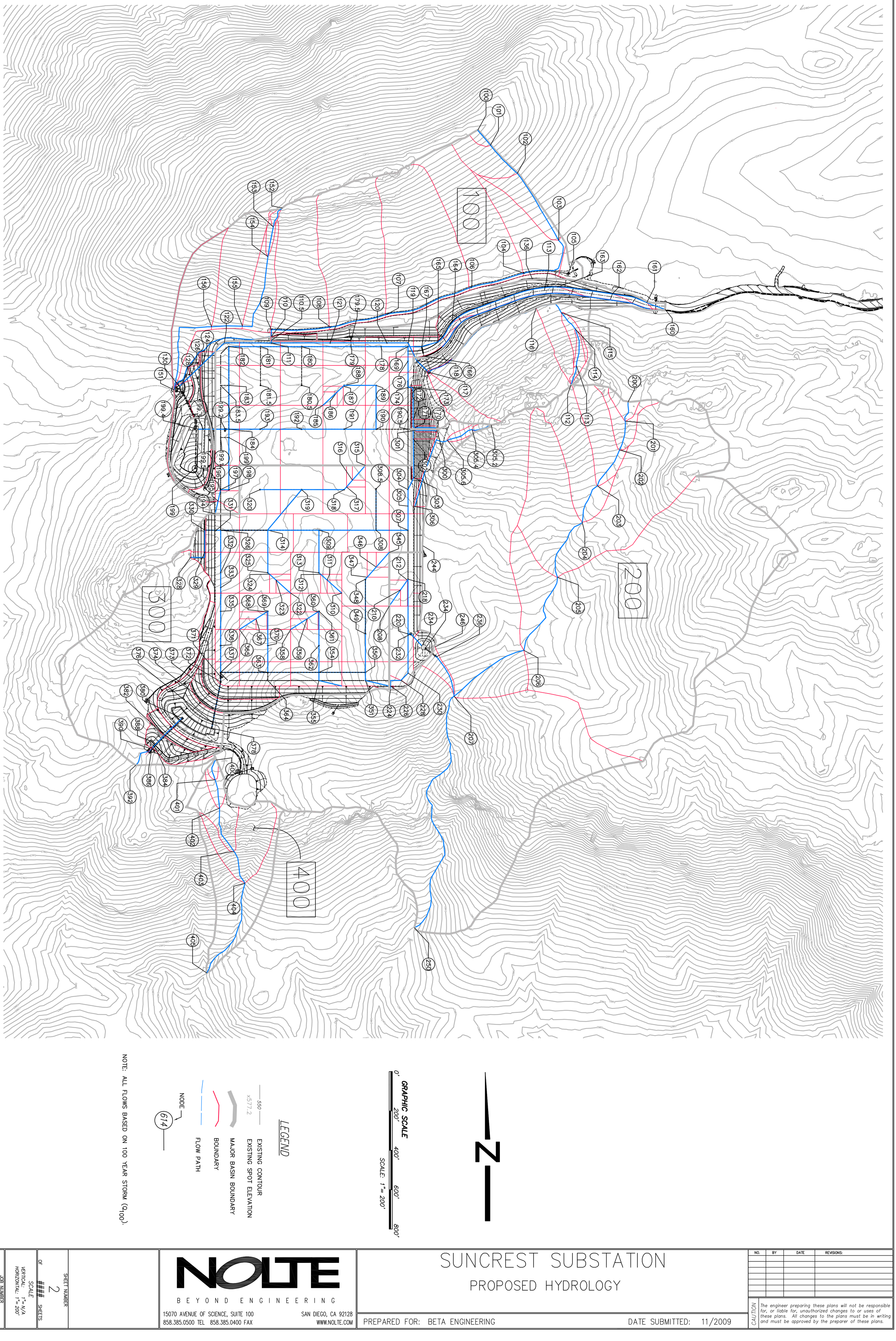
NOLTE
BEYOND ENGINEERING
15070 AVENUE OF SCIENCE, SUITE 100 SAN DIEGO, CA 92128
858.385.0500 TEL 858.385.0400 FAX WWW.NOLTE.COM

SUNCREST SUBSTATION
EXISTING HYDROLOGY

PREPARED FOR: BETA ENGINEERING DATE SUBMITTED: 11/2009

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NOTE: ALL FLOWS BASED ON 100 YEAR STORM (Q_{100}).

LEGEND

- 550 — EXISTING CONTOUR
- x577.2 EXISTING SPOT ELEVATION
- MAJOR BASIN BOUNDARY
- BOUNDARY
- FLOW PATH
- NODE 614

GRAPHIC SCALE
0' 200' 400' 600' 800'
SCALE: 1"= 200'

N

SUNCREST SUBSTATION

PROPOSED HYDROLOGY

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DATE SUBMITTED: 11/2009

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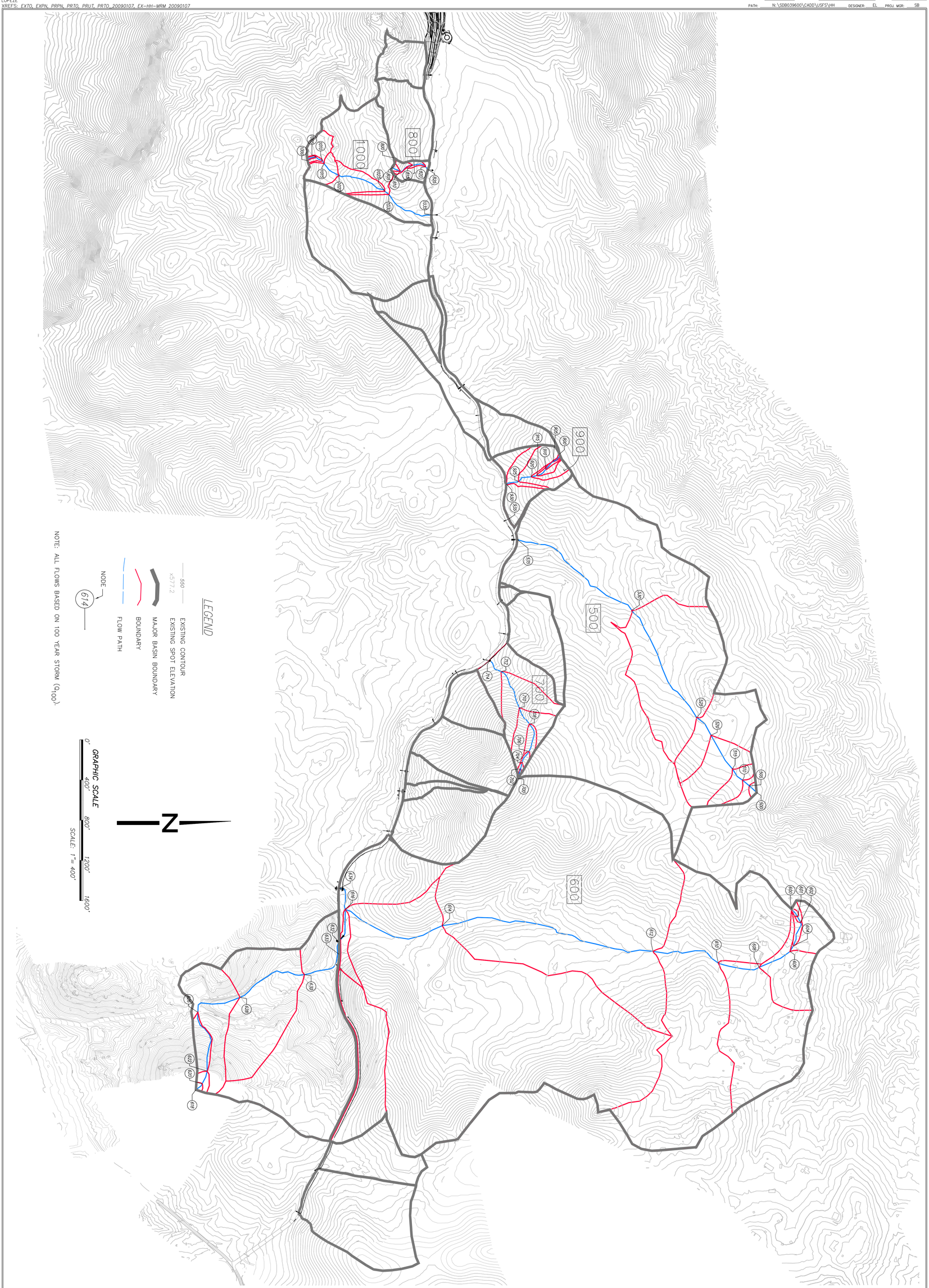
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PROPOSED ACCESS ROAD HYDROLOGY

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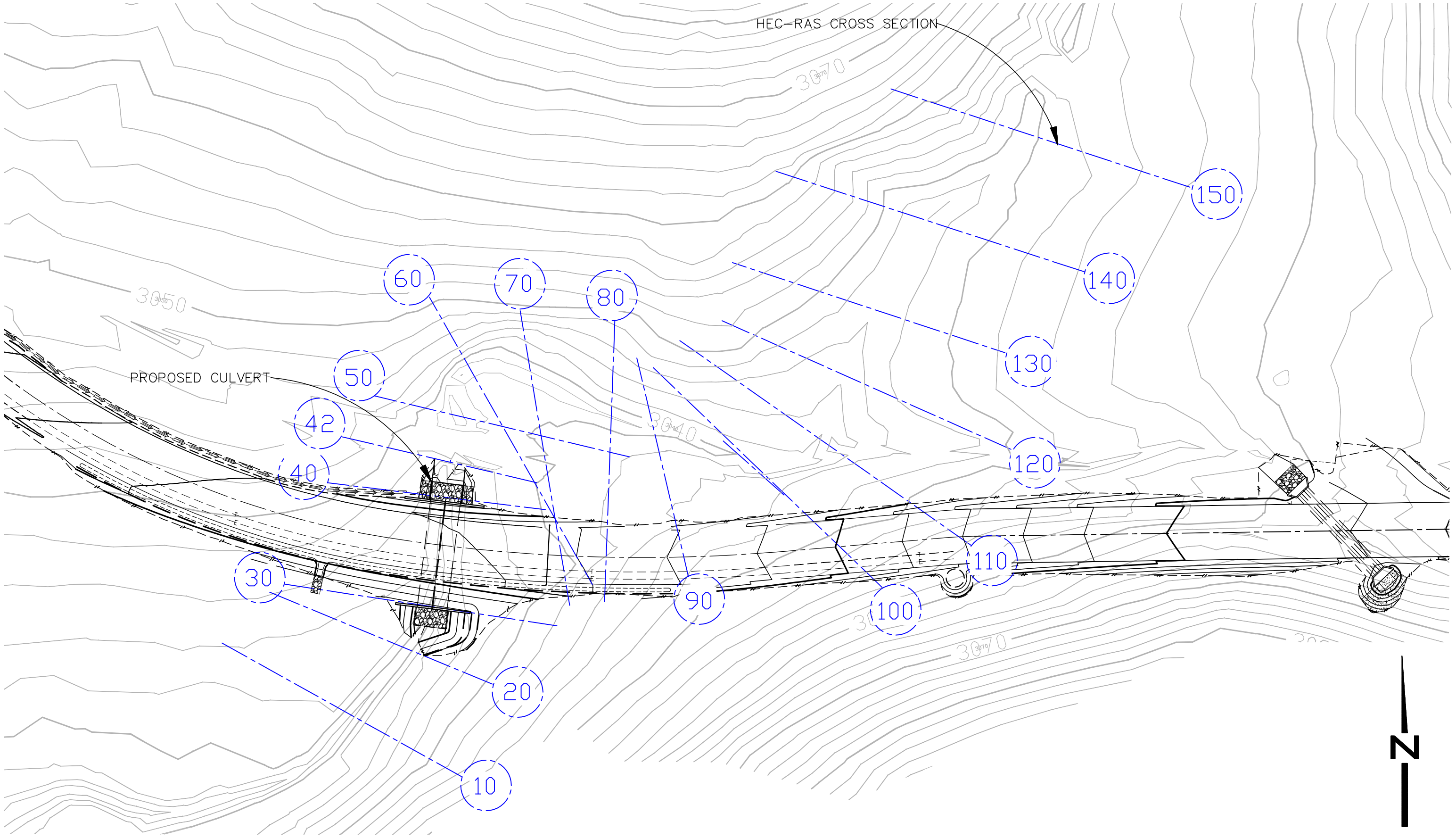
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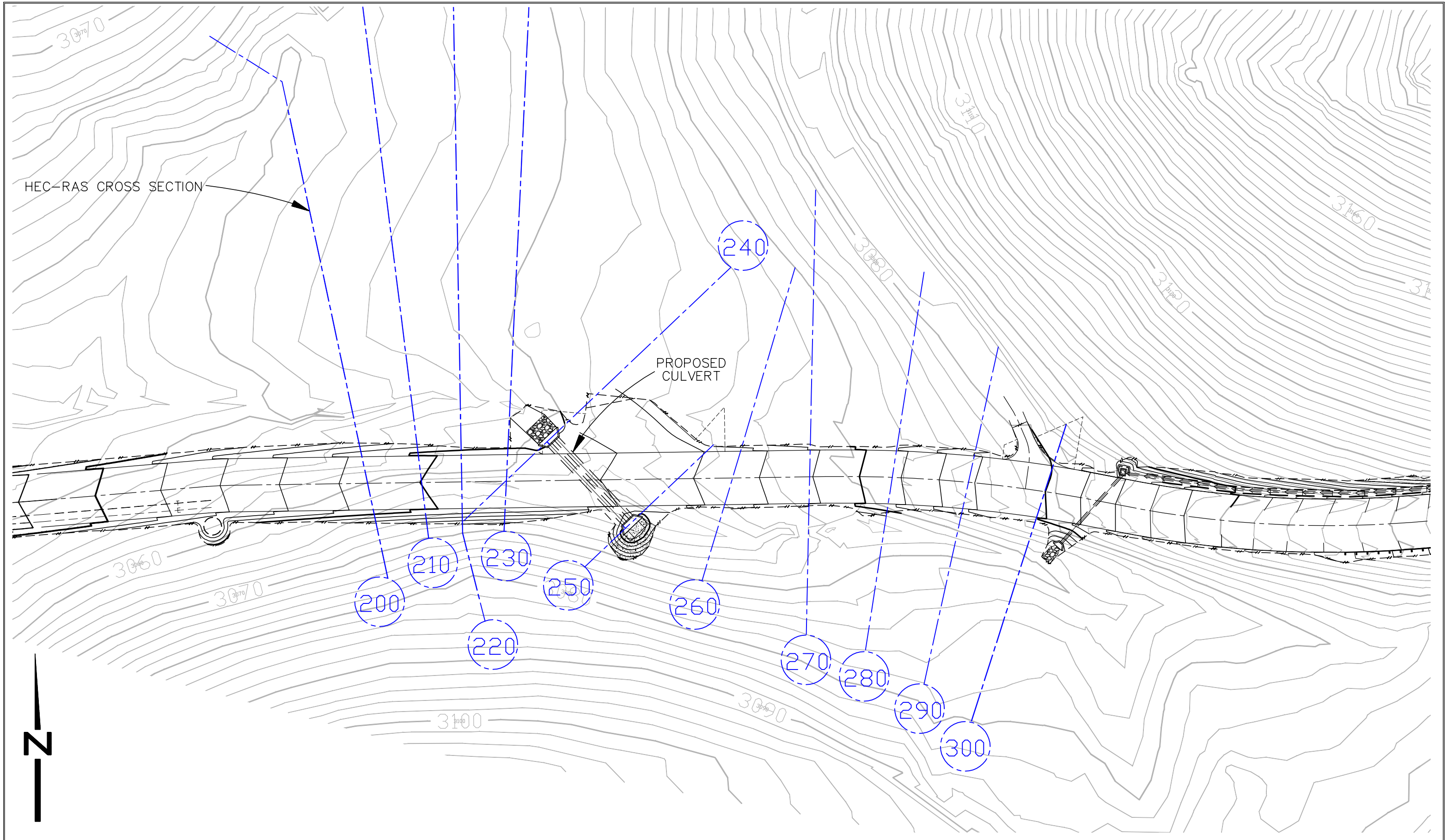
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PETERSON CREEK
HEC-RAS ANALYSIS - SD18

PREPARED FOR: BETA ENGINEERING DATE SUBMITTED: 11/2009

SHEET NUMBER 1 OF 2 SHEETS
JOB NUMBER SDB039600

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SUNCREST SUBSTATION
PETERSON CREEK
HEC-RAS ANALYSIS – SD19

PREPARED FOR: BETA ENGINEERING DATE SUBMITTED: 11/2009

SHEET NUMBER 2 OF 2 SHEETS

JOB NUMBER SDB039600

Appendix E. Sunrise Powerlink Habitat Management Plan

SUNRISE POWERLINK℠

Sunrise Powerlink Project

Habitat Acquisition Plan and Habitat Management Plan

Submitted to:

California Public Utilities Commission

Bureau of Land Management
U.S. Department of Interior

Fish and Wildlife Service
U.S. Department of Interior

California Department of Fish and Game

September 22, 2010

SDGE

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ABBREVIATIONS AND ACRONYMS

ABDSP	Anza-Borrego Desert State Park
BLM	Bureau of Land Management, U.S. Department of Interior
BO	Biological Opinion
CDFG	California Department of Fish and Game
CNDDB	California Natural Diversity Database
CNF	Cleveland National Forest
CPUC	California Public Utilities Commission
CSLC	California State Lands Commission
CSS	Coastal Sage Scrub
Gecko	Barefoot Banded Gecko
Gnatcatcher	Coastal California gnatcatcher
HAP	Habitat Acquisition Plan
HMP	Habitat Management Plan
HMMP	Habitat Mitigation and Monitoring Plan
ITS	Incidental Take Statement
MMCRP	Mitigation Monitoring, Compliance, and Reporting Program
MSCP	Multiple Species Conservation Plan [or Program]
OWSVRA	Ocotillo Wells State Vehicular Recreation Area
NTRP	Native Tree Restoration Plan
PAR	Property Analysis Record
PBS	Peninsular Bighorn Sheep
Quino	Quino checkerspot butterfly
ROW	Right-of-Way
RPSP	Restoration Plan for Special Status Plants
RPSV	Restoration Plan for Sensitive Vegetation [in Temporary Impact Areas}
SDG&E	San Diego Gas & Electric Company
State ITP	State Incidental Take Permit
State Parks	California Department of Parks and Recreation
TSAP	Tower Staging Access Pad (for helicopters)
USFS	United States Forest Service, U.S. Department of Agriculture
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service

SUMMARY

This Habitat Acquisition Plan and Habitat Management Plan (HAP/HMP) for the Sunrise Powerlink Project (Project) addresses offsite mitigation requirements for the Project's impacts on the sensitive vegetation communities and listed species identified in Table A.

TABLE A. SENSITIVE VEGETATION COMMUNITIES AND LISTED SPECIES ADDRESSED BY THIS HAP/HMP

Sensitive Vegetation Communities	Listed Species[2]
Chaparrals	Quino Checkerspot Butterfly
Coastal and Montane Scrubs	Arroyo Toad
Desert Scrubs	Barefoot Banded Gecko
Grasslands and Meadows	Coastal California Gnatcatcher
Herbaceous Wetlands, Freshwater, and Streams[1]	Peninsular Bighorn Sheep
Riparian Forests and Woodlands[1]	
Woodlands and Forests	

Notes

1 Impacts to these communities also typically entail impacts to federal and State waters. Mitigation for the Project's impacts to federal and State waters is addressed in a separate document.

2 These are these listed species for which the HAP/HMP properties are being used as offsite mitigation for Project impacts. On some of the HAP/HMP properties, other listed species do or may occur.

The HAP/HMP identifies nine properties that will be conserved and managed through funding provided by San Diego Gas & Electric Company (SDG&E) and includes a management plan for each property. Each management plan:

- Identifies the mitigation function of the property,
- Identifies the proposed land manager and holder of the fee title or conservation easements,
- Describes the property and its biological resources,
- Identifies the biological resource and land stewardship tasks necessary to conserve and maintain the property's mitigation values,
- Estimates (based on a Property Analysis Record) the funding required for the first five years of management and for a non-wasting endowment for ongoing management, and
- Indicates the current status of the land acquisition.

Table B provides a summary profile of the nine properties and their management plans. Approximately 8,940 acres will be acquired, and approximately $17,072,416 will be provided for management. Figure A shows the location of the nine properties in relation to the Project right-of-way.

Eight of the nine properties will be acquired by SDG&E and then conveyed to a public agency or conservancy, together with funding for start-up and ongoing management. The ninth property (Desert Cahuilla) entails a transaction between the California Department of Parks and Recreation (State Parks) and California State Lands Commission (CSLC) by which habitat for Peninsular bighorn sheep will be conserved on lands added Anza-Borrego Desert State Park (ABDSP) and one of the acquired parcels will be designated as a Project mitigation area. SDG&E will fund acquisition of the nine CSLC parcels, contribute to the management of the lands added to ABDSP, and provide for the ongoing management of the one parcel.

In a separate but related action, SDG&E also will acquire and provide funding for the management of offsite mitigation lands for vegetation and species impacts in Cleveland National Forest (CNF). A separate HAP/HMP is being prepared for those mitigation lands, which are being identified in consultation with the U.S. Department of Agriculture Forest Service. The CNF HAP/HMP will provide for the acquisition and management of at least 185.56 acres.

SDG&E is seeking approval of the properties and management plans in this HAP/HMP as the offsite mitigation for impacts to sensitive vegetation and listed species outside CNF. Approval requires the concurrence of the California Public Utilities Commission and U.S. Department of Interior Bureau of Land Management – the lead agencies for the Project – and the U.S. Fish and Wildlife Service and California Department of Fish and Game. The CNF HAP/HMP will be submitted when it has been approved by USFS.

TABLE B. SUMMARY PROFILE OF THE HAP/HMP PROPERTIES

FIGURE A. LOCATION OF THE HAP/HMP PROPERTIES

PART 1

PURPOSE, RELATIONSHIP TO OTHER PROJECT DOCUMENTS, AND ORGANIZATION

PURPOSE

This Habitat Acquisition Plan and Habitat Management Plan (HAP/HMP) for the Sunrise Powerlink Project (Project) addresses offsite mitigation requirements for the Project's impacts on sensitive vegetation communities and listed species. It identifies nine properties that will be conserved and managed through funding provided by San Diego Gas & Electric Company (SDG&E) and includes a management plan for each property. Table 1 lists the nine properties; Figure 1 shows their location in relation to the Project right-of-way (ROW).

TABLE 1. OFFSITE MITIGATION PROPERTIES FOR SUNRISE POWERLINK[1]

Property Name	County	Location in Relation to Project ROW	Acres
Nabi	San Diego	North of ROW	93.46
Lakeside Ranch	San Diego	Crossed by ROW	427.38
Hamlet	San Diego	Crossed by ROW	84.35
El Capitan	San Diego	North of ROW	381.40
Chocolate Canyon	San Diego	Crossed by ROW	76.14
Lightner	San Diego	Crossed by ROW	705.86
Long Potrero	San Diego	Crossed by ROW	1,212.27
Suckle	Imperial	West of ROW	199.39
Desert Cahuilla	Imperial	North of ROW	5,760.00
TOTAL	--	--	8,940.25

Note

1 Does not include offsite mitigation properties for impacts to biological resources in Cleveland National Forest.

As a separate but related action, SDG&E also will acquire and provide funding for the management of offsite mitigation lands for vegetation and species impacts in Cleveland National Forest (CNF). A separate HAP/HMP is being prepared for those mitigation lands, which are being identified in consultation with the U.S. Department of Agriculture Forest Service (USFS). The CNF HAP/HMP will provide for the acquisition and management of at least 185.56 acres.

SDG&E is seeking approval of the nine properties and management plans in this HAP/HMP as the offsite mitigation for impacts to sensitive vegetation and listed species outside CNF. Approval requires the concurrence of the California Public Utilities Commission (CPUC) and U.S. Department of Interior Bureau

of Land Management (BLM) – the lead agencies for the Project – and the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG). The CNF HAP/HMP will be submitted when it has been approved by USFS.

RELATIONSHIP TO OTHER PROJECT DOCUMENTS

The offsite mitigation requirements addressed in this HAP/HMP are those specified in:

- The Final Environmental Impact Report and Environmental Impact Statement (Final EIR/EIS)for the Project prepared and approved by the CPUC and BLM;
- The Final Mitigation Monitoring, Compliance, and Reporting Program (MMCRP) for the Project (a component of the Final EIR/EIS), specifically measures B-1a, B-2a, B-5a, B-7c, B-7e, B-7I, B-7j, B-7l, G-CM-17 and G-CM-45;
- The BLM and USFS Records of Decision (RODs) for the Final EIR/EIS;
- The Biological Opinion (BO) issued by the U.S. Department of Interior Fish and Wildlife Service (USFWS) pursuant to Section 7 of the federal Endangered Species Act (FESA); and
- The requirements for an incidental take permit from the California Department of Fish and Game (CDFG) pursuant to the California Endangered Species Act (CESA).

The impacts being mitigated are those resulting from the construction, operation, and maintenance of the Project, based on the configuration and components identified in the May 2010 Project Modification Report (PMR) for the Project.

The nine properties identified in this HAP/HMP also play a role in the implementation of other mitigation measures for the Project, including those specified in the:

- Habitat Mitigation and Monitoring Program (HMMP),
- Restoration Plan for Sensitive Vegetation Communities in Temporary Impact Area (RPSV),
- Restoration Plan for Special Status Plants (RPSP), and
- Native Tree Restoration Plan (NTRP).

Table 2 briefly describes the documents cited above and the relationship of the HAP/HMP to each. Table 3 indicates the Project's permanent and temporary impacts to sensitive vegetation communities as estimated for the Project in the May 2010 PMR, including impacts within CNF. Table 4 indicates the estimated impacts to the habitats of listed/proposed species. Tables 5 and 6 identify the offsite mitigation ratios that apply to the vegetation and species impacts based on the Final EIR/EIS, MMRCP, BLM and USFS RODs, and the USFWS BO.

FIGURE 1. LOCATION OF THE HAP/HMP PROPERTIES

TABLE 2. RELATIONSHIP OF THIS HAP/HMP TO OTHER PROJECT DOCUMENTS

Document	Description	Relationship of the HMP
Final Environmental Impact Report and Environmental Impact Statement (Final EIR/EIS)	The Final EIR/EIS is the environmental documentation for the Project as required under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA). The CPUC certified the Final EIR/EIS, approved the Project, and adopted the MMCRP for the Project in December 2008. BLM issued a ROD approving the Project in January 2009 and included the mitigation and monitoring measures for impacts to BLM lands in the ROD. USFS, a cooperating federal agency for the EIR/EIS, issued its own ROD in July 2010. The requirements to prepare a HAP and HMP for offsite mitigation lands are stated in the Final EIR/EIS. The Project is the Final Environmentally Superior Southern Route identified in the Final EIR/EIS, as modified in the May 2010 PMR.	This HAP/HMP was prepared in compliance with the measure identified in Chapter D of the Final EIR/EIS. It identifies the offsite mitigation for impacts of the Project.
Final Mitigation, Monitoring, and Compliance Reporting Program (MMCRP)	The MMCRP is a component of the Final EIR/EIS. It contains the mitigation measures identified in the Final EIR/EIS for the Project and also provides clarifications of the wording and intent of the measures.	This HAP/HMP fulfills MMCRP measures B-1a, B-2a, B-5a, B-7c, B-7e, B-7I, B-7j, B-7l, G-CM-17 and G-CM-45 as they apply to mitigation for impacts outside of Cleveland National Forest.
Sunrise Powerlink Project Modification Report (PMR)	The PMR was prepared by SDG&E to comply to comply with Section 4.2.1 of the MMCRP. It presents the final engineering and design of the Project and identifies the modifications that were made since adoption of the Final EIR/EIS and approval of the Project by the CPUC and BLM. The modifications described in the PMR are the result of SDG&E's implementation of MMCRP measures to avoid and minimize impacts to sensitive resources, reduce or eliminate engineering constraints, and accommodate landowner location preferences where possible. A draft PMR was submitted in January 2010; the final PMR was submitted in May 2010. CPUC and BLM acceptance of the changes will be indicated in a memorandum that will be issued in September 2010.	This HAP/HMP provides offsite mitigation for the impacts of the Project as presented in the May 2010 PMR.
Federal Biological Opinion (BO) and Incidental Take Statement (ITS)	The BO and ITS identifies offsite mitigation requirements for Project impacts to federally listed species, species proposed for federal listing, and any designated or proposed critical habitat for federally listed species. The BO and ITS require that the offsite mitigation area be protected and managed in perpetuity.	Properties in this HAP/HMP are the offsite mitigation sites for Project impacts to Quino checkerspot, arroyo toad, coastal California gnatcatcher, least Bell's vireo, Peninsular bighorn sheep, and critical habitat for these species. The HMPs includes management measures for these species on the mitigation properties where they occur.
State Incidental take Permit (State ITP)	The State ITP authorizes incidental take of the State-listed barefoot banded gecko, conditioned on implementation of impact avoidance and minimization measures and offsite conservation and management of habitat for the species. The State ITP requires that the offsite mitigation area be protected and managed in perpetuity.	The Suckle property in this HAP/HMP is the offsite mitigation for impacts to barefoot banded gecko. The HMP for Suckle provides for the ongoing management of habitat for this species on that property.

Document	Description	Relationship of the HMP
Habitat Mitigation and Monitoring Plan (HMMP)	The HMMP identifies the offsite properties where jurisdictional waters and wetland/riparian resources will be preserved, enhanced, and/or restored as a condition of the Project's 401/404 permits and Streambed Alteration Agreement (SAA). The HMMP indicates where the HMMP measures will be implemented, what success criteria will apply, the cost of those measures, and the source of assured funding for those measures. Temporary as well as permanent impacts to dry washes and riparian/wetland habitats are covered by the HMMP. The HMMP requires that the HMMP mitigation areas be protected in perpetuity.	Five of the properties in this HAP/HMP (Chocolate Canyon, Lightner, Long Potrero, Suckle, and one of the Desert Cahuilla parcel) are proposed as mitigation sites in the HMMP. When the HMMP success criteria are met, the ongoing management of the areas where the HMMP measures were implemented will occur under the HMP for that property. The cost of the HMMP restoration/enhancement is not covered by the HMP endowment, but the ongoing management of the HMMP mitigation area is.
Restoration Plan for Sensitive Vegetation Communities in Temporary Impact Areas (RPSV)	The MMCRP requires that sensitive vegetation types be restored within temporary impact areas. The RPSV identifies the process, methods, and success criteria for such restoration within temporary work areas around structure pads, construction yards, wire stringing areas, guard areas, and designated access roads. The sensitive vegetation types include chaparrals, coastal and montane scrubs, desert scrubs, herbaceous wetlands, riparian forests and woodlands, and woodlands and forests. The measures for temporary impacts to riparian/wetland types in the PRSV are from the HMMP.	The RPSV applies to the Project's temporary impact areas. Any restoration or enhancement that might occur on an offsite mitigation property would be addressed in the HMP for that property. The offsite properties also serve as back-up mitigation for the restoration efforts within temporary impacts areas. The MMCRP allows for the conservation or enhancement/restoration of sensitive vegetation types on offsite mitigation lands if restoration within temporary impact areas is not feasible or fails.
Restoration Plan for Special Status Plant Species (RPSP)	The MMCRP requires that unavoidable impacts to listed plants be mitigated through salvage and relocation via a restoration plan and/or offsite acquisition and conservation at a 2:1 ratio. The MMRCP also requires that unavoidable impacts to CNPS List 1 and 2, BLM sensitive species, and USFS sensitive species be mitigated through reseeding or relocation as part of the restoration of temporary impact areas or via offsite habitat conservation. No listed plants will be affected by the Project. Nine CNPS List 1 or 2 and/or BLM or USFS sensitive species will be affected. The RPSP provides for the reseeding/relocation of 7 species and for the offsite conservation of 2 species (felt-leaved monardella and Lakeside ceanothus, which are not amenable to reseeding or relocation).	No reseeding or relocation of special status plants to the offsite mitigation lands in this HAP/HMP is proposed. Conservation of existing populations of felt-leaved monardella on the Lightner property and of Lakeside ceanothus on the El Capitan property is proposed in the RPSP. The HMPs for those properties provide for surveys and monitoring of those populations as part of the conservation and management activities on those properties.
Native Tree Restoration Plan (NTRP)	The MMRCP requires that Project impacts to native tree be mitigated through the planting of replacement trees and/or or the conservation existing woodlands at specified ratios. The NTRP identifies the methods and ratios that will apply in circumstances when replanting is required; it also identifies the woodland conservation that SDG&E is providing in advance of impacts.	The HAP/HMP identifies the properties where offsite conservation of woodlands will occur; these properties also are the locations where replacement trees would be planted if required during operation and maintenance activities.
Cleveland National Forest Habitat Acquisition Plan/Habitat Management Plan (CNF HAP/HMP)	The CNF HAP/HAP will identify the offsite mitigation lands for Project impacts to sensitive vegetation and species in CNF and will include a management plan for those properties. USFS has provided SDG&E with a list of potential mitigation properties and has indicated that, based on the requirements specified in the USFS ROD, at least 185.56 acres are needed as mitigation for the Project's construction impacts.	This HAP/HMP is mitigation for impacts outside CNF.

TABLE 3. ESTIMATED PROJECT IMPACTS TO SENSITIVE VEGETATION TYPES BASED ON THE MAY 2010 PMR

Vegetation Category	Vegetation Subtype	Acres		
		Permanent	Temporary	Total
Chaparrals	Chamise Chaparral	33.54	29.89	63.43
	Chamise Chaparral – Burned	2.14	3.82	5.97
	Chamise Chaparral – Disturbed	0.00	0.00	0.00
	Northern Mixed Chaparral	66.43	51.40	117.83
	Northern Mixed Chaparral – Disturbed	11.19	0.00	11.19
	Redshank Chaparral	1.76	2.56	4.32
	Scrub Oak Chaparral	0.29	0.00	0.29
	Scrub Oak Chaparral – Disturbed	1.41	1.16	2.58
	Semi-desert Chaparral	21.21	62.62	83.83
	Semi-desert Chaparral – Disturbed	2.10	56.16	58.27
	Southern Mixed Chaparral	28.60	9.35	37.95
	Southern Mixed Chaparral – Burned	9.84	7.00	16.84
	Southern Mixed Chaparral – Disturbed	2.68	0.00	2.68
	Chaparrals Total	**181.20**	**223.97**	**405.17**
Coastal and Montane Scrubs	Big Sagebrush Scrub	0.74	8.43	9.17
	Big Sagebrush Scrub – Disturbed	0.00	0.00	0.00
	Coastal Sage-Chaparral Scrub	6.25	1.76	8.01
	Coastal Sage-Chaparral Scrub – Disturbed	0.00	0.00	0.00
	Diegan Coastal Sage Scrub	11.52	16.39	27.91
	Diegan Coastal Sage Scrub – Burned	0.00	0.00	0.00
	Diegan Coastal Sage Scrub – Disturbed	2.84	3.77	6.60
	Diegan Coastal Sage Scrub, Inland Form	5.09	6.47	11.56
	Diegan Coastal Sage Scrub, Inland Disturbed	0.39	0.50	0.89
	Flat-topped Buckwheat Scrub	0.63	28.45	29.09
	Flat-topped Buckwheat Scrub, Disturbed	0.00	1.17	1.17
	Coastal and Montane Scrubs Total	**27.46**	**66.94**	**94.39**
Desert Scrubs	Desert Saltbush Scrub	0.00	0.00	0.00
	Sonoran Creosote Bush Scrub	14.88	89.28	104.16
	Sonoran Creosote Bush Scrub – Disturbed	3.86	28.12	31.98
	Sonoran Desert Mixed Scrub	5.91	2.48	8.39
	Sonoran Desert Scrub	0.94	3.47	4.41
	Sonoran Desert Wash Scrub	0.45	0.58	1.03
	Sonoran Mixed Woody and Succulent Scrub	5.15	6.75	11.91
	Sonoran Mixed Woody Scrub	5.03	11.44	16.46
	Sonoran Mixed Woody Scrub – Disturbed	0.15	0.15	0.29
	Sonoran Wash Scrub	0.00	0.00	0.00
	Desert Scrubs Total	**36.36**	**142.26**	**178.62**

Vegetation Category	Vegetation Subtype	Acres		
		Permanent	Temporary	Total
Grasslands and Meadows	Meadow	0.00	0.00	0.00
	Non-native Grassland	3.95	48.31	52.26
	Non-native Grassland – Disturbed	0.00	0.09	0.09
	Valley Needlegrass Grassland	0.20	0.00	0.20
	Valley Needlegrass Grassland – Disturbed	0.00	0.00	0.00
Grasslands and Meadows Total		**4.14**	**48.41**	**52.55**
Herbaceous Wetlands, Freshwater, and Streams	Non-vegetated Channel	1.10	2.37	3.47
Herbaceous Wetlands, Freshwater, and Streams Total		1.10	2.37	3.47
Riparian Forests and Woodlands	Riparian Woodland	0.00	0.00	0.00
	Southern Coast Live Oak Riparian Forest	0.25	0.08	0.33
	Southern Riparian Forest	0.00	0.00	0.00
	Southern Cottonwood-Willow Riparian For	0.00	0.00	0.00
Riparian Forests and Woodlands Total		**0.25**	**0.09**	**0.34**
Woodlands and Forests	Coast Live Oak Woodland	1.60	2.42	4.02
	Coast Live Oak Woodland – Burned	0.00	0.00	0.00
	Coast Live Oak Woodland – Disturbed	0.00	1.18	1.18
	Engelmann Oak Woodland	1.27	0.00	1.27
	Mixed Oak Woodland	0.99	0.00	0.99
	Peninsular Juniper Woodland Scrub	0.38	0.32	0.70
Woodlands and Forests Total		**4.24**	**3.92**	**8.16**
TOTAL		**254.75**	**487.97**	**742.71**

TABLE 4. ESTIMATED HABITAT IMPACTS TO LISTED AND PROPOSED SPECIES BASED ON THE MAY 2010 PMR[1]

SPECIES	Acres		
	Permanent	Temporary	Total
QUINO CHECKERSPOT BUTTERFLY			
USFWS Critical Habitat (2009 Designation)	4.45	1.59	6.04
USFWS Occupied Habitat (USFWS Data)[2]	15.16	17.49	32.65
ARROYO TOAD			
USFWS Proposed Critical Habitat	2.46	44.23	46.69
USFS Suitable Habitat [USFS Habitat Model]	11.92	63.00	74.92
USFS Suitable Habitat in CNF [USFS Habitat Model]	3.49	0.01	3.50
BAREFOOT BANDED GECKO (SUITABLE HABITAT)	10.84[3]	4.53[3]	15.37[3]
FLAT-TAILED HORNED LIZARD[4]			
Management Areas	9.54	36.87	46.41
Habitat Outside of Management Areas	26.35	94.88	121.23
Total	35.89	131.75	167.64
COASTAL CALIFORNIA GNATCATCHER			
USFWS Critical Habitat	3.88	21.58	25.46
USFWS Occupied Habitat (USFWS Data)	0.16	8.11	8.27
USFS Suitable Habitat [USFS Habitat Model]	11.97	15.67	27.64
USFS Suitable Habitat in CNF [USFS Habitat Model]	1.12	0.06	1.18
LEAST BELL'S VIREO[5]			
USFWS Occupied Habitat [USFWS Data]	0.00	0.00	0.00
USFS Suitable Habitat in CNF [USFS Habitat Model]	0.19	0.00	0.19
SOUTHWESTERN WILLOW FLYCATCHER[5]			
USFS Suitable Habitat in CNF (USFS Modeled Habitat]	3.98	0.74	4.72
PENINSULAR BIGHORN SHEEP			
Occupied Habitat[6]	10.36	20.24	30.60
2009 Designated Critical Habitat	5.41	1.41	6.82
STEPHENS' KANGAROO RAT[5]			
USFS Suitable Habitat in CNF [USFS Habitat Model]	0.18	0.00	0.18

Notes

1 Habitat impacts to listed and proposed species were quantified in the Final EIR/EIS, BO, and PMR in terms of the following habitat categories: USFWS critical habitat (designated or proposed), USFWS occupied habitat (areas that USFWS considers occupied by the species based on available information and/or assumptions); mapped habitat and management areas for flat-tailed horned lizard; mapped suitable habitat for barefoot banded gecko; and suitable habitat as identified by habitat models used by USFS (USFS Suitable Habitat).

2 USFWS Occupied Habitat includes areas of known Quino populations and sightings and a buffer that typically encompasses all host plants in the vicinity. Some of the USFWS occupied habitat areas also are part of designated critical habitat (e.g., the Jacumba population).

3 Based on protocol surveys conducted after the May 2010 PMR was submitted, it was determined that the Project would affect fewer acres of gecko habitat. As documented in the Project's 2081 permit application to CDFG, there would be 7.21 acres of permanent impacts and 1.41 acres of temporary impacts (8.62 acres total).

4 Impacts to flat-tailed horned lizard have been mitigated in advance through payment of a fee; the species is not covered by the HAP/HMP.

5 Focused surveys have determined that this species does not occur in Project impact areas. The USFS habitat model results have been retained for lands in the CNF.

6 This category includes areas previously designated as critical habitat, which USFWS considers to be occupied habitat.

TABLE 5. MITIGATION RATIOS FOR PROJECT IMPACTS TO SENSITIVE VEGETATION TYPES

Vegetation Community	Permanent Impacts	Temporary Impacts[1]
	Ratio for Offsite Mitigation	Ratio for Onsite and Offsite Mitigation
Desert Scrub and Dune Habitats	2:1	1:1 + 1:1
Coastal and Montane Scrub Habitats	1.5:1 2:1 for flat topped buckwheat 2:1 for CNF impacts	1:1 + 0.5:1 1:1 + 1:1 for flat topped buckwheat 1:1 +1:1 for CNF impacts
Grasslands and Meadows	1:1 2:1 for CNF impacts	1:1 1:1 + 1:1 for CNF Impacts
Chaparrals	1:1 2:1 for CNF Impacts	1:1 1:1 + 1:1 for CNF Impacts
Woodlands and Forests	3:1	1:1 + 2:1 1:1 + 1:1 for juniper woodland
Herbaceous Wetlands, Freshwater, and Streams	3:1	1:1 + 1:1
Riparian Forests and Woodlands	3:1	1:1 + 1:1
Impacts to the above types on existing preserves	Ratios Doubled	Ratios Doubled

Note

1 In its ROD, USFS indicates that temporary Project components (i.e., temporary impacts) that entail cut and fill ground disturbance will be subject to the same mitigation ratios that apply to permanent impacts. This will apply to Project activities on lands in CNF.

TABLE 6. MITIGATION RATIOS FOR IMPACTS TO THE HABITAT OF LISTED/PROPOSED SPECIES

Species	Habitat Category	Permanent Impacts	Temporary Impacts
		Ratio for Offsite Mitigation	Ratio for Onsite and Offsite Mitigation
Quino Checkerspot	Occupied Habitat Critical Habitat	3:1 3:1	1:1 + 1:1 1:1 + 1:1
Arroyo Toad	Occupied Breeding Habitat Occupied Upland Habitat Critical Habitat[2]	3:1 2:1 3:1	1:1 + 2:1 1:1 + 1:1 1:1 + 1:1
Barefoot Banded Gecko	Suitable Habitat	No ratio set by CDFG	No ratio set by CDFG
Flat Tailed Horned Lizard	In FTHL Management Area Outside FTHL Management Area	5.5:1 (4.5:1)[3] or in lieu fee 1:1 or in lieu Fee	3.5 (2.5:1)[3] or in lieu fee 1:1 or in lieu fee
California Gnatcatcher	Occupied Habitat Critical Habitat	2:1 2:1	1:1 + 1:1 1:1 + 1:1
Least Bell's Vireo[4]	Occupied Habitat	3:1	1:1 + 2:1
Southwestern Willow Flycatcher[4]	Occupied Habitat	3:1	1:1 + 2:1
Peninsular Bighorn Sheep	Occupied Habitat Critical Habitat	5:1 5:1	1:1 + 2:1 1:1 + 2:1
Stephens' Kangaroo Rat[4]	Occupied Habitat	2:1	1:1 + 1:1

Note

1 The Final EIR/EIS and BO do not specify a mitigation ratio for impacts to arroyo toad critical habitat (designated or proposed) because the USFWS did not propose to revise arroyo toad critical habitat to include the project until October 2009. For planning purposes, SDG&E has assumed that impacts to arroyo toad critical habitat would require 3:1 mitigation for permanent impacts and 2:1 mitigation for temporary impacts.

2 CDFG does not have a specified a mitigation ratio for impacts to barefoot banded gecko and basis mitigation on the quality of habitat removed and conserved.

3 Ratios in parentheses apply to agriculture and disturbed habitat.

4 Focused surveys have determined that this species does not occur within Project impact areas.

ORGANIZATION

This HAP/HMP is organized into four parts:

- Part 1 states the purpose of the HAP/HMP and describes its relationship to other Project documents and its organization.
- Part 2 contains the management plans for the properties, together with a description of the goals, assumptions, and tasks common to the plans. Each management plan:
    1) Identifies the mitigation function of the property,
    2) Identifies the proposed land manager and holder of the fee title or conservation easements,
    3) Describes the property and its biological resources,
    4) Identifies the biological resource and land stewardship tasks necessary to conserve and maintain the property's mitigation values,
    5) Summarizes the results of the Property Analysis Record (PAR) for each property in terms of funding required for the first five years of management and for a non-wasting endowment for ongoing management, and
    6) Indicates the current status of the proposed land acquisition.
- Part 3 includes the PAR spreadsheets for each property and a description of the PAR assumptions.
- Part 4 includes the legal descriptions for five of the properties (Chocolate Canyon, El Capitan, Hamlet, Lightner, and Long Potrero). Legal descriptions for the other properties will be provided as those transactions proceed.

PART 2

HABITAT MANAGEMENT PLANS FOR THE PROPERTIES

INTRODUCTION

The HMPs for the properties were prepared by qualified biologists working in coordination with the Project's environmental mitigation team. Biologists and conservation planners at Technology Associates International Corporation (TAIC) were the lead for compiling baseline biological information about the properties, drafting the biological resource and land stewardship tasks, and preparing the PARs. Biologists at ICF International conducted habitat assessments and species surveys at several properties. Eric Dugan, a barefoot banded gecko specialist, conducted habitat assessments and protocol surveys on the Suckle property and surrounding area. USFWS and CDFG staff provided habitat and species information from their databases. California Department of Parks and Recreation (State Parks) provided cost information for managing one of the parcels that will be acquired as part of the Desert Cahuilla transaction and will be identified as a mitigation area for the Project; State Parks also provided cost information relevant to management of lands within Anza-Borrego Desert State Park (ABDSP).

The HMPs are based on a common set of premises and share a common set of tasks.

PREMISES

1. The ownership of mitigation lands acquired directly by SDG&E will be conveyed to a public agency or a conservancy. SDG&E will ensure interim protection of the lands until the conveyance is completed. The Desert Cahuilla properties will be acquired and held by State Parks.

2. The land owner will be the land manager. A third-party may be retained by the land owner to provide all or some of the management services.

3. Management of the property will be integrated and conducted as part of the existing land management program of the public agency or conservancy to whom the lands are conveyed.

4. Management will focus on protecting and maintaining the resources that are being conserved as mitigation for the Project's impacts. Where there are other sensitive resources on the property, management will be planned to avoid impacts to and, where possible, benefit those resources.

5. For planning and PAR purposes, it is assumed that the land manager will not reside or require facilities on the mitigation property in order to implement the HMP measures.

6. Five of the properties also are mitigation sites for Project impacts to jurisdictional waters. Restoration and enhancement of stream/riparian resources on these properties will be planned, funded, and implemented separately by SDG&E in accordance with the HMMP. When the HMMP measures are successfully completed, ongoing management of the restored/enhanced areas will occur under the HMP for the property (i.e., will be conducted by the land manager and funded by the management endowment for the property).

7. Two of the properties (Lightner and El Capitan) also are mitigation sites for Project impacts to two non-listed special status species (Lakeside ceanothus and felt-leaved monardella). Conservation and management of these plants are addressed in the HMPs for these properties.

8. In San Diego County, the Project occurs within areas where regional multiple species conservation plans (MSCPs) for lands under the jurisdiction of the City of San Diego and County of San Diego have been approved by USFWS and CDFG or are being planned. The HAP has taken the MSCPs into consideration in identifying mitigation lands in San Diego County, and the HMPs for the San Diego properties consider conveyance of lands to the City and County for inclusion in their MSCP preserve systems.

9. The acquisition transactions and management arrangements (including funding) for the nine properties will be completed and/or financial assurances adequate to cover any pending acquisitions and management arrangements will be provided before the transmission line is energized.

HMP TASKS

Tasks common to the HMPs are described below.

Access Controls

To control access and deter illegal uses, gates, fences and signs will be installed and property patrols will be conducted. Fencing will be used selectively where access to areas with highly sensitive resources or hazards needs to be precluded and where the fencing would not interfere with wildlife movement. Signs, gates, and fencing will be maintained and replaced as needed as part of property management.

General Conditions Monitoring and Wildlife Assessment

The land manager will patrol the property on an annual basis to monitor the general condition of the property and to identify areas of management concern. All areas that have signs of illegal activity (such as dumping, unauthorized access, off-road vehicle use, or other unauthorized actions), invasive species problems, erosion issues, or other habitat degradation problems will be mapped using Geographic Positioning System (GPS) technology. A general assessment of wildlife habitat conditions will be coordinated and reported with the general conditions monitoring. All properties will be assessed for the potential occurrence of listed and other special status species.

Vegetation and Invasive Species Mapping

A qualified biologist will map the type, species dominance, and boundaries of all vegetation communities using the vegetation classification system commonly used by the management entity, and note the overall quality of the habitat. Concurrently, invasive plant species will be mapped in a manner appropriate to the species and extent of infestation (e.g., individual plants or general extent of a population). Target invasives are those listed by the California Invasive Pest Council (CalIPC) as highly or moderately invasive (Cal-IPC 2006). Information from the wildlife assessment regarding the location of observed exotic wildlife that may be a threat to listed species (e.g., cowbirds, bullfrogs, feral pigs) also will be included on the invasive species map. The mapping will be completed by the third year of property management and will be updated on a routine basis. Depending on the condition of the property, updates will occur every three to five years.

Species Surveys

On properties identified as mitigation for impacts to a listed species, focused surveys for that species will be conducted during start-up management and repeated as part of ongoing management. The surveys will be conducted by a qualified biologist using established protocols. The purpose of the surveys is to establish baseline information about occurrence and conditions and the basis for ongoing monitoring. The listed species of concern are: Quino checkerspot butterfly (Quino), arroyo toad, barefoot banded gecko (Gecko), coastal California gnatcatcher (Gnatcatcher), and Peninsular bighorn sheep (PBS). If other listed species are known or have a high likelihood to occur on the property, surveys also will be conducted for those species. Surveys for non-listed special status species will be planned on a property-by-property basis.

Invasive Species Control

The work program for the property will include a vegetation management component that (1) identifies the location and extent of target invasive species, 2) determines the threat posed to sensitive vegetation communities, (3) prioritizes remedial management actions based on the level of threat, (4) identifies methods that will be used and (5) provides a schedule for the management actions. The least biologically intrusive (yet effective) methods will be used at the appropriate time of year for a given species. Remedial restoration may be required after invasive species removal, as described below. Exotic species removal will be performed by the land manager on an annual basis.

Road Maintenance and Road Decommissioning

As part of the conditions assessment and vegetation mapping, existing roads on the property will be mapped, and roads required for property management and emergency response will be identified.

On the properties not crossed by Project access roads, existing roads not required for property management will be considered for decommissioning. Maintenance of roads required for property management will be inspected and maintained on a schedule established in the property work program.

Generally, decommissioning of roads will occur in the first five years of HMP implementation and maintenance of required roads will occur very two years.

On properties crossed by Project access roads, use of those roads for property management will be planned and coordinated with SDG&E. Maintenance of those roads will be conducted by SDG&E.

Erosion Control and Remedial Restoration

The land manager may be responsible for controlling minor erosion problems related to road use and invasive species removal. Erosion control activities may include minor earth work or the installation of gravel bags, silt fencing, or fiber rolls to control runoff and sedimentation. Where needed to prevent further erosion, hydroseeding and selective planting of native species will be considered. Hydroseeding and selective plantings also will be used where needed to remediate areas of illegal disturbance.

Trash Removal

The land manager will monitor the property for illegal dumping and provide for the collection and disposal of trash on an as-needed basis.

Planning and Coordination

Management of each property will be guided by a 5-year work program prepared by the land manager. The work program will include the following tasks as appropriate for the property being managed:

1. Installation and maintenance of access controls (signage, gates, and selective fencing)
2. Monitoring of general conditions and wildlife habitat
3. Vegetation and invasive species mapping
4. Surveys for species affected by the Project (i.e., the species for which the property is offsite mitigation for Project impacts) and other special status species on the property
5. Control of exotic invasive plant species
6. Road maintenance and decommissioning
7. Erosion control and remedial restoration
8. Fire management
9. Database management
10. Priorities for annual work plans and expenditures
11. Annual reporting of activities, expenditures, and principal balance of the endowment
12. Public information/education

The 5-year work programs also will establish funding priorities for management activities and will include a five-year cost estimate. The work program and cost estimate will be updated every 3 years.

Fire Management

The 5-year work programs will include a fire management component developed in cooperation with the responsible fire agencies and in compliance with applicable State and local policies and regulations.

GIS Database

The land manager will establish and maintain a GIS database for the property and management program. For properties in San Diego County, the database will be compatible with the MSCP regional database.

Annual Reporting

The land manager will prepare annual reports that identify management activities conducted in the prior 12 months, activities planned for the upcoming 12-months, expenditures for the past 12 months, proposed allocation of funds for the next 12 months, performance of the endowment in the prior year, and the balance of endowment at the end of the prior year.

Public Education/Information

Web-ready public information/education materials regarding the property's resources and any restrictions that apply to public access will be prepared and posted on the land manager/owner's website during the start-up management phase. After the start-up phase, the annual reports and any notices issued as part of access controls will be the primary vehicle for public information/education.

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NABI HMP

OVERVIEW

ACRES	93.46
LOCAL JURISDICTION	County of San Diego
CROSSED BY PROJECT ROW	No
CONSERVED AS MITIGATION FOR PROJECT IMPACTS TO	Sensitive Vegetation Communities
INCIDENTAL BIOLOGICAL VALUES	Arroyo Toad (Project impacts to this species are covered in full by the Long Potrero property)
ALSO A MITIGATION SITE FOR PROJECT IMPACTS TO	
JURISDICTIONAL WATERS	No
SENSITIVE PLANTS	No
NATIVE TREES	Yes (via conservation of woodlands)
OTHER	MSCP considerations
ADJACENT CONSERVED/PUBLIC LANDS	City of San Diego San Vicente Reservoir Cornerstone Lands, BLM Lands, CDFG San Vicente Ecological Reserve
PROPOSED LAND MANAGER/OWNER	City of San Diego
ESTIMATED START-UP MANAGEMENT COSTS	$88,732
ESTIMATED ENDOWMENT FOR ONGOING MANAGEMENT	$536,355
ACQUISITION STATUS	Willing seller; currently in appraisal process.

MITIGATION FUNCTION

This property will be part of the required offsite mitigation for the Project's permanent impacts to sensitive vegetation communities.

The property is not a mitigation site for the Project's impacts to listed species, jurisdictional waters, or sensitive plants. The oak woodlands on the property are part of the mitigation for the Project's impacts to native trees. The property also will augment and link lands conserved under the San Diego City and County MSCPs.

PROPERTY DESCRIPTION

Nabi is a 93.46-acre parcel under the jurisdiction of San Diego County (Figure N-1). The property is bisected by San Vicente Creek and Kimball Valley Road north of the Interstate 8 freeway. The Project ROW and Project impact areas do not occur on or immediately adjacent to the property.

A legal description of the property will be added to Part 4 of this HAP/HMP when the acquisition proceeds to the due diligence phase.

Access

The property is accessed mainly off Kimball Valley Road and a private road that cross the southern extent of the parcel.

Adjacent Lands and Land Use

Conserved lands either abut or are in the immediate vicinity of the Nabi parcel (Figure N-2). These conserved lands include: BLM (west), San Vicente County Reservoir Cornerstone Lands (southwest), and Monte Vista Ranch (east).

Climate, Geology, and Landscape

Nabi occurs in an area characterized by warm, dry summers and mild winters with occasional precipitation. Also characteristic of the region is the sea-breeze/land-breeze cycle. During the daytime, on-shore winds move inland with speeds of approximately seven to ten miles per hour (mph). During the nighttime, the direction is reversed and winds move from an easterly direction towards the coast. In addition, periodic Santa Ana wind conditions, which last from 2-3 days, are present.

Nabi contains numerous cliffs and granitic outcroppings. In general, the area is defined by steep slopes and xeric soils.

Vegetation Communities

The flora of Nabi is typical of areas with dry, steep slopes with little to no soil. Most of the parcel is vegetated with chaparral and coastal sage scrub. There are a few small stands of oak woodlands and patches of riparian forest and scrub. See Table N-1 and Figure N-3.

TABLE N-1. NABI VEGETATION

Vegetation Community		Acreage	
Type	**Subtypes**	**Subtype**	**Total**
Chaparrals	Southern Mixed Chaparral	37.85	37.85
Coastal and Montane Scrub	Diegan Coastal Sage Scrub	36.50	36.50
Woodlands and Forests	Coast Live Oak Woodland	4.47	4.47
Riparian Forests and Woodlands	Southern Coast Live Oak Riparian Woodland	6.42	6.42
Riparian Scrub	Mule Fat Scrub	1.63	1.63
Non-native Grassland	Non-native Grassland	4.86	4.86
Non-native Habitats, Developed and Disturbed Habitats	Developed	1.73	1.73
		Total	93.46

Southern Mixed Chaparral (37120)**.** This vegetation type is found throughout the property and is approximately 37.85 acres or 41% of the total area.

Diegan Coastal Sage Scrub (32500). This vegetation type is found throughout the property. It is completely surrounded by Southern Mixed Chaparral and makes up approximately 36.50 acres or 40% of the total property.

Coast Live Oak Woodland (71161). This vegetation type is found in small patches and makes up approximately 4.47 acres or 5% of the property.

Southern Coast Live Oak Riparian Woodland (61310). This vegetation type is found in a small patch along ephemeral drainages and makes up approximately 6.42 acres or 7% of the property.

Mule Fat Scrub (63310). This vegetation is found in a small patch adjacent to the Southern Coast Live Oak Riparian Woodland and up approximately 1.63 acres or 1% of the property.

Non-Native Grassland (42200). This vegetation type is found adjacent to the "developed" areas on the property. vegetation type within the Nabi Property. This vegetation type makes up approximately 4.86 acres or 5% of the total Property.

Developed (1200). Approximately 1.73 acres or 1% of the property is classified as "developed."

Sensitive Plant Species

Table N-2 and Figure N-4 indicate the sensitive plant species that are known to occur on the property.

TABLE N-2. NABI SENSITIVE PLANT SPECIES

Common Name	Scientific Name	Listing Status (Federal/State/CNPS)	Occurrence
Orcutt's brodiaea	*Brodiaea orcuttii*	-/-/1B	Observed
San Miguel savory	*Satureja chandleri*	-/-/1B	Observed

Invasive Plant Species

Invasive plants species are present on the property, mainly along roads. No significant populations have been recorded or mapped for the property.

Sensitive Animal Species

Table N-3 and Figure N-4 indicate the sensitive animal species associated with the property. Arroyo toad is known to occur based on existing data records. There also is a high likelihood that golden eagle forages on the property.

TABLE N-3. NABI SENSITIVE ANIMAL SPECIES

Common Name	Scientific Name	Listing Status (Federal/State/CNPS)	Likelihood of Occurrence
Arroyo toad	*Bufo californicus*	E/-/G2G3 S2S3	Observed
Golden eagle	*Aquila chrysaetos*	-/-/G5 S3	High

Invasive Animal Species

To date, no significant populations of invasive animals have been mapped or recorded for this property

Wildlife Movement and Linkages

Nabi is not located within a mapped wildlife linkage or MSCP linkage area. However, the property does provide a habitat linkages between MSCP conserved lands to the southwest and northeast.

MANAGEMENT SPECIFICATIONS

This section identifies the proposed land manager/owner, start-up and ongoing tasks, and the estimated costs of HMP implementation.

Proposed Land Manager/Owner

SDG&E proposes to convey the lands to the City of San Diego, who would manage them as an open space preserve. This arrangement is proposed because the property is adjacent to the City's San Vicente Reservoir Cornerstone Lands (conserved under the City's approved MSCP). The arrangement also offsets the Project's effects on the Cornerstone Lands.

Start-up Tasks (Years 1-5)

Access Control

Approximately ten signs will be installed in appropriate areas to limit public access. No gates or fencing are proposed. The signs will be maintained and replaced as needed during the period.

General Conditions Monitoring and Wildlife Assessment

The land manager will conduct annual inspections to determine overall conditions on the property and assess threats to habitat and species. Results of the inspection will be used to map and prioritize areas where preventive or remedial measures are needed.

Vegetation and Invasive Species Mapping

A qualified plant ecologist will prepare baseline mapping of vegetation communities and invasive plant species on the property based on field surveys and aerial imagery. The mapping will be completed by year three and updated as needed during the period.

Species Surveys

To establish the extent and condition of occupied arroyo toad habitat, a qualified herpetologist will conduct three sets of surveys for the species. The survey results will be used to identify areas where impacts to this listed species need to be avoided and where there are opportunities to incidentally benefit the species.

5-Year Work Program and Annual Work Plans

Using results from general conditions assessment and vegetation/invasive species mapping, the land manager will prepare a 5-year work program that identifies and prioritizes biological resource and land stewardship tasks for the period and includes a five-year staffing and materials budget. The 5-year work program will be completed no later than year 3 and updated every three years. Annual work plans and annual budgets will be based on the priorities set in the 5-year work program.

Interim Work Plans

Prior to completion of the first 5-year work program, the land manager will prepare annual work plans and budgets for the general conditions assessment, surveys, mapping, and other data collection required to guide management of the property. The interim work plans also may include access control, invasive species control, and erosion control measures that the land manager determines are necessary.

Invasive Plant Control

Invasive plant control measures will be initiated based on the results of the mapping effort and the priorities established in the work program.

Erosion Control, Road Maintenance, and Road Decommissioning

Erosion control and road maintenance will be performed on an as-needed basis. The existing internal access roads will be maintained if required for access control and monitoring purposes. No new roads will be added, and unnecessary internal roads will be decommissioned.

Fire Management

The 5-year work program will include a fire management component developed in consultation with the appropriate fire agencies. Controlled or systematic burns will not be allowed as a fuel reduction measure.

Trash Removal

The property will be managed for illegal dumping in concert with the management for public access. Any evidence of illegal dumping will be recorded by the land manager and addressed accordingly. Trash will be removed and disposed in accordance with applicable local ordinances.

GIS Database

The land manager will establish and maintain a GIS database for the property.

Annual Reports

The land manager will prepare annual reports on management activities and expenditure of start-up funds.

Public Information/Education
The land manager will prepare web-ready notices and fact sheets regarding the inclusion of the lands in the properties managed by the public agency or conservancy, the resources on the property, and public access restrictions. The materials will be posted on the land manager/owner's website.

Ongoing Tasks (Beginning Year 6)

Access Control
Signs will be maintained and replaced as needed. Barriers and other access controls will be considered if monitoring identifies illegal access and uses as a problem.

General Conditions Monitoring and Wildlife Assessment
The land manager will conduct annual inspections to determine overall conditions on the property and assess threats to habitat and species. Results of the inspection will be used to map and prioritize areas where preventive or remedial measures are needed.

Vegetation and Invasive Species Mapping
The vegetation and invasive species mapping will be updated every three years.

Species Surveys
Surveys for arroyo toads will be conducted every three to five years.

5-Year Work Program and Annual Work Plans
The 5-year work program will be updated every three years. Annual work plans and annual budgets will be based on the priorities identified in the work program.

Exotic Plant Control
Control measures for exotic invasive plants will be implemented as specified in the work program and annual work plans.

Erosion Control, Road Maintenance, and Road Decommissioning
Erosion control and road maintenance will be performed on an as-needed basis. No new roads will be added, and unnecessary internal roads will be decommissioned.

Fire Management
The fire management component of the management plan will be updated every three years.

Trash Removal
Monitoring for illegal dumping and the collection and disposal of trash will occur on an as-needed basis.

GIS Database
The land manager will maintain the GIS database for the property on an annual basis.

Annual Reports
The land manager will prepare annual reports on management activities, expenditures, and the balance of the management endowment.

Public Information/Education

Notices regarding access controls and limits on public uses and annual reports will be posted on the land manager/owner's website.

Estimated Costs and Funding

As presented in detail in Part 3, start-up management costs are estimated at $88,732 for the five-year period ($17,746 annually). Ongoing annual costs are estimated at $10,721 and would require a non-wasting endowment of $536,355. The total funding commitment required for management of the property is $625,087.

STATUS OF THE ACQUISITION

The owner is a willing seller. The acquisition is in the land-appraisal phase.

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LAKESIDE RANCH HMP

OVERVIEW

ACRES	427.38
LOCAL JURISDICTION	County of San Diego
CROSSED BY PROJECT ROW	Yes
CONSERVED AS MITIGATION FOR PROJECT IMPACTS TO	Sensitive vegetation and Coastal California Gnatcatcher
INCIDENTAL BIOLOGICAL VALUES	Sensitive plant species
ALSO A MITIGATION SITE FOR PROJECT IMPACTS TO	
JURISDICTIONAL WATERS	No
SENSITIVE PLANTS	No
NATIVE TREES	Yes (via woodland conservation)
OTHER	MSCP considerations; restoration of 50 acres of CSS.
ADJACENT CONSERVED/PUBLIC LANDS	City of San Diego San Vicente Reservoir Cornerstone Lands, County of San Diego Oak Oasis Open Space Preserve, County of San Diego Stelzer Regional Park, and Johnson Lake Open Space
PROPOSED LAND MANAGER/OWNER	County of San Diego
ESTIMATED START-UP MANAGEMENT COSTS	$246,219
ESTIMATED ENDOWMENT FOR ONGOING MANAGEMENT	$2,074,455
ACQUISITION STATUS	Willing seller; final negotiations.

MITIGATION FUNCTION

The property is part of the required mitigation for the Project's impacts to sensitive vegetation and is the offsite mitigation for impacts to the federally-listed coastal California gnatcatcher (Gnatcatcher).

As part of the mitigation for Project impacts to coastal sage scrub (CSS) vegetation, SDG&E will enhance and restore 50 acres of CSS in a recovering burn area on this property. The CSS enhancement and restoration will be funded and implemented separately by SDG&E under a plan subject to USFWS and CDFG approval. Implementation of the CSS plan will be coordinated with management of the property. Ongoing management of the enhanced/restored CSS will occur under the HMP.

The oak woodlands on the property are part of the mitigation for the Project's impacts to native trees. The property also will augment and link lands conserved under the San Diego City and County MSCPs.

The property is not a proposed site for Project mitigation measures for impacts to other listed species, jurisdictional waters, or sensitive plants.

PROPERTY DESCRIPTION

Lakeside Ranch is an aggregation of parcels located southeast of San Vicente Reservoir, east of State Route (SR) 67, and west of Wildcat Canyon Road (Figure LR-1). The Project ROW crosses the property and includes permanent and temporary impact areas for three towers, two tower staging access pads (TSAPs), and an access road to one of the towers. The ROW and these impact areas are not part of the mitigation site.

A legal description of the property will be inserted in Part 4 of this HAP/HMP when the acquisition is ready to proceed to escrow.

Access

The property is accessed from Vigilante Road and San Vicente Avenue on the west and Muth Valley Road on the east. Several existing roads cross the property. One of the roads is designated as an emergency evacuation road for a planned development east of the property.

Adjacent Lands and Land Use

Conserved lands either abut or are in the immediate vicinity of the property (Figure LR-2). These conserved lands include: San Vicente Reservoir (north), San Vicente View (north), Oak Oasis Open Space Preserve (northeast), Johnson Lake Open Space (west), Goodan Ranch/Sycamore Canyon Open Space Preserve (northwest), Stelzer Regional Park (south). The site is identified in the South County MSCP as a "hardline preserve"; about 30 percent of the site was planned for development.

Adjacent land uses include recreation concurrent with the management goals for the City of San Diego San Vicente Reservoir. Currently, the San Vicente Reservoir is closed to public use during the construction of a new dam. In the future (approximately 2014-2017), the reservoir will re-open to boating, picnicking, and other localized recreation.

Climate, Geology, and Landscape

The property is an area characterized by warm, dry summers and mild winters with occasional precipitation. Also characteristic of the region is the sea-breeze/land-breeze cycle. During the daytime, on-shore winds move inland with speeds of approximately seven to ten miles per hour (mph). During the nighttime, the direction is reversed and winds move from an easterly direction towards the coast. In addition, periodic Santa Ana wind conditions, which last from 2-3 days, are present.

The property is characterized by gently sloping rocky hills and canyons. In general the area contains fairly xeric soils and vegetation characteristic of the Mediterranean ecosystem. The arid environment along with the xeric soil conditions supports a large amount of Diegan coastal sage scrub (Figure LR-3). Riparian oak woodlands line some of the tributaries on the property. The property is located within the San Diego River Watershed and contains drainages to the San Diego River and/or San Vicente Reservoir. However, the site does not contain mapped jurisdictional waters.

The flora is typical of Mediterranean ecosystems. Most of the property is vegetated with coastal sage scrub and coastal sage scrub/chaparral ecotone.

Soils

TABLE LR-1. LAKESIDE RANCH SOILS

Soil Type	Summary Description
AcG	Acid igneous rock land
CmE2	Cieneba rocky coarse sandy loam, 9 to 30 percent slopes, eroded
CmrG	Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes
CnG2	Cieneba-Fallbrook rocky sandy loams, 30 to 65 percent slopes, eroded
FvE	Fallbrook-Vista sandy loams, 15 to 30 percent slopes
PeD2	Placentia sandy loam, 9 to 15 percent slopes, eroded
Rm	Riverwash
SvE	Stony land
VaA	Visalia sandy loam, 0 to 2 percent slopes
VaB	Visalia sandy loam, 2 to 5 percent slopes
VvE	Vista rocky coarse sandy loam, 15 to 30 percent slopes
VvG	Vista rocky coarse sandy loam, 30 to 65 percent slopes

Source: Data from USDA NRCS Soil Surveys.

Vegetation Communities

The vegetation on the property is primarily coastal sage scrub with coastal sage scrub/chaparral ecotone in the northeast. The entire property burned in the 2003 Cedar Fire. East of the Project ROW, vegetation communities have retained their original characterization and are recovering, but have not yet reached a climax condition. West of the alignment, the vegetation communities are in inferior recovery from the fire and have type-converted to non-native grassland, interspersed with small pockets of coastal sage scrub (Figure LR-3). The area west of the ROW is where SDG&E will enhance and restore 50 acres of coastal sage scrub.

The property is primarily occupied by coastal sage scrub and coastal sage-chaparral scrub with small portions of oak woodlands (Table LR-2).

Diegan Coastal Sage Scrub (32500) - This vegetation type is found in a small patch along the western border of the property. The vegetation type is bordered by Southern Mixed Chaparral and Southern Coast Live Oak Riparian Woodland. This vegetation type makes up approximately 223.57 acres or 52% of the property.

Coastal Sage-Chaparral Scrub (37G00) – This vegetation type is found in northwestern portion of the property on the north facing slopes. This vegetation type makes up approximately 102.60 acres or 24% of the property.

Southern Mixed Chaparral (37120) - This vegetation type is found on approximately 90.26 acres or 21% of the property.

TABLE LR-2. LAKESIDE RANCH VEGETATION COMMUNITIES

Vegetation Communities		Acreage	
Type	**Subtype**	**Subtype**	**Total**
Chaparrals	Southern Mixed Chaparral	90.26	90.26
Woodlands and Forests	Coast Live Oak Woodland	11.54	11.54
Coastal and Montane Scrub Habitats	Diegan Coastal Sage Scrub	223.57	326.17
	Coastal Sage-Chaparral Scrub	102.60	
Riparian Forests and Woodlands	Southern Coast Live Oak Riparian Forest	3.76	3.76
Non-native Vegetation, Developed Areas, and Disturbed Habitat	Developed	0.58	0.80
	Disturbed	0.22	
		Total	432.93

Coast Live Oak Woodland (71161) - This vegetation type is found along the northeastern borders of the property. Significant amounts of Disturbed Habitat and Developed areas are adjacent to or bordering this vegetation type. This vegetation type makes up approximately 11.54 acres or 3% of the property.

Southern Coast Live Oak Riparian Woodland (61310) - This vegetation type is found in a linear patch on the southern portion of the property. This vegetation type is surrounded almost entirely by southern mixed chaparral. This vegetation type makes up approximately 3.76 acres or less than 1% of the property.

Developed (1200) – Less than one acre is classified as developed. It is found in small, linear patches along the northeastern borders of the property.

Disturbed Habitat (11300) - This type is found along the northeaster borders of the property adjacent to Coast Live Oak Woodland and Chaparral. This makes up approximately 0.22 acres or less than 1% of the property.

Sensitive Plant Species

TABLE LR-3. LAKESIDE RANCH SENSITIVE PLANT SPECIES

Common Name	Scientific Name	Listing Status Federal/State/CNPS	Potential to Occur
Orcutt's brodieae	*Brodieae orcuttii*	-/-/1B	High
Delicate clarkia	*Clarkia delicate*	-/-/1B	High
California plantain	*Plantago erecta*	-/-/1B	High

Invasive Plant Species

Invasive plant species occur on the property, along roads and in the burn area west of the ROW, but have not been mapped.

Sensitive Animal Species

Historically, the site was densely occupied by the California gnatcatcher (Figure LR-4). There is a low probability of Quino occurrence. There is a high probably of San Diego horned lizard occurrence.

TABLE LR-4. LAKESIDE RANCH SENSITIVE ANIMAL SPECIES

Common Name	Scientific Name	Listing Status Federal/State/CNDDB	Likelihood of Occurrence
Quino checkerspot butterfly	*Euphydryas editha quino*	E/-/G5T1 S1	Low
San Diego horned lizard	*Phrynosoma coronatum blainvillii*	-/-/G4G5 S3S4	High
California Gnatcatcher	*Polioptila californica*	-/-/G5T4 S5	High

Invasive Animal Species

There are no records of the presence of invasive animal species on the properties.

Wildlife Movement and Linkages

The property is not located within any identified wildlife movement corridors or habitat linkages. However, the property contributes to the overall landscape connectivity for wildlife, and specifically provides a "stepping stone" of habitats to benefit movement for the California gnatcatcher.

MANAGEMENT SPECIFICATIONS

This section identifies the proposed land manager/owner, start-up and ongoing tasks, and the estimated costs of HMP implementation.

Proposed Land Manager/Owner

SDG&E proposes to convey the lands to the County of San Diego, who would manage them as an open space preserve. This arrangement is proposed because the property includes lands previously identified as a "hardline preserve" in the County's approved MSCP for the area. The arrangement also offsets the Project's effects on lands conserved under the County's approved MSCP.

Start-up Tasks (Years 1-5)

Access Control

Approximately ten signs will be installed in appropriate areas to limit public access. No gates or fencing are proposed at this time.

General Conditions Monitoring and Wildlife Assessment

The land manager will conduct annual inspections to determine overall conditions on the property and assess threats to habitat and species. Results of the inspection will be used to map and prioritize areas where preventive or remedial measures are needed.

Vegetation and Invasive Species Mapping

A qualified plant ecologist will prepare baseline mapping of vegetation communities and invasive plant species on the property based on field surveys and aerial imagery. The mapping will be completed by year three and updated as needed during the period.

Species Surveys

Focused surveys for Gnatcatcher will be conducted annually. Surveys for Quino are not proposed but would be scheduled the annual general monitoring detects the species on the property.

5-Year Work Program and Annual Work Plans

Using results from general conditions assessment and vegetation/invasive species mapping, the land manager will prepare a 5-year work program that identifies and prioritizes biological resource and land stewardship tasks for the period and includes a five-year staffing and materials budget. The 5-year work program will be completed no later than year 3 and updated every three years. Annual work plans and annual budgets will be based on the priorities set in the 5-year work program.

Interim Work Plans

Prior to completion of the first 5-year work program, the land manager will prepare annual work plans and budgets for the general conditions assessment, surveys, mapping, and other data collection required to guide management of the property. The interim work plans also may include access control, invasive species control, and erosion control measures that the land manager determines are necessary.

Invasive Plant Control

Invasive plant control measures will be initiated based on the results of the mapping effort and the priorities established in the work program.

Erosion Control, Road Maintenance, and Road Decommissioning

Erosion control and road maintenance will be performed on an as-needed basis. The existing internal access roads will be maintained if required for access control and monitoring purposes. No new roads will be added, and unnecessary internal roads will be decommissioned. Use of the Project access road will be coordinated with SDG&E.

Fire Management

The 5-year work program will include a fire management component developed in consultation with the appropriate fire agencies. Controlled or systematic burns will not be allowed as a fuel reduction measure.

Trash Removal
The property will be managed for illegal dumping in concert with the management for public access. Any evidence of illegal dumping will be recorded by the land manager and addressed accordingly. Trash will be removed and disposed in accordance with applicable local ordinances.

GIS Database
The land manager will establish and maintain a GIS database for the property.

Annual Reports
The land manager will prepare annual reports on management activities and expenditure of start-up funds.

Public Information/Education
The land manager will prepare web-ready notices and fact sheets regarding the inclusion of the lands in the properties managed by the public agency or conservancy, the resources on the property, and public access restrictions. The materials will be posted on the land manager/owner's website.

Ongoing Tasks (Beginning Year 6)

Access Control
Signs will be maintained and replaced as needed. Barriers and other access controls will be considered if monitoring identifies illegal access and uses as a problem.

General Conditions Monitoring and Wildlife Assessment
The land manager will conduct annual inspections to determine overall conditions on the property and assess threats to habitat and species. Results of the inspection will be used to map and prioritize areas where preventive or remedial measures are needed.

Vegetation and Invasive Species Mapping
The vegetation and invasive species mapping will be updated every three years.

Species Surveys
Gnatcatcher surveys will be conducted every three to five years. Quino surveys will become part of ongoing management if the species is detected onsite.

5-Year Work Program and Annual Work Plans
The 5-year work program will be updated every three years. Annual work plans and annual budgets will be based on the priorities identified in the work program.

Exotic Plant Control
Control measures for exotic invasive plants will be implemented as specified in the work program and annual work plans.

Erosion Control, Road Maintenance, and Road Decommissioning
Erosion control and road maintenance will be performed on an as-needed basis. No new roads will be added, and unnecessary internal roads will be decommissioned.

Fire Management
The fire management component of the management plan will be updated every three years.

Trash Removal
Monitoring for illegal dumping and the collection and disposal of trash will occur on an as-needed basis.

GIS Database
The land manager will maintain the GIS database for the property on an annual basis.

Annual Reports
The land manager will prepare annual reports on management activities, expenditures, and the balance of the management endowment.

Public Information/Education
Notices regarding access controls and limits on public uses and annual reports will be posted on the land manager/owner's website.

Estimated Costs and Funding

Start-up costs are estimated at approximately $246,219 for the five years ($49,244 annually). Annual costs for ongoing management are estimated at $41,449, which would require a non-wasting endowment of $2,074,455. The total funding commitment required for management of the property is $2,320,674.

STATUS OF THE ACQUISITION

The owner is a willing seller. The acquisition is in the final negotiations stage.

HAMLET HMP

OVERVIEW

ACRES	84.35
LOCAL JURISDICTION	County of San Diego
CROSSED BY PROJECT ROW	Yes
CONSERVED AS MITIGATION FOR PROJECT IMPACTS TO	Sensitive Vegetation
INCIDENTAL BIOLOGICAL VALUES	Potential habitat for California gnatcatcher and Quino checkerspot
ALSO A MITIGATION SITE FOR PROJECT IMPACTS TO	
JURISDICTIONAL WATERS	No
SENSITIVE PLANTS	No
NATIVE TREES	No
OTHER	MSCP consideration
ADJACENT CONSERVED/PUBLIC LANDS	Stelzer Regional Park, Helix Water District Lands
PROPOSED LAND MANAGER/OWNER	County of San Diego
ESTIMATED START-UP MANAGEMENT COSTS	$77,786
ESTIMATED ENDOWMENT FOR ONGOING MANAGEMENT	$397,507
ACQUISITION STATUS	Acquired by SDG&E

MITIGATION FUNCTION

This property is part of the offsite mitigation for the Project's impacts to sensitive vegetation types. It includes potential habitat for Gnatcatcher and Quino but is not a proposed mitigation site for impacts to these or other listed species. It also is not a mitigation site for impacts to jurisdictional waters, sensitive plants, or native trees.

PROPERTY DESCRIPTION

The Hamlet parcel is located south of the Interstate 8 freeway and Willow Road between Wildcat Canyon Road and highway 67 (Figure H-1). A legal description is included in Part 4 of this HAP/HMP.

The Project ROW crosses the property. Two towers and two TSAPs will be permanent components within the ROW. An existing road on the property will be used as temporary access road during construction and will require improvements within the roadway.

Access

The property is accessed off Wildcat Canyon Road.

Adjacent Lands and Land Use

The parcel encompasses High Meadows Road and borders Louis A. Stelzer County Park to the south and west. Hamlet is located in the community of Lakeside. Directly north is the San Vicente Reservoir and Oak Oasis County Park. Helix Water District is within a close proximity to the eastern border of the parcel (Figure H-2). Allowable uses on the adjacent County Park include biking and hiking (day use only).

Climate, Geology, and Landscape

The Hamlet parcel is in an area characterized by warm, dry summers and mild winters with occasional precipitation. Also characteristic of the region is the sea-breeze/land-breeze cycle. During the daytime, on-shore winds move inland with speeds of approximately seven to ten miles per hour (mph). During the nighttime, the direction is reversed and winds move from an easterly direction towards the coast. In addition, periodic Santa Ana wind conditions, which last from 2-3 days, are present.

The Hamlet parcel contains hills that rise between 500-1500 feet above sea level. The resulting small canyons, valleys, and gullies distribute a dendritic system of ephemeral and perennial channels to the San Vicente Reservoir to the north.

Soils

TABLE H-1. HAMLET SOILS

Soil Type	Summary Description
CnG2	Cieneba-Fallbrook rocky sandy loams, 30 to 65 percent s lopes, eroded
RaD2	Ramona sandy loam, 9 to 15 percent slopes, eroded

Source: USDA NRCS Soil Surveys.

Vegetation Communities

Hamlet contains mainly coastal scrub (recovering) and non-native grassland communities (Table H-2 and Figure H-3). Jurisdictional wetlands also have been mapped on the property (Figure H-4).

TABLE H-2. HAMLET VEGETATION

Vegetation Communities		Acreage	
Types	**Subtypes**	**Subtype**	**Total**
Chaparrals	Southern Mixed Chaparral-Burned	2.24	2.24
Coastal and Montane Scrub Habitats	Diegan Coastal Sage Scrub	56.21	56.21
Grasslands and Meadows	Non-native Grassland	19.45	19.45
Herbaceous Wetlands, Freshwater, and Streams	Non-vegetated Channel	0.66	0.66
Non-Native Vegetation, Developed, Disturbed	Developed	5.79	5.79
		Total	84.35

Diegan Coastal Sage Scrub (32500) - This vegetation type makes up the majority of the Hamlet parcel. This vegetation type accounts for approximately 56.21 acres or 67% of the total parcel.

Non-native Grasslands (42200) - This vegetation type is found in three patches within Diegan Coastal Sage Scrub and directly adjacent to the Developed Area on the Hamlet parcel. This vegetation type occurs on approximately 19.62 acres or 23% of the parcel.

Southern Mixed Chaparral (37120) - This vegetation type is found in one small patch on the south western corner boundary of the Hamlet parcel. This area has been recently burned and accounts for approximately 2.24 acres or 3% of the parcel.

Non-Vegetated Channel (13200) – This vegetation type is found primarily on the northern portion of the Hamlet parcel. This type occurs on less than 1 acre (less than 1%) of the parcel.

Developed Area (12000) - This area is found in one patch within the Hamlet parcel and is adjacent to the Non-Native Grasslands and the southern border of the parcel. This type occurs on approximately 5.79 acres or 7% of the parcel.

Sensitive Plant Species

Two sensitive plant species are associated with the parcel (Table H-3 and Figure H-5).

TABLE H-3. HAMLET SENSITIVE PLANT SPECIES

Common Name	Scientific Name	Listing Status Federal/State/CNPS	Probability of Occurrence
San Diego sunflower	*Bahiopsis laciniata*	-/-/1B	Observed
Southern jewel-flower	*Streptanthus campestris*	-/-/1B	High

Invasive Plant Species

The Hamlet parcel contains one species listed by Cal-IPC as an invasive, fountain grass (*Pennisetum setaceum)*. Two individuals have been mapped along an access road through the property (Figure H-6).

Sensitive Animal Species

The Hamlet parcel has potentially suitable habitat for a diversity of sensitive fauna (Table H-4 and Figure H-5), including for potential habitat for Gnatcatcher and Quino.

The probability of Gnatcatcher occurrence is moderate to high. The CSS on the site was significantly affected by the 2003 Cedar fire and has not yet fully recovered. However, occupied habitat occurs just outside the boundaries of the Hamlet parcel on all sides. Gnatcatcher surveys conducted on the parcel in 2010 were negative.

The probability of Quino occurrence is moderate. A reasonably large population of California plantain (*Plantago erecta*) occur just outside the parcel. Host plants have not been found on the parcel.

TABLE H-4. HAMLET SENSITIVE ANIMAL SPECIES

Common Name	Scientific Name	Listing Status (Federal/State/CNDDB)	Potential to Occur
Quino Checkerspot Butterfly	*Euphydryas editha quino*	E/-/G5T1 S1	Moderate
Coast Patch-nosed Snake	*Salvadora hexalepis virguletea*	-/SSC/G5T3 S2S3	High
Costal Rosy Boa	*Lichanura trivirgata roseofusca*	-/-/G4G5 S3S4	Moderate
Coronado Skink	*Eumeces skiltonianus interparietalis*	-/-/G5T2T3Q S1S2	High
Northern Red-Diamond Rattlesnake	*Crotalus ruber ruber*	-/-/G4T3T4 S2	Moderate
Orange-throated Whiptail	*Aspidoscelis hyperythra*	-/-/G5 S2	Observed
San Diego Horned Lizard	*Phrynosoma coronatum blainvillii*	-/-/G4G5 S3S4	Observed
Black-tailed Jackrabbit	*Lepus californicus*	-/-/G5T4 S5	Moderate
Coastal California Gnatcatcher	*Polioptila californica californica*	T/SSC/G3T2 S2	Moderate/High
Loggerhead Shrike	*Lanius ludovicianus*	-/-/G4 S4	Low
Dulzura Pocket Mouse	*Chaetodipus californicus femoralis*	-/-/G5T3 S2	Low
Northwestern San Diego Pocket Mouse	*Chaetodipus fallax fallax*	-/-/G5T3 S2S3	Low

Invasive Animal Species

There have been no invasive animal species identified on the Hamlet property.

Wildlife Movement and Linkages

The Hamlet parcel is not located within any identified linkages. However, the habitat on the parcel connects with open space on the adjacent County parklands and Helix Water District properties.

MANAGEMENT SPECIFICATIONS

This section identifies the proposed land manager/owner, start-up and ongoing tasks, and the estimated costs of HMP implementation.

Proposed Land Manager/Owner

SDG&E proposes to convey the lands to the County of San Diego, who would manage them as part of a regional park or as an open space preserve. This arrangement is proposed because the property is adjacent to a existing regional county park. The arrangement also offsets the Project's effects on lands conserved under the County's approved MSCP.

Start-up Tasks (Years 1-5)

Access Control

Approximately five signs will be installed in appropriate areas to limit public access and maintained during the period. No gates or fencing is proposed at this time.

General Conditions Monitoring and Wildlife Assessment

The land manager will conduct annual inspections to determine overall conditions on the property and assess threats to habitat and species. Results of the inspection will be used to map and prioritize areas where preventive or remedial measures are needed.

Vegetation and Invasive Species Mapping

A qualified plant ecologist will prepare baseline mapping of vegetation communities and invasive plant species on the property based on field surveys and aerial imagery. The mapping will be completed by year three and updated as needed during the period.

Species Surveys

Focused surveys for Gnatcatcher and Quino would not be conducted unless general monitoring detects the species on the property.

5-Year Work Program and Annual Work Plans

Using results from general conditions assessment and vegetation/invasive species mapping, the land manager will prepare a 5-year work program that identifies and prioritizes biological resource and land stewardship tasks for the period and includes a five-year staffing and materials budget. The 5-year work program will be completed no later than year 3 and updated every three years. Annual work plans and annual budgets will be based on the priorities set in the 5-year work program.

Interim Work Plans

Prior to completion of the first 5-year work program, the land manager will prepare annual work plans and budgets for the general conditions assessment, surveys, mapping, and other data collection required to guide management of the property. The interim work plans also may include access control, invasive species control, and erosion control measures that the land manager determines are necessary.

Invasive Plant Control

Invasive plant control measures will be initiated based on the results of the mapping effort and the priorities established in the work program.

Erosion Control, Road Maintenance, and Road Decommissioning

Erosion control and road maintenance will be performed on an as-needed basis. The existing internal access roads will be maintained if required for access control and monitoring purposes. No new roads will be added, and unnecessary internal roads will be decommissioned. Use of the Project access road will be coordinated with SDG&E.

Fire Management
The 5-year work program will include a fire management component developed in consultation with the appropriate fire agencies. Controlled or systematic burns will not be allowed as a fuel reduction measure.

Trash Removal
The property will be managed for illegal dumping in concert with the management for public access. Any evidence of illegal dumping will be recorded by the land manager and addressed accordingly. Trash will be removed and disposed in accordance with applicable local ordinances.

GIS Database
The land manager will establish and maintain a GIS database for the property.

Annual Reports
The land manager will prepare annual reports on management activities and expenditure of start-up funds.

Public Information/Education
The land manager will prepare web-ready notices and fact sheets regarding the inclusion of the lands in the properties managed by the public agency or conservancy, the resources on the property, and public access restrictions. The materials will be posted on the land manager/owner's website.

Ongoing Tasks (Beginning Year 6)

Access Control
Signs will be maintained and replaced as needed. Barriers and other access controls will be considered if monitoring identifies illegal access and uses as a problem.

General Conditions Monitoring and Wildlife Assessment
The land manager will conduct annual inspections to determine overall conditions on the property and assess threats to habitat and species. Results of the inspection will be used to map and prioritize areas where preventive or remedial measures are needed.

Vegetation and Invasive Species Mapping
The vegetation and invasive species mapping will be updated every three years.

Species Surveys
If these species are detected onsite, surveys would be conducted at least every three years.

5-Year Work Program and Annual Work Plans
The 5-year work program will be updated every three years. Annual work plans and annual budgets will be based on the priorities identified in the work program.

Exotic Plant Control
Control measures for exotic invasive plants will be implemented as specified in the work program and annual work plans.

Erosion Control, Road Maintenance, and Road Decommissioning
Erosion control and road maintenance will be performed on an as-needed basis. No new roads will be added, and unnecessary internal roads will be decommissioned.

Fire Management
The fire management component of the management plan will be updated every three years.

Trash Removal
Monitoring for illegal dumping and the collection and disposal of trash will occur on an as-needed basis.

GIS Database
The land manager will maintain the GIS database for the property on an annual basis.

Annual Reports
The land manager will prepare annual reports on management activities, expenditures, and the balance of the management endowment.

Public Information/Education
Notices regarding access controls and limits on public uses and annual reports will be posted on the land manager/owner's website.

Estimated Costs and Funding

As presented in detail in Part 3, start-up management costs are estimated at $77,786 for the five-year period ($15,557 annually). Ongoing annual costs are estimated at $7,950 and would require a non-wasting endowment of $397,507. The total funding commitment required for management of the property is $475,293.

STATUS OF THE ACQUISITION

The property has been acquired by SDG&E.

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EL CAPITAN HMP

OVERVIEW

ACRES	381.40
LOCAL JURISDICTION	San Diego County El Capitan Open Space Preserve, CNF
CROSSED BY PROJECT ROW	No
CONSERVED AS MITIGATION FOR PROJECT IMPACTS TO	Sensitive Vegetation Communities
INCIDENTAL BIOLOGICAL VALUES	Nesting Golden Eagles
ALSO A MITIGATION SITE FOR PROJECT IMPACTS TO	
JURISDICTIONAL WATERS	No
SENSITIVE PLANTS	Yes (Lakeside ceanothus)
NATIVE TREES	No
OTHER	MSCP considerations; golden eagle conservation.
ADJACENT CONSERVED/PUBLIC LANDS	CNF, San Diego County El Capitan Open Space Preserve
PROPOSED LAND MANAGER/OWNER	County of San Diego or San Diego River Conservancy
ESTIMATED START-UP MANAGEMENT COSTS	$235,817
ESTIMATED ENDOWMENT FOR ONGOING MANAGEMENT	$1,440,192
ACQUISITION STATUS	Acquired by SDG&E

MITIGATION FUNCTION

This property will be part of the required offsite mitigation for the Project's permanent impacts to sensitive vegetation communities and will be location for mitigating impacts to Lakeside ceanothus. Conservation of the property also augments the Project's golden eagle impact avoidance and minimization measures. The property also will augment and link lands conserved under the San Diego County MSCP.

The property is not a mitigation site for the Project's impacts to listed species, jurisdictional waters, or native trees.

A legal description of the property is included in Part 4 of this HAP/HMP.

PROPERTY DESCRIPTION

The El Capitan property includes four parcels totaling 381.40 acres. The property is located north of El Monte Road and the Project ROW.

Access

The property is in a remote location and is accessed off a trail in the County open space preserve.

Adjacent Lands and Land Use

A variety of conserved and public lands either abut or are in the immediate vicinity of the property (Figure EC-2). These lands include: Audubon Society Silverwood Wildlife Sanctuary (northwest), County of San Diego El Monte Park (southwest), Center for Lands Management Blossom Valley (south), City of San Diego El Capitan Reservoir Open Space (south east), Cleveland National Forest (east), County of San Diego El Capitan Open Space Preserve (north).

Adjacent land uses include recreation concurrent with the management goals for County of San Diego open space and Cleveland National Forest. Cleveland allows for public use and access including hunting, fishing, camping, hiking, shooting, and ORV use. County of San Diego open space allows for recreational activities as well including hiking. El Capitan Open Space preserve, also adjacent to the El Capitan parcel, is open to hikers for day use only.

Climate, Geology, and Landscape

The area has a climate characterized by warm, dry summers and mild winters with occasional precipitation. Also characteristic of the region is the sea-breeze/land-breeze cycle. During the daytime, on-shore winds move inland with speeds of approximately seven to ten miles per hour (mph). During the nighttime, the direction is reversed and winds move from an easterly direction towards the coast. In addition, periodic Santa Ana wind conditions, which last from 2-3 days, are present.

El Capitan contains numerous cliffs and granitic outcroppings. In general, the area is defined by steep slopes and xeric soils. The arid environment along with the xeric soil conditions supports a large amount of the fire-prone southern mixed chaparral (Figure EC-3). The property has burned over five times in the last 100 years, most recently during the 2003 Cedar Fire.

The parcel is located within the San Diego River Watershed and contains intermittent seeps and streams which are tributaries to the San Diego River. However, there are no mapped jurisdictional waters.

Soils

TABLE EC-1. EL CAPITAN SOILS

Soil Type	Summary Description
AcG	Acid igneous rock land
FxG	Friant rocky fine sandy loam, 30 to 70 percent slopes
SvE	Stony land

Source: USDA NRCS Soils Survey Division

Vegetation Communities

The vegetation within the boundaries of the El Capitan parcel is fairly monotypic and mainly chaparral (Figure EC-3 and Table EC-2). Smaller patches of oak woodland are located mainly along the western

and southern extent of the property along drainages. There is a small amount of riparian forest, indicative of the ephemeral streams present on the property.

TABLE EC-2. EL CAPITAN VEGETATION

Vegetation Communities		Acreage	
Types	**Subtypes**	**Subtypes**	**Total**
Chaparrals	Chamise Chaparral	44.48	378.56
	Scrub Oak Chaparral	15.93	
	Southern Mixed Chaparral	318.16	
Woodlands and Forests	Coast Live Oak Woodland	2.84	2.84
		Total	381.40

Southern Mixed Chaparral (37120) - This vegetation type is found throughout the property on approximately 318.16 acres or 83% of the land.

Chamise Chaparral (37200) - This vegetation type is found in the south eastern corner of the El Capitan property. The vegetation type is completely surrounded by Southern Mixed Chaparral. This vegetation type makes up approximately 44.48 acres or 12% of the total area.

Scrub Oak Chaparral (37900) - This vegetation type is found in one patch along the southwestern border of the El Capitan property. This vegetation type makes up approximately 15.93 acres or 4% of the total area.

Coast Live Oak Woodland (71161) - This vegetation type is found in four small patches in the southwestern corner of the El Capitan property. This vegetation type makes up approximately 2.84 acres or less than 1% of the total area.

Sensitive Plant Species

The plant species found within the El Capitan property include Lakeside ceanothus, Ramona spineflower, Orcutt's brodiaea, and Ramona horkelia. For a detailed list of sensitive plant species with a high probability of occurrence or observed to occur on the El Capitan property, see Table EC-3 (Figure EC-4).

Invasive Plant Species

Because the El Capitan parcel contains no roads or trails of any kind, the invasive species present are minimal. To date, no significant populations of invasive plants have been mapped or recorded for this property. There are records of pampas grass and fountain grass north of the property.

TABLE EC-3. EL CAPITAN SENSITIVE PLANT SPECIES

Common Name	Scientific Name	Listing Status Federal/State/CNPS	Potential to Occur
Lakeside ceanothus	*Ceanothus cyaneus*	-/-/1B	Observed
Delicate clarkia	*Clarkia delicate*	-/-/1B	Observed
Ramona horkelia	*Horkelia truncate*	-/-/1B	Observed
Felt-leaved monardella	*Mondardella hypoleuca spp. lanata*	-/-/1B	High
Orcutt's brodiaea	*Brodiaea orcuttii*	-/-/1B	Observed
Moreno currant	*Ribes canthariforme*	-/-/1B	Moderate
Ramona spineflower	*Chorizanthe leptotheca*	-/-/4	Observed

Sensitive Animal Species

The golden eagle has been observed on the El Capitan property. In addition, survey conducted in 2010 for the Project confirmed that there is one active nest and one inactive nest on the site (Figure EC-5).

TABLE EC- 1. EL CAPITAN SENSITIVE ANIMAL SPECIES

Common Name	Scientific Name	Listing Status Federal/State/ CNDDB	Likelihood of Occurrence
Quino Checkerspot Butterfly	*Euphydryas editha quino*	E/-/G5T1 S1	Low
Coastal Rosy Boa	*Lichanura trivirgata roseofusca*	-/-/G4G5 S3S4	Moderate
Coast Patch-nosed Snake	*Salvadora hexalepis virguletea*	-/SSC/G5T3 S2S3	Moderate
Coronado Skink	*Eumeces skiltonianus interparietalis*	-/-/G5T2T3Q S1S2	Low
Orange-throated Whiptail	*Aspidoscelis hyperythra*	-/-/G5 S2	High
San Diego Horned Lizard	*Phrynosoma coronatum blainvillii*	-/-/G4G5 S3S4	High
Golden Eagle	*Aquila chrysaetos*	-/SSC/G5 S3	Observed
Black-tailed Jackrabbit	*Lepus californicus*	-/-/G5T4 S5	Moderate
Dulzura Pocket Mouse	*Chaetodipus californicus femoralis*	-/-/G5T3 S2	High

Invasive Animal Species

To date, no significant populations of invasive animals have been mapped or recorded for this property.

Wildlife Movement and Linkages

The El Capitan property is not located within any identified linkages but connects conserved lands and public open space to the south, east, and north.

MANAGEMENT SPECIFICATIONS

This section identifies the proposed land manager/owner, start-up and ongoing tasks, and the estimated costs of HMP implementation.

Proposed Land Manager/Owner

SDG&E proposes to convey the lands to the County of San Diego or the San Diego River Conservancy, who would manage them as an open space preserve. The County is proposed because the property is adjacent an existing open space preserve. The arrangement also offsets the Project's effects on lands conserved under the County's approved MSCP. The River Conservancy is proposed because both the City and County of San Diego are participants and the property is a key watershed land.

Start-up Tasks (Years 1-5)

Access Control
Approximately 10 signs will be installed in appropriate areas and maintained over the period. No gates or fencing is proposed at this time.

General Conditions Monitoring and Wildlife Assessment
The land manager will conduct annual inspections to determine overall conditions on the property and assess threats to habitat and species. Results of the inspection will be used to map and prioritize areas where preventive or remedial measures are needed.

Vegetation and Invasive Species Mapping
A qualified plant ecologist will prepare baseline mapping of vegetation communities and invasive plant species on the property based on field surveys and aerial imagery. The mapping will be completed by year three and updated as needed during the period.

Species Surveys
The Lakeside ceanothus population will be surveyed twice during the period. The location and status of eagle nest sites will be mapped based on data from Project monitoring efforts and other sources.

5-Year Work Program and Annual Work Plans
Using results from general conditions assessment and vegetation/invasive species mapping, the land manager will prepare a 5-year work program that identifies and prioritizes biological resource and land stewardship tasks for the period and includes a five-year staffing and materials budget. The 5-year work program will be completed no later than year 3 and updated every three years. Annual work plans and annual budgets will be based on the priorities set in the 5-year work program.

Interim Work Plans
Prior to completion of the first 5-year work program, the land manager will prepare annual work plans and budgets for the general conditions assessment, surveys, mapping, and other data collection required to guide management of the property. The interim work plans also may include access control, invasive species control, and erosion control measures that the land manager determines are necessary.

Invasive Plant Control
Invasive plant control measures will be initiated based on the results of the mapping effort and the priorities established in the work program. For this property, the focus will be on preventive measures.

Erosion Control, Road Maintenance, and Road Decommissioning
Erosion control will be performed on an as-needed basis. There are no existing internal access roads. No new roads will be added.

Fire Management
The 5-year work program will include a fire management component developed in consultation with the appropriate fire agencies. Controlled or systematic burns will not be allowed as a fuel reduction measure.

Trash Removal
Because of its limited access, illegal dumping is not expected to be problem on this property. However, the property will be monitored for illegal dumping in concert with the management for public access. Any evidence of illegal dumping will be recorded by the land manager and addressed accordingly. Trash will be removed and disposed in accordance with applicable local ordinances.

GIS Database
The land manager will establish and maintain a GIS database for the property.

Annual Reports
The land manager will prepare annual reports on management activities and expenditure of start-up funds.

Public Information/Education
The land manager will prepare web-ready notices and fact sheets regarding the inclusion of the lands in the properties managed by the public agency or conservancy, the resources on the property, and public access restrictions. The materials will be posted on the land manager/owner's website.

Ongoing Tasks (Beginning Year 6)

Access Control
Signs will be maintained and replaced as needed. Barriers and other access controls will be considered if monitoring identifies illegal access and uses as a problem.

General Conditions Monitoring and Wildlife Assessment
The land manager will conduct annual inspections to determine overall conditions on the property and assess threats to habitat and species. Results of the inspection will be used to map and prioritize areas where preventive or remedial measures are needed.

Vegetation and Invasive Species Mapping
The vegetation and invasive species mapping will be updated every three years. The status of the Lakeside ceanothus will be evaluated as part of the vegetation mapping update.

Species Surveys
Surveys for listed wildlife species will not be required as part of ongoing management (the property is not proposed as mitigation for impacts to any listed species).

5-Year Work Program and Annual Work Plans
The 5-year work program will be updated every three years. Annual work plans and annual budgets will be based on the priorities identified in the work program.

Exotic Plant Control
Control measures for exotic invasive plants will be implemented as specified in the work program and annual work plans.

Erosion Control, Road Maintenance, and Road Decommissioning
Erosion control will be performed on an as-needed basis. No new roads will be added.

Fire Management
The fire management component of the management plan will be updated every three years.

Trash Removal
Monitoring for illegal dumping and the collection and disposal of trash will occur on an as-needed basis.

GIS Database
The land manager will maintain the GIS database for the property on an annual basis.

Annual Reports
The land manager will prepare annual reports on management activities, expenditures, and the balance of the management endowment.

Public Information/Education
Notices regarding access controls and limits on public uses and annual reports will be posted on the land manager/owner's website.

Estimated Costs and Funding

As presented in detail in Part 3, start-up management costs are estimated at $235,817 for the five-year period ($47,164 annually). Ongoing annual costs are estimated at $28,804 and would require a non-wasting endowment of $1,440,192. The total funding commitment required for management of the property is $1,676,009.

STATUS OF THE ACQUISITION

The property has been acquired by SDG&E.

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CHOCOLATE CANYON HMP

OVERVIEW

ACRES	76.14
LOCAL JURISDICTION	County of San Diego
CROSSED BY PROJECT ROW	Yes
CONSERVED AS MITIGATION FOR PROJECT IMPACTS TO	Sensitive Vegetation
INCIDENTAL BIOLOGICAL VALUES	Southwestern Willow Flycatcher, Least Bell's Vireo
ALSO A MITIGATION SITE FOR PROJECT IMPACTS TO	
JURISDICTIONAL WATERS	Yes
SENSITIVE PLANTS	No
NATIVE TREES	Yes (via oak woodland conservation)
OTHER	MSCP considerations
ADJACENT CONSERVED/PUBLIC LANDS	City of San Diego Cornerstone Lands,
PROPOSED LAND MANAGER/OWNER	City of San Diego
ESTIMATED START-UP MANAGEMENT COSTS	$107,233
ESTIMATED ENDOWMENT FOR ONGOING MANAGEMENT	$598,088
ACQUISITION STATUS	Acquired by SDG&E

MITIGATION FUNCTION

This property will be part of the required offsite mitigation for the Project's permanent impacts to sensitive vegetation communities and will be a mitigation site for impacts to jurisdictional waters. The property also will augment and link lands conserved under the City of San Diego MSCP.

The property is not a mitigation site for the Project's impacts to listed species, special status plants, or native trees.

A legal description of the property is included in Part 4 of this HAP/HMP.

PROPERTY DESCRIPTION

The Chocolate Canyon property includes all or part of five parcels. It is located northeast of the Interstate 8 freeway between the Chocolate Summit Drive and Peutz Valley Road exits (Figure CC-1). This area is located between the communities of Crest and Alpine in El Cajon.

The Project ROW and impact areas (temporary and permanent) cross the property and are excluded from the mitigation land. Impact areas include a permanent access road, four structures, and a TSAP.

Access

The property can be accessed off of Chocolate Summit Drive and Peutz Valley Road. There are two paved roads on the property.

Adjacent Lands and Land Use

The Chocolate Canyon property is bordered on the west by private lands and the County of San Diego's Chocolate Summit. The northern border of the property is adjacent to the City of San Diego's Cornerstone Lands, which in turn are adjacent to CNF and El Capitan Lake. The southern border runs along the Interstate 8 freeway edge and is adjacent to the community of Harbison Canyon. (Figure CC-2).

Climate, Geology, and Landscape

The area has a climate characterized by warm, dry summers and mild winters with occasional precipitation. Also characteristic of the region is the sea-breeze/land-breeze cycle. During the daytime, on-shore winds move inland with speeds of approximately seven to ten miles per hour (mph). During the nighttime, the direction is reversed and winds move from an easterly direction towards the coast. In addition, periodic Santa Ana wind conditions, which last from 2-3 days, are present. These wind conditions contribute to the overall arid environment and can exacerbate fire risk.

This property, as well as the surrounding area, was burned in the 2003 Cedar fire and is slowly recovering from the fire effects, The entire property is located within the San Diego River watershed and is just south of El Capitan Reservoir. The main water body which supports the riparian and coast live oak woodland found on the property is the Chocolate Canyon Stream.

Soils

TABLE CC-1. CHOCOLATE CANYON SOILS

Soil Type	Summary Description
ClG2	Cieneba coarse sandy loam, 30 to 65 percent slopes, eroded
CnG2	Cieneba-Fallbrook rocky sandy loams, 30 to 65 percent s lopes, eroded

Vegetation Communities

The Chocolate Canyon property contains a variety of vegetation and habitat types due to its ecotonal nature. The property is characterized by coastal sage scrub covered hills surrounding a canyon of riparian forests and chaparral, with large patches of non-native grasslands interspersed as a result of the 2003 Cedar Fire, which significantly affected this area (Figure CC-3). The property is bisected by a canyon with a densely vegetated riparian corridor that contains low to moderately dense oak woodlands. The north-facing slopes are dense chaparral.

TABLE CC-2. CHOCOLATE CANYON VEGETATION

Vegetation Communities		Acreage	
Types	**SubTypes**	**Subtypes**	**Total**
Chaparrals	Southern Mixed Chaparral	26.10	26.10
Coastal and Montane Scrub Habitats	Diegan Coastal Sage Scrub	30.63	30.63
Herbaceous Wetlands, Freshwater, and Streams	Non-vegetated Channel	0.03	0.03
Riparian Forests and Woodlands	Southern Coast Live Oak Riparian Forest	14.16	14.16
Woodlands and Forests	Coast Live Oak Woodland	4.42	4.42
Non-Native Vegetation, Developed Areas, and Disturbed Habitat	Developed	0.80	0.80
		Total	76.14

Southern Mixed Chaparral (37120) - This vegetation type is found on the southern half and north eastern arm of the Chocolate Canyon property. A small portion of southern mixed chaparral, located along the south western border of the property, is considered disturbed.

Diegan Coastal Sage Scrub (32500) - This vegetation type makes up the majority of the northern half of the Chocolate Canyon property.

Southern Coast Live Oak Riparian Forest (61310) - This vegetation type is found in one north to south linear finger within the Chocolate Canyon property, dividing the Diegan Coastal Sage Scrub and the Southern Mixed Chaparral vegetation types.

Coast Live Oak Woodland (71160) - This vegetation type is usually found on north-facing slopes and shaded ravines and also as part of the Southern Coast Live Oak Riparian Forest vegetation type. This vegetation type is found in one small patch on the south western border of the Chocolate Canyon property.

Non-vegetated Channel (13200) - Two small Non-vegetated Channels are found running within the Diegan Coastal Sage Scrub vegetation type on the Chocolate Canyon Property. This vegetation type is approximately 0.15 acre or less than 1% of the total Chocolate Canyon Property.

Developed (1200) - Two paved roads are found within the Chocolate Canyon Property. One is located within the Southern Mixed Chaparral on the south eastern portion of the property, the other bisects the ROW and is located within the Diegan Coastal Sage Scrub on the north western portion of the Chocolate Canyon property.

The property has a large number of streams and riparian habitats running along the many small valleys and canyons located within its boundaries (Figure CC-4). A system of jurisdictional wetlands runs north to south along the eastern border of the property. In addition, a dendritic system of ephemeral, intermittent and perennial streams run throughout the property and flows into El Capitan Reservoir.

Sensitive Plant Species

Three CNPS List 1b plant species are associated with the property. California plantain also occurs. See Table CC-3 (Figure CC-5).

TABLE CC-7. CHOCOLATE CANYON SENSITIVE PLANT SPECIES

Common Name	Scientific Name	Listing Status Federal/State/CNPS	Potential to Occur
Delicate clarkia	*Clarkia delicate*	-/-/1B	Observed
Lakeside ceanothus	*Ceanothus cyaneus*	-/-/1B	Moderate
Tecate cypress	*Cupressus forbesii*	-/-/1B	High

Invasive Plant Species

There have been two Cal-IPC listed invasive plant species identified and mapped on Chocolate Canyon (Figure CC-6).

Patches of arundo (*Arrundo donax*) have been mapped along the entire length of the Chocolate Canyon Stream. Arrundo is considered to be a noxious invasive plant because it not only displaces native riparian vegetation, it also can alter the hydrogeomorphology of the watershed. The plants can grow so large and so dense that they alter the way a stream flows, the depth of the water table, and the angle of the embankment.

A linear population of castor bean (*Ricinus communis*) has been mapped along the southern border of the Chocolate Canyon property where it meets the Interstate 8 freeway. Castor bean can reach a height of 3-15 feet and is considered to be invasive in southern California. The seeds are toxic to humans and some wildlife.

Sensitive Animal Species

For a detailed list of sensitive animal species with a high probability of occurrence or observed to occur on the Chocolate Canyon Property, see Table CC-4 (Figure CC-5).

The probability of Quino occurrence is moderate because of the presence of California plantain.

Despite the presence of significant portions of coastal sage scrub habitat, the likelihood of Gnatcatcher occurrence is low. Recent focused surveys for gnatcatcher have located the bird just off property. Focused surveys on the property did not find any gnatcatcher. It is likely that gnatcatcher could occupy this habitat in the future even if current probability of occurrence is low.

One migrating individual southwestern willow flycatcher was observed on the property in 2010 (ICF per. comm. 2010). The likelihood of the southwestern willow flycatcher being present within the Chocolate Canyon property is moderate. The property contains a significant amount of riparian habitat which would be suitable breeding habitat for the bird. Suitable riparian habitat is, by its nature, ephemeral in

nature and dynamic in distribution (USFWS 2002). The bird has been observed migrating through the property. Only four populations of southwestern willow flycatcher are known to nest in San Diego County.

While the least Bell's vireo were not observed onsite during surveys conducted in 2010, habitat for these species occur onsite. The property contains a both riparian areas and oak woodland. The density of willow and cotton wood trees is somewhat lower than ideal for the least Bell's vireo. Therefore, the likelihood of occurrence for this species is low to moderate. Permanent sources of water and riparian areas within the species' identified range increase the likelihood that this bird will be found here.

TABLE CC-4. CHOCOLATE CANYON SENSITIVE ANIMAL SPECIES

Common Name	Scientific Name	Listing Status Federal/State/CNDDB	Likelihood of Occurrence
Quino Checkerspot Butterfly	*Euphydryas editha quino*	E/-/G5T1 S1	Moderate
Black-tailed Jackrabbit	*Lepus californicus*	-/-/G5T4 S5	Low
Coast Patch-nosed Snake	*Salvadora hexalepis virguletea*	-/SSC/G5T3 S2S3	High
Costal Rosy Boa	*Lichanura trivirgata roseofusca*	-/-/G4G5 S3S4	High
Orange-throated Whiptail	*Aspidoscelis hyperythra*	-/-/G5 S2	Observed
San Diego Horned Lizard	*Phrynosoma coronatum blainvillii*	-/-/G4G5 S3S4	High
Coronado Skink	*Eumeces skiltonianus interparietalis*	-/-/G5T2T3Q S1S2	High
Two-striped Garter Snake	*Thamnophis hammondii*	-/-/G3 S2	Low
Coastal California Gnatcatcher	*Polioptila californica californica*	T/SSC/G3T2 S2	Low
Cooper's Hawk	*Accipiter cooperii*	-/-/G5 S3	High
Least Bell's Vireo	*Vireo bellii pusillus*	E/E/G5T2 S2	Moderate
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	E/E/G5T1T2 S1	Moderate
Yellow-breasted Chat	*Icteria virens*	-/SSC/G5 S3	Moderate
Yellow Warbler	*Dendroica petechia brewsteri*	-/SSC/G5T3 S2	Moderate
Dulzura Pocket Mouse	*Chaetodipus californicus femoralis*	-/-/G5T3 S2	Moderate
Northwestern San Diego Pocket Mouse	*Chaetodipus fallax fallax*	-/-/G5T3 S2S3	Low

Invasive Animal Species

No significant populations of invasive animal species have been identified on the property to date.

Wildlife Movement and Linkages

The Puetz Valley Wildlife Movement Corridor runs through the property, linking El Capitan Reservoir to open space lands south of I-8. The property also link City of San Diego MSCP lands.

MANAGEMENT SPECIFICATIONS

This section identifies the proposed land manager/owner, start-up and ongoing tasks, and the estimated costs of HMP implementation.

Proposed Land Manager/Owner

SDG&E proposes to convey the lands to the City of San Diego, who would manage them as an open space preserve. This arrangement is proposed because the property is adjacent to the City's San Vicente Reservoir Cornerstone Lands (MSCP preserve) and is identified by the City as an important watershed property. The arrangement also offsets the Project's effects on lands conserved under the City's approved MSCP.

Start-up Tasks (Years 1-5)

Access Control
Four bollards, one gate, and 15 signs will be installed and maintained over the period.

General Conditions Monitoring and Wildlife Assessment
The land manager will conduct annual inspections to determine overall conditions on the property and assess threats to habitat and species. Results of the inspection will be used to map and prioritize areas where preventive or remedial measures are needed.

Vegetation and Invasive Species Mapping
A qualified plant ecologist will prepare baseline mapping of vegetation communities and invasive plant species on the property based on field surveys and aerial imagery. The mapping will be completed by year three and updated as needed during the period.

Species Surveys
Two sets of surveys (3 visits each set) will be conducted for southwestern willow flycatcher and least Bell's vireo. Surveys for Quino and Gnatcatcher will be scheduled if general monitoring detects the species on the property during the period.

5-Year Work Program and Annual Work Plans
Using results from general conditions assessment and vegetation/invasive species mapping, the land manager will prepare a 5-year work program that identifies and prioritizes biological resource and land stewardship tasks for the period and includes a five-year staffing and materials budget. The 5-year work program will be completed no later than year 3 and updated every three years. Annual work plans and annual budgets will be based on the priorities set in the 5-year work program.

Interim Work Plans
Prior to completion of the first 5-year work program, the land manager will prepare annual work plans and budgets for the general conditions assessment, surveys, mapping, and other data collection required to guide management of the property. The interim work plans also may include access control, invasive species control, and erosion control measures that the land manager determines are necessary.

Invasive Plant Control
Invasive plant control measures will be initiated based on the results of the mapping effort and the priorities established in the work program. This effort will be coordinated with the invasives control conducted as part of the HMMP measures on the property.

Erosion Control, Road Maintenance, and Road Decommissioning
Erosion control and road maintenance will be performed on an as-needed basis. The existing internal access roads will be maintained if required for access control and monitoring purposes. No new roads will be added, and unnecessary internal roads will be decommissioned. Use of the Project access road will be coordinated with the SDG&E.

Fire Management
The 5-year work program will include a fire management component developed in consultation with the appropriate fire agencies. Controlled or systematic burns will not be allowed as a fuel reduction measure.

Trash Removal
The property will be managed for illegal dumping in concert with the management for public access. Any evidence of illegal dumping will be recorded by the land manager and addressed accordingly. Trash will be removed and disposed in accordance with applicable local ordinances.

GIS Database
The land manager will establish and maintain a GIS database for the property.

Annual Reports
The land manager will prepare annual reports on management activities and expenditure of start-up funds.

Public Information/Education
The land manager will prepare web-ready notices and fact sheets regarding the inclusion of the lands in the properties managed by the public agency or conservancy, the resources on the property, and public access restrictions. The materials will be posted on the land manager/owner's website.

Ongoing Tasks (Beginning Year 6)

Access Control
The barriers, gate, and signs will be maintained and replaced as needed. Additional barriers and other access controls will be considered if monitoring identifies illegal access and uses as a problem.

General Conditions Monitoring and Wildlife Assessment
The land manager will conduct annual inspections to determine overall conditions on the property and assess threats to habitat and species. Results of the inspection will be used to map and prioritize areas where preventive or remedial measures are needed.

Vegetation and Invasive Species Mapping
The vegetation and invasive species mapping will be updated every three years.

Species Surveys
Surveys for flycatcher and vireo will be conducted every three to five years. Surveys for Quino and Gnatcatcher will be scheduled if general monitoring detects the species on the property.

5-Year Work Program and Annual Work Plans
The 5-year work program will be updated every three years. Annual work plans and annual budgets will be based on the priorities identified in the work program. Ongoing management of the HMMP enhancement and preservation areas will begin under the HMP when the success criteria are met (potentially beginning year 6).

Exotic Plant Control
Control measures for exotic invasive plants will be implemented as specified in the work program and annual work plans.

Erosion Control, Road Maintenance, and Road Decommissioning
Erosion control and road maintenance will be performed on an as-needed basis. No new roads will be added, and unnecessary internal roads will be decommissioned.

Fire Management
The fire management component of the management plan will be updated every three years.

Trash Removal
Monitoring for illegal dumping and the collection and disposal of trash will occur on an as-needed basis.

GIS Database
The land manager will maintain the GIS database for the property on an annual basis.

Annual Reports
The land manager will prepare annual reports on management activities, expenditures, and the balance of the management endowment.

Public Information/Education
Notices regarding access controls and limits on public uses and annual reports will be posted on the land manager/owner's website.

Estimated Costs and Funding

As presented in detail in Part 3, start-up management costs are estimated at $107,233 for the five-year period ($21,447 annually). Ongoing annual costs are estimated at $11,962 and would require a non-wasting endowment of $598,088. The total funding commitment required for management of the property is $709,333.

STATUS OF THE ACQUISITION

The property has been acquired by SDG&E.

LIGHTNER HMP

OVERVIEW

ACRES	705.86
LOCAL JURISDICTION	County of San Diego
CROSSED BY PROJECT ROW	Yes (also Substation Site)
CONSERVED AS MITIGATION FOR PROJECT IMPACTS TO	Sensitive Vegetation Communities
INCIDENTAL BIOLOGICAL VALUES	Hermes Copper Habitat and Potential Quino Habitat
ALSO A MITIGATION SITE FOR PROJECT IMPACTS TO	
JURISDICTIONAL WATERS	Yes
SENSITIVE PLANTS	Yes (Felt-leaved Monardella)
NATIVE TREES	Yes (via oak woodland conservation)
OTHER	None
ADJACENT CONSERVED/PUBLIC LANDS	CNF
PROPOSED LAND MANAGER/OWNER	Conservancy
ESTIMATED START-UP MANAGEMENT COSTS	$364,446
ESTIMATED ENDOWMENT FOR ONGOING MANAGEMENT	$1,479,648
ACQUISITION STATUS	Acquired by SDG&E

MITIGATION FUNCTION

This property is part of the mitigation for the Project's impacts to sensitive vegetation, is a mitigation site under the HMMP, is the conservation site for felt-leaved monardella, and is the primary mitigation/conservation site for native oaks.

The property is not proposed as a mitigation site for impacts to listed species.

PROPERTY DESCRIPTION

This property includes 12 parcels located south of Interstate 8 within the Congressional boundaries of the CNF. It is the second largest of the properties acquired directly by SDG&E.

The Project ROW crosses the property and includes several towers, a substation, a TSAP, and permanent access roads.

A legal description of the property is included in Part 4 of this HAP/HMP.

Access

The property is accessed mainly from the east on an existing road that extends onto the property from adjacent private lands. There are multiple dirt roads on the property.

Adjacent Lands and Land Use

The Lightner property is surrounded on the north, south, and west by CNF and by private lands to the east. Recreational uses in CNF include target shooting, camping, biking, hiking, designated OHV areas, and hunting. The private lands to the east are generally designated as rural residential.

In addition to dirt roads, the Lightner property contains a windmill/well and structures. These features, along with stands of non-native grasslands are consistent with agricultural and residential land uses (ranching) and historic use of the land for open range cattle ranching. Historically, open-range cattle ranching was practiced on this property. As a result, the property contains remnants of fencing, a well with windmill and "guzzler" designed for livestock. The presence of riparian and wetland habitat as well as non-native grasslands and other vegetation made this parcel ideal for cattle. Currently, there are no grazing or agricultural activities practiced on this parcel.

Fire is relatively frequent on the property, the most recent occurring in 2001 as a result of the Viejas fire.

Climate, Geology, and Landscape

The area has a climate characterized by warm, dry summers and mild winters with occasional precipitation. Also characteristic of the region is the sea-breeze/land-breeze cycle. During the daytime, on-shore winds move inland with speeds of approximately seven to ten miles per hour (mph). During the nighttime, the direction is reversed and winds move from an easterly direction towards the coast. In addition, periodic Santa Ana wind conditions, which last from 2-3 days, are present.

The landscape is a combination of gently rolling hills and shallow valleys with dendritic streams and drainages.

Soils

TABLE L-1. LIGHTNER SOILS

Soil Type	Summary Description
AcG	Acid igneous rock land
ClE2	Cieneba coarse sandy loam, 15 to 30 percent slopes, eroded
ClG2	Cieneba coarse sandy loam, 30 to 65 percent slopes, eroded
CmrG	Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes
FaD2	Fallbrook sandy loam, 9 to 15 percent slopes, eroded
FeE	Fallbrook rocky sandy loam, 9 to 30 percent slopes
FvD	Fallbrook-Vista sandy loams, 9 to 15 percent slopes
TuB	Tujunga sand, 0 to 5 percent slopes

Source: USDA NRCS Soils Survey Division

Vegetation Communities

Lightner contains upland scrub, oak woodland, and wetland communities (Table L-2, Figure L-3), including jurisdictional wetlands (Figure L-4).

The property is characterized by chaparral covered hills surrounding a flatter area containing two small wetlands as well as stands of oak and non-native grasslands. While the hills contain the dense vegetation characteristic of chaparral communities, the low-lying areas of wetlands contain low to moderately dense oak woodlands. Large areas of non-native grasslands are adjacent to the wetlands as well as the multiple dirt roads that run through the property (Figure L-3).

TABLE L-2. LIGHTNER VEGETATION

Vegetation Communities		Acreage	
Chaparrals	Chamise Chaparral	256.33	599.37
	Northern Mixed Chaparral	205.36	
	Northern Mixed Chaparral - Disturbed	0.36	
	Scrub Oak Chaparral	0.03	
	Southern Mixed Chaparral	134.79	
	Southern Mixed Chaparral - Disturbed	2.51	
Coastal and Montane Scrub Habitats	Flat-topped Buckwheat Scrub	0.82	0.82
Grasslands and Meadows	Meadow – Wet	0.45	21.68
	Native Grassland - Disturbed	6.47	
	Non-native Grassland	14.76	
Herbaceous Wetlands, Freshwater, and Streams	Disturbed Wetland	0.07	0.12
	Non-vegetated Channel	0.05	
Non-Native Vegetation, Developed Areas, and Disturbed Habitat	Developed	0.63	8.56
	Disturbed Habitat	7.93	
Woodlands and Forests	Engelmann Oak Woodland	43.87	75.31
	Englemann Oak Woodland - Disturbed	0.22	
	Mixed Oak Woodland	31.23	
		Total	705.86

Chamise Chaparral (37200) - This vegetation type is found throughout the Lightner property often adjacent to and within patches of Northern Mixed Chaparral and makes up approximately 256.33 acres or 36% of the total property.

Northern Mixed Chaparral (37130) - This vegetation type is the most abundant within the Lightner property and is found throughout. This vegetation type is approximately 205.36 acres or 29% of the total Lightner parcel. Of the 29%, a small portion of the Northern Mixed Chaparral, located near the Developed and ROW area(s), is considered disturbed. This is less than one acre or less than 1% of the total Northern Mixed Chaparral vegetation type.

Southern Mixed Chaparral (37120) - This vegetation type is found in large contiguous patches throughout the Lightner property. It makes up approximately 134.79 acres or 19% of the total parcel. Of the 19%, a small portion of the Southern Mixed Chaparral, adjacent to the roads on the western portion of the Lightner property, is considered disturbed. This is approximately 2.51 acres or 2% of the total Southern Mixed Chaparral vegetation type.

Engelmann Oak Woodland (71180) - This vegetation type occurs on the eastern half of the parcel adjacent to both Non-Native Grassland and Northern and Southern Mixed Chaparral patches within the Lightner property. It occupies approximately 43.87 acres or 6% of the total parcel. Of the 6%, a small portion of the Engelmann Oak Woodland, adjacent to the roads on the western portion of the Lightner property, is considered disturbed. This is less than one acre or less than 1% of the total Engelmann Oak Woodland vegetation type.

Mixed Oak Woodland (77000) - The largest patch of Mixed Oak Woodland found on the Lightner property is located in the northeastern corner surrounded by larger patches of Northern Mixed Chaparral, Chamise Chaparral, and a relatively smaller patch of Non-Native Grassland. Three smaller patches are located just west of the center of the Lightner property adjacent to patches of Northern Mixed Chaparral and Southern Mixed Chaparral. Mixed Oak Woodland makes up approximately 31.23 acres or less than 1% of the total parcel.

Non-native Grasslands (42200) - This vegetation type is found in three small patches within the Lightner property, one near the southwestern portion of the property, and two on the northeaster portion of the property. All three are directly adjacent to dirt roads and/or disturbed areas. Non-native Grasslands are not found on the westernmost portion of the parcel. This vegetation type makes up approximately 14.76 acres or 2% of the total parcel.

Native Grasslands (42100) - This vegetation type is found in two small patches within the Lightner property. The larger of the two patches is located on the western half of the property while the much smaller patch is located on the south eastern portion of the Lightner property. This vegetation type makes up approximately 6.47 acres or less than 1% of the total property. All of the Native Grassland within the Lightner property is considered disturbed.

Wet Montane Meadow (45110) - This vegetation type is found on the north eastern portion of the Lightner property. It is located within Disturbed Wetland and Mixed Oak Woodland vegetation types. This vegetation type makes up less than 1 acre or less than 1% of the total property.

Disturbed Wetlands (11200) - This vegetation type is found within the Disturbed Habitat located on the south western portion of the Lightner property. This vegetation type makes up less than 1 acre or less than 1% of the total property.

Disturbed Habitat (11300) - This vegetation type is found in two small areas, one in the southeastern half of the Lightner property (within APN: 52-392-007) and makes up approximately 8 acres or 1% of the total parcel.

Developed (1200) - Only a small portion of this parcel is considered developed. There are a few paved roads that run east-west through a portion of the parcel. This makes up less than 1 acre or less than 1% of the total property.

Sensitive Plant Species

TABLE L-3. LIGHTNER SENSITIVE PLANT SPECIES

Common Name	Scientific Name	Listing Status Federal/State/CNPS	Potential to Occur
Delicate clarkia	*Clarkia delicate*	-/-/1B	High, CNDDB
Sticky geraea	*Geraea viscid*	-/-/2	Moderate
Felt-leaved mondardella	*Monardella hypoleuca ssp. Lanata*	-/-/1B	Observed
Rush-like bristleweed	*Xanthisma junceum*	-/-/4	Observed
Orcutt's brodiaea	*Brodiaea orcuttii*	-/-/1B	Moderate
Southern skullcap	*Scutellaria bolanderi spp. austromontana*	-/-/1B	Moderate

Invasive Plant Species

TABLE L-8. LIGHTNER INVASIVE PLANT SPECIES

Common Name	Scientific Name	Listing Status (Cal-IPC)	Potential to Occur
Ripgut brome	*Bromus diandrus*	Moderate/B	Observed
Soft brome	*Bromus hordeaceus*	Limited/C	Observed
Cheatgrass	*Bromus tectorum*	High/A	Observed
Star thistle	*Centaurea melitensis*	Moderate/B	Observed
Western tansy mustard	*Descurainia pinnata spp. halictorum*	Limited/C	Observed
Foxtail	*Hordeum murinum spp. glaucum*	Moderate/B	Observed
Mustard	*Hirschfeldia incana*	Moderate/B	Observed
Spiny sow thistle	*Sonchus asper spp. Asper*	*	Observed
Tall tumble mustard	*Sisymbrium altissimum*	Limited/C	Observed
Hedge mustard	*Sisymbrium orientale*	Limited/C	Observed
Tamarisk	*Tamarix spp.*	High/A	Observed

Note

* currently being evaluated—no listing

Sensitive Animal Species

TABLE L-5. LIGHTNER SENSITIVE ANIMAL SPECIES

Common Name	Scientific Name	Listing Status Federal/State/CNDDB	Potential to Occur
Hermes Copper Butterfly	*Lycaena hermes*	-/-/G1G2 S1S2	Low
Quino Checkerspot Butterfly	*Euphydryas editha quino*	E/-/G5T1 S1	Low
Coast Patch-nosed Snake	*Salvadora hexalepis virguletea*	-/SSC/G5T3 S2S3	Moderate
Costal Rosy Boa	*Lichanura trivirgata roseofusca*	-/-/G4G5 S3S4	Moderate
Coronado Skink	*Eumeces skiltonianus interparietalis*	-/-/G5T2T3Q S1S2	High
Northern Red-Diamond Rattlesnake	*Crotalus ruber*	-/-/G4T3T4 S2	Moderate
Orange-throated Whiptail	*Aspidoscelis hyperythra*	-/-/G5 S2	High
San Diego Horned Lizard	*Phrynosoma coronatum blainvillii*	-/-/G4G5 S3S4	High
Two-striped Garter Snake	*Thamnophis hammondii*	-/-/G3 S2	High
Cooper's Hawk	*Accipiter cooperii*	-/-/G5 S3	Observed
Loggerhead shrike	*Lanius ludovicianus*	-/-/G4 S4	Observed
Prairie Falcon	*Falco mexicanus*	-/-/G5 S3	Low
Black-tailed Jackrabbit	*Lepus californicus*	-/-/G5T4 S5	High
Dulzura Pocket Mouse	*Chaetodipus californicus femoralis*	-/-/G5T3 S2	Moderate

Invasive Animal Species

There have been no invasive animal species identified on the Lightner property

Wildlife Movement and Linkages

The Lightner parcel is not located within any identified linkages. However, the parcel links natural open space of CNF.

MANAGEMENT SPECIFICATIONS

This section identifies the proposed land manager/owner, start-up and ongoing tasks, and the estimated costs of HMP implementation.

Proposed Land Manager/Owner

SDG&E proposes to convey the lands to a conservancy. USFS has indicated that it is not interested in holding or managing the property.

Start-up Tasks (Years 1-5)

Access Control

Bollards, a gate, approximately 10 signs, and some fencing will be installed and maintained over the period.

General Conditions Monitoring and Wildlife Assessment

The land manager will conduct annual inspections to determine overall conditions on the property and assess threats to habitat and species. Results of the inspection will be used to map and prioritize areas where preventive or remedial measures are needed.

Vegetation and Invasive Species Mapping

A qualified plant ecologist will prepare baseline mapping of vegetation communities and invasive plant species on the property based on field surveys and aerial imagery. The mapping will be completed by year three and updated as needed during the period.

Species Surveys

Surveys for Hermes Copper and Quino will be conducted every other year. The felt-leaved mondardella population will be surveyed twice during the period.

5-Year Work Program and Annual Work Plans

Using results from general conditions assessment and vegetation/invasive species mapping, the land manager will prepare a 5-year work program that identifies and prioritizes biological resource and land stewardship tasks for the period and includes a five-year staffing and materials budget. The 5-year work program will be completed no later than year 3 and updated every three years. Annual work plans and annual budgets will be based on the priorities set in the 5-year work program.

Interim Work Plans

Prior to completion of the first 5-year work program, the land manager will prepare annual work plans and budgets for the general conditions assessment, surveys, mapping, and other data collection required to guide management of the property. The interim work plans also may include access control, invasive species control, and erosion control measures that the land manager determines are necessary.

Invasive Plant Control

Invasive plant control measures will be initiated based on the results of the mapping effort and the priorities established in the work program. This effort will be coordinated with the enhancement measures under the HMMP that will be implemented on the property.

Erosion Control, Road Maintenance, and Road Decommissioning

Erosion control and road maintenance will be performed on an as-needed basis. The existing internal access roads will be maintained if required for access control and monitoring purposes. No new roads will be added, and unnecessary internal roads will be decommissioned. Most decommissioning will occur under the HMMP. Use of the Project access road will be coordinated with SDG&E.

Fire Management

The 5-year work program will include a fire management component developed in consultation with the appropriate fire agencies. Controlled or systematic burns will not be allowed as a fuel reduction measure.

Trash Removal
The property will be managed for illegal dumping in concert with the management for public access. Any evidence of illegal dumping will be recorded by the land manager and addressed accordingly. Trash will be removed and disposed in accordance with applicable local ordinances.

GIS Database
The land manager will establish and maintain a GIS database for the property.

Annual Reports
The land manager will prepare annual reports on management activities and expenditure of start-up funds.

Public Information/Education
The land manager will prepare web-ready notices and fact sheets regarding the inclusion of the lands in the properties managed by the public agency or conservancy, the resources on the property, and public access restrictions. The materials will be posted on the land manager/owner's website.

Ongoing Tasks (Beginning Year 6)

Access Control
The barriers, gates, signs, and fencin will be maintained and replaced as needed. Additional barriers and other access controls will be considered if monitoring identifies illegal access and uses as a problem.

General Conditions Monitoring and Wildlife Assessment
The land manager will conduct annual inspections to determine overall conditions on the property and assess threats to habitat and species. Results of the inspection will be used to map and prioritize areas where preventive or remedial measures are needed.

Vegetation and Invasive Species Mapping
The vegetation and invasive species mapping will be updated every three years.

Species Surveys
Surveys for Quino and Hermes Copper will be conducted every three to five years. The status of the felt-leaved monardella will be assessed as part the vegetation mapping update and general conditions monitoring.

5-Year Work Program and Annual Work Plans
The 5-year work program will be updated every three years. Annual work plans and annual budgets will be based on the priorities identified in the work program. Ongoing management of the areas where HMMP restoration/enhancement occurred would begin under the HMP when the success criteria are met (potentially in year 6).

Exotic Plant Control
Control measures for exotic invasive plants will be implemented as specified in the work program and annual work plans.

Erosion Control, Road Maintenance, and Road Decommissioning

Erosion control and road maintenance will be performed on an as-needed basis. No new roads will be added, and unnecessary internal roads will be decommissioned. Use the Project access roads will be coordinated with SDG&E.

Fire Management

The fire management component of the management plan will be updated every three years.

Trash Removal

Monitoring for illegal dumping and the collection and disposal of trash will occur on an as-needed basis.

GIS Database

The land manager will maintain the GIS database for the property on an annual basis.

Annual Reports

The land manager will prepare annual reports on management activities, expenditures, and the balance of the management endowment.

Public Information/Education

Notices regarding access controls and limits on public uses and annual reports will be posted on the land manager/owner's website.

Estimated Costs and Funding

As presented in detail in Part 3, start-up management costs are estimated at $364,446 for the five-year period ($72,889 annually). Ongoing annual costs are estimated at $29,593 and would require a non-wasting endowment of $1,479,648. The total funding commitment required for management of the property is $1,844,094.

STATUS OF THE ACQUISITION

The property has been acquired by SDG&E.

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LONG POTRERO HMP

OVERVIEW

ACRES	1212.27
LOCAL JURISDICTION	County of San Diego
CROSSED BY PROJECT ROW	Yes
CONSERVED AS MITIGATION FOR PROJECT IMPACTS TO	Sensitive Vegetation, Quino, Arroyo Toad
INCIDENTAL BIOLOGICAL VALUES	Sensitive Plants
ALSO A MITIGATION SITE FOR PROJECT IMPACTS TO	
JURISDICTION WATERS	Yes
SENSITIVE PLANTS	No
NATIVE TREES	Yes (via oak woodland conservation)
OTHER	None
ADJACENT CONSERVED/PUBLIC LANDS	CNF, BLM, Hauser Wilderness Area
PROPOSED LAND MANAGER/OWNER	Conservancy, County of San Diego, or BLM
ESTIMATED START-UP MANAGEMENT COSTS	$527,356
ESTIMATED ENDOWMENT FOR ONGOING MANAGEMENT	$3,279,064
ACQUISITION STATUS	Acquired by SDG&E

MITIGATION FUNCTION

This property in part of the mitigation for the Project's sensitive vegetation impacts, is the offsite mitigation property for impacts to Quino and arroyo toad, is a mitigation site under the HMMP, and is a primary mitigation area for impacts to native oaks.

The property is not a designated mitigation site for impacts to special status plants.

PROPERTY DESCRIPTION

This property includes 11 parcels totaling 1212.27 acres. The property is the largest of the mitigation areas acquired by SDG&E. The Project ROW and impact areas cross the northern portion of the property. Impact areas include four towers and permanent access roads.

A legal description of the property is included in Part 4 of this HAP/HMP.

Access

The property is accessed mainly from the north by existing roads that cross USFS, BLM, and private lands in the areas. These same existing roads provide access to the Project ROW and impact areas. On the property, there are paved roads that run north-south.

Adjacent Lands and Land Use

The property abuts CNF, BLM lands, and privately owned lands. It is within close proximity to the Hauser Mountain Wilderness Area (Figure LP-1). Most of the northern border is shared with CNF (Figure LP-2). BLM lands lie to the east, southeast, and west. The western half of the southern border is shared with private lands.

Most of the property, as well as the private lands to the south, are rural agriculture or natural upland habitat. Historically, open-range cattle ranching has been practiced on this property. The presence of riparian and wetland habitat as well as non-native grasslands and other vegetation made this property ideal for cattle. Currently, there are no grazing or agricultural activities practiced on this parcel.

The BLM lands are within the California Desert Conservation Area. As part of its land management activities, the BLM has designated some lands as sensitive. These designations do not necessarily preclude recreational use. Land uses on adjacent properties include any public access allowed by BLM which includes: target shooting, camping, biking, hiking, rock hounding (collecting), OHV use, and hunting. CNF has similar recreational uses including target shooting, camping, biking, hiking, designated OHV areas, and hunting.

Climate, Geology, and Landscape

The area has a climate characterized by warm, dry summers and mild winters with occasional precipitation. Also characteristic of the region is the sea-breeze/land-breeze cycle. During the daytime, on-shore winds move inland with speeds of approximately seven to ten miles per hour (mph). During the nighttime, the direction is reversed and winds move from an easterly direction towards the coast. In addition, periodic Santa Ana wind conditions, which last from 2-3 days, are present.

The property contains dirt roads, fencing, and non-native grassland consistent with agricultural land use and historic open range cattle ranching.

Soils

TABLE LP-1. LONG POTRERO SOILS

Soil Type	Summary Description
AcG	Acid igneous rock land
ChA	Chino fine sandy loam, 0 to 2 percent slopes
FaB	Fallbrook sandy loam, 2 to 5 percent slopes
FaC	Fallbrook sandy loam, 5 to 9 percent slopes
FaD2	Fallbrook sandy loam, 9 to 15 percent slopes, eroded
LcE	La Posta rocky loamy coarse sand, 5 to 30 percent slope s
MvC	Mottsville loamy coarse sand, 2 to 9 percent slopes
ToE2	Tollhouse rocky coarse sandy loam, 5 to 30 percent slopes, eroded
ToG	Tollhouse rocky coarse sandy loam, 30 to 65 percent slopes
VaA	Visalia sandy loam, 0 to 2 percent slopes

Vegetation Communities

The Long Potrero parcel contains a variety of vegetation and habitat types due to its ecotonal nature and unique resources. A non-vegetated channel runs diagonally through the southeastern borders of the parcel and feeds an emergent wetland area as well as meadows and stands of coast live oak woodland. Low lying hills characterized by large boulders surround the water features on either side and are vegetated with chaparral (Figure LP-4).

The water features present within Long Potrero include man-made ponds, ephemeral, intermittent and perennial streams as well as potential jurisdictional wetlands (Figure LP-5). The substantial amount of water on the site supports riparian habitats including vernal marsh and oak woodlands.

TABLE LP-2. LONG POTRERO VEGETATION COMMUNITIES

Vegetation Communities		**Acreage**	
Chaparrals	Chamise Chaparral	170.58	757.70
	Northern Mixed Chaparral	0.01	
	Southern Mixed Chaparral	587.11	
Coastal and Montane Scrub Habitats	Flat-topped Buckwheat Scrub	29.34	175.75
	Flat-topped Buckwheat Scrub - Disturbed	146.41	
Grasslands and Meadows	Non-native Grassland	21.30	21.30
Herbaceous Wetlands, Freshwater, and Streams	Emergent Wetland	2.44	60.12
	Non-vegetated Channel	24.98	
	Vernal Marsh	32.69	
Non-Native Vegetation, Developed Areas, and Disturbed Habitat	Developed	7.22	122.59
	Disturbed Habitat	115.36	
Riparian Forests and Woodlands	Southern Coast Live Oak Riparian Forest	0.20	0.20
Riparian Scrubs	Mule Fat Scrub	0.32	0.32
Woodlands and Forests	Coast Live Oak Woodland	74.09	74.09
		Total	1,212.08

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Chamise Chaparral (37200) - This vegetation type is found throughout the Long Potrero property and makes up approximately 170.58 acres or 14% of the total area.

Southern Mixed Chaparral (37120) - This vegetation type is found on the eastern border and the northwestern corner of the Long Potrero property. It makes up approximately 587.11 acres or 48.4% of the total Property.

Flat-topped Buckwheat Scrub (37K00) - This vegetation type is found in the center of the property adjacent to Coast Live Oak Woodland vegetation type and Disturbed Habitat vegetation type. This vegetation type makes up approximately 175.75 acres or 14.5% of the total Property. Of this 14.5%, approximately 46 acres or 83% of this vegetation type is considered disturbed.

Coast Live Oak Woodland (71160) - This vegetation type is found in the center of the Long Potrero property adjacent to Non-native Grassland, Chamise Chaparral, and Flat-topped Buckwheat Scrub. Coast Live Oak Woodland is also found along the center of the southeastern portion of the Long Potrero property. This vegetation type makes up approximately 74.09 acres or 6% of the total area.

Non-native Grasslands (42200) - This vegetation type is found in small patches interspersed throughout the Long Potrero Property, but is concentrated on the eastern half. Non-native Grasslands are not found on the westernmost portion of the Property. This vegetation type makes up approximately 21.30 acres or 2% of the total property.

Vernal Marsh (52410) - This vegetation type is surrounded by Non-native Grasslands on the western portion of the Long Potrero Property. It makes up approximately 32.69 acres or approximately 3% of the total Property.

Emergent Wetlands (52500) - This vegetation type is found on the eastern portion of the Long Potrero Property adjacent to Coast Live Oak Woodland, Chamise Chaparral, and Disturbed Habitat. This vegetation type makes up approximately 2.44 acres or less than 1% of the total Property.

Non-vegetated Channel (13200) - This vegetation type is found running from northeast to southwest along the lower portion of the Long Potrero Property. It is located within the flat-topped buckwheat Scrub and coast live oak woodland vegetation types. This vegetation type makes up approximately 24.98 acres or 1% of the total Property.

Northern Mixed Chaparral (37110) – A very small amount of northern mixed chaparral is located on this Property. It is found in conjunction with the Southern Mixed Chaparral vegetation community. This vegetation type makes up less than 1 acre or less than 1% of the total Property.

Southern Coast Live Oak Riparian Forest (61310) – A small amount of southern coast live oak riparian forest is located within the coast live oak woodland located on the southeastern portion of the Property. This vegetation type makes up less than 1 acre or less than 1% of the total Property.

Mule Fat Scrub (63310) – A small amount of mule fat scrub is located within the coast live oak woodland located on the southeastern portion of the Property. This vegetation type is found just adjacent to a small patch of southern coast live oak riparian forest. This vegetation type makes up less than 1 acre or less than 1% of the total Property.

Disturbed Habitat (11300) - This vegetation type is found in the center of the southern border of the Long Potrero Property and also on the northeastern portion and makes up approximately 115.36 acres or 9.5% of the total Property.

Developed (1200) - Only a small portion of this Property is considered developed. There are a few paved roads that run north-south through the center of the Property. This vegetation type makes up approximately 7.22 acres or less than 1% of the total Property.

Sensitive Plant Species

TABLE LP-3. LONG POTRERO SENSITIVE PLANT SPECIES

Common Name	Scientific Name	Listing Status Federal/State/CNPS	Probability of Occurrence
Tecate tarplant	*Deinandra floribunda*	-/-/1B	Observed
Engelmann oak	*Quercus engelmannii*	-/-/4	Observed
California plantain	*Plantago erecta*	-/-/-	Observed

Invasive Plant Species

The Long Potrero parcel has large patches of non-native grasslands surrounding many of the riparian and wetland areas (Figure LP-4). These grasslands are likely the result of the cattle grazing that has taken place on the parcel in the past. In addition to non-native grasslands, tamarisk (*Tamarix* spp.) is present in and near some of the wetland areas (Figure LP-7).

Sensitive Animal Species

The Long Potrero property contains a diversity of sensitive fauna, including the federally listed arroyo toad and Quino checkerspot butterfly.

TABLE LP- 1. LONG POTRERO SENSITIVE ANIMAL SPECIES

Common Name	Scientific Name	Listing Status (Federal/State/CNDDB)	Potential to Occur
Quino Checkerspot Butterfly	*Euphydryas editha quino*	E/-/G5T1 S1	Observed
Arroyo toad	*Bufo californicus*	E/SSC/G4T3T4 S3	Observed
Coast Patch-nosed Snake	*Salvadora hexalepis virguletea*	-/SSC/G5T3 S2S3	High
Coronado Skink	*Eumeces skiltonianus interparietalis*	-/-/G5T2T3Q S1S2	Observed
Coastal Rosy Boa	*Lichanura trivirgata roseofusca*	-/-/G4G5 S3S4	High
Northern Red-Diamond Rattlesnake	*Crotalus ruber*	-/-/G4T3T4 S2	Moderate
Orange-throated Whiptail	*Aspidoscelis hyperythra*	-/-/G5 S2	High
San Diego Horned Lizard	*Phrynosoma coronatum blainvillii*	-/-/G4G5 S3S4	Observed
Two-striped Garter Snake	*Thamnophis hammondii*	-/-/G3 S2	High
Western Spadefoot toad	*Spea hammondii*	-/-/G3 S3	Observed
Cooper's Hawk	*Accipiter cooperii*	-/-/G5 S3	High
Least Bell's Vireo	*Vireo bellii pusillus*	E/E/G5 T2 S2	Low
Loggerhead shrike	*Lanius ludovicianus*	-/-/G4 S4	Moderate
Prairie Falcon	*Falco mexicanus*	-/-/G5 S3	Low
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	E/E/G5 T1T2 S1	Low
Black-tailed Jackrabbit	*Lepus californicus*	-/-/G5T4 S5	High
Dulzura Pocket Mouse	*Chaetodipus californicus femoralis*	-/-/G5T3 S2	High
Northwestern San Diego Pocket Mouse	*Chaetodipus fallax fallax*	-/-/G5T3 S2S3	Moderate

Quino has been observed on the northern portion of the property along the Project ROW. In addition, historic records confirm presence of this species near parcel boundaries (Mattoni et. al 1997, Pratt et. al. 2001). Arroyo toad has been observed onsite during 2010 focused surveys of the property. There also are CNDDB historic records for arroyo toad on the property.

Invasive Animal Species

There have been no invasive animal species identified on the Long Potrero property. However, because this property is intended to conserve Quino checkerspot butterfly and arroyo toad, general surveys should include notations about invasive species.

Wildlife Movement and Linkages

The Long Potrero property is situated between two identified linkages between the U.S. and Mexico, the Otay Mountain-Cerra San Ysidro linkage to the west and the La Posta linkage to the east. The La Posta linkage serves as an important transition zone from desert to coastal ecosystems and will help to maintain the integrity of a landscape fragmented by intense urbanization. The Otay Mountain-Cerra San Ysidro linkage represents the last cross-border coastal sage scrub linkage and will help maintain the many endemic plant species found within the linkage footprint.

MANAGEMENT SPECIFICATIONS

This section identifies the proposed land manager/owner, start-up and ongoing tasks, and the estimated costs of HMP implementation.

Proposed Land Manager/Owner

SDG&E proposes to convey the lands to a conservancy, the County of San Diego, or BLM. USFS has indicated it is not interested in holding or managing the northern-most parcel that is within the CNF boundaries.

Start-up Tasks (Years 1-5)

Access Control

Approximately 20 signs and selective fencing will be installed and maintained over the period. Gates and vehicle barriers are not proposed at this time. Illegal access and property damage is a known concern, and patrols may be required to deter such activities.

General Conditions Monitoring and Wildlife Assessment

The land manager will conduct annual inspections to determine overall conditions on the property and assess threats to habitat and species. Results of the inspection will be used to map and prioritize areas where preventive or remedial measures are needed.

Vegetation and Invasive Species Mapping

A qualified plant ecologist will prepare baseline mapping of vegetation communities and invasive plant species on the property based on field surveys and aerial imagery. The mapping will be completed by year three and updated as needed during the period.

Species Surveys

Surveys for Quino and arroyo toad will be conducted every three years.

5-Year Work Program and Annual Work Plans

Using results from general conditions assessment and vegetation/invasive species mapping, the land manager will prepare a 5-year work program that identifies and prioritizes biological resource and land stewardship tasks for the period and includes a five-year staffing and materials budget. The 5-year work program will be completed no later than year 3 and updated every three years. Annual work plans and annual budgets will be based on the priorities set in the 5-year work program.

Interim Work Plans

Prior to completion of the first 5-year work program, the land manager will prepare annual work plans and budgets for the general conditions assessment, surveys, mapping, and other data collection required to guide management of the property. The interim work plans also may include access control, invasive species control, and erosion control measures that the land manager determines are necessary.

Invasive Plant Control

Invasive plant control measures will be initiated based on the results of the mapping effort and the priorities established in the work program. These efforts will be coordinated with the HMMP enhancement measures.

Erosion Control, Road Maintenance, and Road Decommissioning

Erosion control and road maintenance will be performed on an as-needed basis. The existing internal access roads will be maintained if required for access control and monitoring purposes. No new roads will be added, and unnecessary internal roads will be decommissioned. Use of the Project access road will be coordinated with SDG&E.

Fire Management

The 5-year work program will include a fire management component developed in consultation with the appropriate fire agencies. Controlled or systematic burns will not be allowed as a fuel reduction measure.

Trash Removal

The property will be managed for illegal dumping in concert with the management for public access. Any evidence of illegal dumping will be recorded by the land manager and addressed accordingly. Trash will be removed and disposed in accordance with applicable local ordinances.

GIS Database

The land manager will establish and maintain a GIS database for the property.

Annual Reports
The land manager will prepare annual reports on management activities and expenditure of start-up funds.

Public Information/Education
The land manager will prepare web-ready notices and fact sheets regarding the inclusion of the lands in the properties managed by the public agency or conservancy, the resources on the property, and public access restrictions. The materials will be posted on the land manager/owner's website.

Ongoing Tasks (Beginning Year 6)

Access Control
Signs will be maintained and replaced as needed. Barriers and other access controls will be considered if monitoring identifies illegal access and uses as a problem.

General Conditions Monitoring and Wildlife Assessment
The land manager will conduct annual inspections to determine overall conditions on the property and assess threats to habitat and species. Results of the inspection will be used to map and prioritize areas where preventive or remedial measures are needed.

Vegetation and Invasive Species Mapping
The vegetation and invasive species mapping will be updated every three years.

Species Surveys
Surveys for Quino and arroyo toad will be conducted every three to five years.

5-Year Work Program and Annual Work Plans
The 5-year work program will be updated every three years. Annual work plans and annual budgets will be based on the priorities identified in the work program. Ongoing management of the areas where HMMP measures were implemented will occur under the HMP when the success criteria are met (potentially year 6).

Exotic Plant Control
Control measures for exotic invasive plants will be implemented as specified in the work program and annual work plans.

Erosion Control, Road Maintenance, and Road Decommissioning
Erosion control and road maintenance will be performed on an as-needed basis. No new roads will be added, and unnecessary internal roads will be decommissioned. Use of the Project access road will be coordinated with SDG&E.

Fire Management
The fire management component of the management plan will be updated every three years.

Trash Removal
Monitoring for illegal dumping and the collection and disposal of trash will occur on an as-needed basis.

GIS Database
The land manager will maintain the GIS database for the property on an annual basis.

Annual Reports
The land manager will prepare annual reports on management activities, expenditures, and the balance of the management endowment.

Public Information/Education
Notices regarding access controls and limits on public uses and annual reports will be posted on the land manager/owner's website.

Estimated Costs and Funding

As presented in detail in Part 3, start-up management costs are estimated at $527,356 for the five-year period ($105,471 annually). Ongoing annual costs are estimated at $65,581 and would require a non-wasting endowment of $3,279,064. The total funding commitment required for management of the property is $3,806,420.

STATUS OF THE ACQUISITION

The property has been acquired by SDG&E.

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SUCKLE HMP

OVERVIEW

ACRES	199.39
LOCAL JURISDICTION	County of Imperial
CROSSED BY PROJECT ROW	No
CONSERVED AS MITIGATION FOR PROJECT IMPACTS TO	Sensitive Vegetation and Barefoot Banded Gecko
INCIDENTAL BIOLOGICAL VALUES	Palm Oasis, Peninsular Bighorn Sheep Habitat
ALSO A MITIGATION SITE FOR PROJECT IMPACTS TO	
JURISDICTION WATERS	Yes
SENSITIVE PLANTS	No
NATIVE TREES	No
OTHER	None
ADJACENT TO EXISTING CONSERVED/PUBLIC LANDS:	BLM, Caltrans, San Diego County Park (across county border), Anza-Borrego Desert State Park (in SD County)
PROPOSED LAND MANAGER/OWNER	CDFG, State Parks, or Conservancy
ESTIMATED START-UP MANAGEMENT COSTS	$148,922
ESTIMATED ENDOWMENT FOR ONGOING MANAGEMENT	$970,596
ACQUISITION STATUS	Willing seller; due diligence phase.

MITIGATION FUNCTION

This property is part of the required offsite mitigation for the Project's permanent impacts to desert dry scrubs and is the only mitigation parcel for the Project's impacts to the State-listed barefoot banded gecko. The property also has habitat for Peninsular bighorn sheep (PBS), but the Project's impacts to PBS are being mitigated in full through the Desert Cahuilla transaction. The property also is proposed as a mitigation site for the Project's impacts to dry washes and ephemeral streams. The dry wash and stream resources on the property would be preserved and enhanced under the HMMP (which will be implemented and funded separately from this HMP). However, the HMP would cover the ongoing management of the preserved/enhanced resources after the HMMP measures are successfully implemented.

The property is proposed as a mitigation site for impacts to other listed species, special status plants, or native trees.

PROPERTY DESCRIPTION

The Suckle property is a compilation of contiguous parcels totaling 199.39 acres. It is located in Imperial County, just south of the Interstate 8 (I-8) split near the San Diego County and Imperial County border. The Sunrise Powerlink right-of-way (ROW) is located east of the property. (See Figure S-1.) A legal description of the property will be included in Part 4 of this HAP/HMP when the acquisition proceeds to the escrow phase.

Access

The Suckle property is not open to the public but is not gated or fenced. There are two access roads on the property, which originate on the northern end of the property. The roads do not provide egress from the property on the south, west, or east. The property is vacant and undeveloped.

Adjacent Lands and Land Use

U.S. Department of Interior Bureau of Land Management land border the property on the east, including the In-Ko-Pah gorge at the base of the In-Ko-Pah Mountains. Caltrans lands border the property on the south, west, and north; San Diego County lands also border on the west. Anza Borrego Desert State Park is located west and north of the property. Other lands owned by the Suckle family occur to the north, and other private property occurs to the south near I-8.

The Table Mountain area, which contains the In-Ko-Pah Mountains, has been designated by the BLM as an Area of Critical Environmental Concern (ACEC). The ACEC designation is unique to the BLM and is a required conservation mandate under the 1976 Federal Lands Policy and Management Act. Lands designated by the BLM as ACEC must meet specific criteria; it is defined as "an area within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards." The BLM allowed land uses include: camping, biking, hiking, rock hounding (collecting), OHV use, and hunting. On January 20, 1998, the Table Mountain ACEC (which includes the In-Ko-Pah Mountains) was closed to target shooting to conserve raptor habitats. Hunting is still allowed (with a permit) in the area.

Several out buildings and a residence are located adjacent to the northwest corner of the property. A PVC pipe originating at the northernmost desert fan palm oasis in the southern portion of the property appears to run to one of these buildings. The other Suckle property to the north (in and above the I-8 island) shows signs of target practice (shells, glass bottles, appliances used as targets) and some off-road vehicle use (likely in connection with target practice).

Geology and Landscape

The Suckle Property is located in an area characterized by sloping, granitic hills and outcroppings typical of the Jacumba Mountains. The terrain is very rocky with medium to large boulders across the majority of the property (a deterrent to off-road vehicle use and public access). Elevations range from 2,200 to 2,357 feet.

Soils

Soils at the site are mapped as Rock Outcrop-Lithic Torriorthents-Omstott. Omsott soils are characterized as well drained with rapid to medium runoff and moderate to moderately rapid permeability (USDA 2010a). Soils are non-hydric (USDA 2010b)

Hydrology

Precipitation is the main source of hydrology for this site. This site typically receives on average 3.21 inches of rainfall per year (USDA 2010c). Interstate 8 intersects with an area of desert dry washes on the southern end of the property. The largest desert dry wash on the southern end of the property flows from the west through a culvert under I-8 and onto the Suckle property. Natural hydrology in this dry wash system may be somewhat impeded by the tamarisk and giant reed infestations in the middle of this stream.

Vegetation Communities

The Suckle Property contains vegetation and topographic features typical of the Sonoran Desert. The property consists of primarily rocky outcroppings with sparse vegetation. The vegetation is primarily scrub communities with a few palm trees (Figure S-3). A few small permanent water sources can be found on site and are marked by palm trees (Figure S-4).

The vegetation is characteristic Sonoran mixed woody succulent scrub with some smaller patches of Sonoran desert scrub (Table S-1). Desert washes occur mainly on the northern and southern portion of the property, and the palm oases are a unique feature (Figure S-4).

TABLE S-1. SUCKLE VEGETATION COMMUNITIES

Vegetation Communities		Acreage	
Type	**Subtype**	**Subtype**	**Total**
Desert Scrub and Dune Habitats	Sonoran Mixed Woody and Succulent Scrub	198.23	198.23
Herbaceous Wetlands, Freshwater and Streams	Desert Fan Palm Oases	0.41	1.15
	Freshwater Marsh	0.74	
		Total	199.39

Sonoran Mixed Woody and Succulent Scrub (33220)**.** This vegetation type is found throughout the Suckle property and makes up the majority of the vegetation found there. Sonoran Mixed Woody and Succulent Scrub make up approximately 198.23 acres or 99% of the Suckle property.

Freshwater Marsh (52400). This vegetation type is a small patch located on the southwestern border of the property south of the Interstate 8 freeway. Freshwater Marsh makes up less than 1 acre or less than 1% of the Suckle property.

Desert Fan Palm Oasis Woodland (62300)**.** This vegetation type exists as two very small patches along the border of the southwestern arm as well as the southeastern arm of the Suckle property. Desert Fan Palm Oasis Woodland makes up less than 1 acre or less than 1% of the Suckle property.

Sensitive Plant Species

There have been no sensitive plant species recorded for the property, however, Wolf's cholla (*Cylindropuntia wolfii*) has been observed just off-site.

TABLE S-2. SUCKLE SENSITIVE PLANT SPECIES

Common Name	**Scientific Name**	**Listing** Status Federal/State/CNPS	**Probability of Occurrence**
Wolf's cholla	*Cylindeopuntia wolfii*	-/-/4	High

Invasive Plant Species

Invasive species present on this property include the giant reed (*Arrundo donax*) and tamarisk (*Tamarix* spp.), which are found in restricted areas in and around desert dry washes in the southern portion of the property (Figure S-6). These areas are targeted for treatment under the HMMP (implemented and funded separately).

Sensitive Animal Species

Table S-3 identifies the sensitive animal species observed or potentially occurring on the property.

TABLE S-3. SUCKLE SENSITIVE ANIMAL SPECIES

Common Name	**Scientific Name**	**Listing Status (Federal/State/CNDDB)**	**Potential to Occur**
Black-tailed Jackrabbit	*Lepus californicus*	-/-/G5T4 S5	Moderate
Coastal Rosy Boa	*Lichanura trivirgata roseofusca*	-/-/ G4G5T3 S3S4	Moderate
Northern Red Diamond Rattlesnake	*Crotalus ruber*	-/SSC/ G4T3T4 S3	Observed
Barefoot banded gecko	*Coleonyx switaki*	-/T/G4	Considered Occupied
Peninsular bighorn sheep	*Ovis canadensis nelsonii*	E/ST, FP/ G4T3Q S1	High (Observed in the vicinity)
Prairie Falcon	*Falco mexicanus*	-/-/G5 S3	Moderate, CNDDB

Invasive Animal Species

No invasive animal species have been identified on the Suckle property.

Wildlife Movement and Linkages

The Suckle property is located within the identified wildlife linkage between the Jacumba Mountains in the U.S. and Sierra-Juarez Mountains in Mexico. The so called "Park-to-Parque" linkage represents one of the only montane linkages from the U.S. to Mexico allowing the movement of wildlife cross-border.

This linkage provides a connection between Anza-Borrego Desert State Park in San Diego and Imperial counties and Parque Constitucion de 1857 in Baja California. The goal of conserving and maintaining this linkage is to ultimately allow the Peninsular bighorn sheep to repopulate the Sierra Juarez mountains in northern Baja California (Southcoast Wildlands 2008).

MANAGEMENT SPECIFICATIONS

This section identifies the proposed land manager/owner arrangements, start-up and ongoing tasks, and the estimated costs of HMP implementation.

Proposed Land Manager/Owner

SDG&E proposes to convey the lands to CDFG, State Parks, BLM, or a conservancy. The property is in CDFG region 6, but there are no other CDFG lands in the immediate vicinity. BLM lands are immediately adjacent to the parcel, but BLM may not be able to accept the conservation easement and endowment. The State Park lands closest to the property are to the west in San Diego County. Although not contiguous with the State Park lands, management of the two areas could be effectively coordinated.

The selection of the land manager/owner is subject to approval by CDFG because the property is the mitigation parcel conserved under the terms and conditions of the Project's 2081 permit.

Start-up Tasks (Years 1-5)

Access Control

Approximately five signs will be erected in appropriate areas alerting the public to illegal trespassing, illegal dumping, and other illegal uses. Gates will be installed at the entry of the two existing access roads. No fencing will be installed. The signs and gates will be maintained and replaced as needed during the period.

General Conditions Monitoring and Wildlife Assessment

The land manager will conduct annual inspections to determine overall conditions on the property and assess threats to habitat and species. Results of the inspection will be used to map and prioritize areas where preventive or remedial measures are needed.

Vegetation and Invasive Species Mapping

A qualified plant ecologist will prepare baseline mapping of vegetation communities and invasive plant species on the property based on field surveys and aerial imagery. The mapping will be completed by year 3 and updated once during the period.

Species Surveys

Barefoot banded gecko will be monitored annually during the start up phase. Nocturnal surveys will be conducted four times at least two weeks apart within the period from May 1 through July 31. PBS monitoring also will occur annually during the start up phase. Daytime surveys (1-3 visits per survey) will be conducted. The PBS surveys will be coordinated with 10-year PBS monitoring program being conducted by USFWS and CDFG with funds provided by SDG&E. The monitoring also will be coordinated

with annual sheep count conducted by the Anza Borrego Foundation and Anza-Borrego Desert State Park.

5-Year Work Program and Annual Work Plans

Using results from general conditions assessment and vegetation/invasive species mapping, the land manager will prepare a 5-year work program that identifies and prioritizes biological resource and land stewardship tasks for the period and includes a five-year staffing and materials budget. The 5-year work program will be completed no later than year 3 and updated every three years. Annual work plans and annual budgets will be based on the priorities set in the 5-year work program.

Interim Work Plans

Prior to completion of the first 5-year work program, the land manager will prepare annual work plans and budgets for the general conditions assessment, surveys, mapping, and other data collection required to guide management of the property. The interim work plans also may include access control, invasive species control, and erosion control measures that the land manager determines are necessary.

Invasive Plant Control

Invasive plant control measures will be initiated based on the results of the mapping effort and the priorities established in the work program.

Erosion Control, Road Maintenance, and Road Decommissioning

Erosion control and road maintenance will be performed on an as-needed basis. The existing internal access roads will be maintained if required for access control and monitoring purposes. No new roads will be added, and unnecessary internal roads will be decommissioned.

Fire Management

The 5-year work program will include a fire management component developed in consultation with the appropriate fire agencies. Controlled or systematic burns will not be allowed as a fuel reduction measure.

Trash Removal

The property will be managed for illegal dumping in concert with the management for public access. Any evidence of illegal dumping will be recorded by the land manager and addressed accordingly. Trash will be removed and disposed in accordance with applicable local ordinances.

GIS Database

The land manager will establish and maintain a GIS database for the property.

Annual Reports

The land manager will prepare annual reports on management activities and expenditure of start-up funds.

Public Information/Education
The land manager will prepare web-ready notices and fact sheets regarding the inclusion of the lands in the properties managed by the public agency or conservancy, the resources on the property, and public access restrictions. The materials will be posted on the land manager/owner's website.

Ongoing Tasks (Beginning Year 6)

Access Control
Signs and gates will be maintained and replaced as needed. Barriers and other access controls will be considered if monitoring identifies illegal access and uses as a problem.

General Conditions Monitoring and Wildlife Assessment
The land manager will conduct annual inspections to determine overall conditions on the property and assess threats to habitat and species. Results of the inspection will be used to map and prioritize areas where preventive or remedial measures are needed.

Vegetation and Invasive Species Mapping
The vegetation and invasive species mapping will be updated every three years.

Species Surveys
Surveys for gecko and PBS will be conducted every five years. The survey results will be used to identify areas where impacts to this listed species need to be avoided and where there are opportunities to benefit the species.

5-Year Work Program and Annual Work Plans
The five-year work program will be updated every three years. Annual work plans and annual budgets will be based on the priorities identified in the management plan.

Exotic Plant Control
Control measures for exotic invasive plants will be implemented as specified in the management plan. Management of the HMMP enhancement areas will become part of the HMP work program when the HMMP success criteria have been met (potentially in year 6).

Work Program and Annual Work Plans
The 5-year work program will be updated every three years. Annual work plans and annual budgets will be based on the priorities identified in the work program.

Exotic Plant Control
Control measures for exotic invasive plants will be implemented as specified in the work program and annual work plans.

Erosion Control, Road Maintenance, and Road Decommissioning
Erosion control and road maintenance will be performed on an as-needed basis. No new roads will be added, and unnecessary internal roads will be decommissioned.

Fire Management
The fire management component of the management plan will be updated every three years.

Trash Removal
Monitoring for illegal dumping and the collection and disposal of trash will occur on an as-needed basis.

GIS Database
The land manager will maintain the GIS database for the property on an annual basis.

Annual Reports
The land manager will prepare annual reports on management activities, expenditures, and the balance of the management endowment.

Public Information/Education
Notices regarding access controls and limits on public uses and annual reports will be posted on the land manager/owner's website.

Estimated Costs and Funding

As presented in detail in Part 3, start-up management costs are estimated at $148,922 for the five-year period ($29,784 annually). Ongoing annual costs are estimated at $19,412 and would require a non-wasting endowment of $970,596. The total funding commitment required for management of the property is $1,119,518.

STATUS OF THE ACQUISITION

The owner is a willing seller. The acquisition is in due diligence stage.

DESERT CAHUILLA TRANSACTION AND HMP

OVERVIEW

ACRES	5,760
LOCAL JURISDICTION	County of Imperial
CROSSED BY PROJECT ROW	No
CONSERVED AS MITIGATION FOR PROJECT IMPACTS TO	Sensitive Vegetation, PBS Habitat, PBS Connectivity
INCIDENTAL BIOLOGICAL VALUES	Special Status Plants
ALSO A MITIGATION SITE FOR PROJECT IMPACTS TO	
JURISDICTION WATERS	Yes (on designated mitigation parcel)
SENSITIVE PLANTS	No
NATIVE TREES	No
OTHER	None
ADJACENT CONSERVED/PUBLIC LANDS	Anza-Borrego Desert State Park, Ocotillo Wells State Vehicular Recreation Area
PROPOSED LAND MANAGER/OWNER	State Parks
ESTIMATED START-UP MANAGEMENT COSTS	$125,000 (for designated mitigation parcel)
ESTIMATED ENDOWMENT FOR ONGOING MANAGEMENT	$1,000,000 (for management of mitigation parcel), $3,500,000 (contribution towards management of PBS habitat added to Park)
ACQUISITION STATUS	Agreement with State Parks Proposed

DESCRIPTION OF THE PROPOSED TRANSACTION

The Desert Cahuilla Transaction entails the acquisition and consolidation of State lands within a 14,899-acre area (transaction area) west of Route 86 near the Salton Sea in Imperial County, California (Figure 1). The primary goal of the transaction is to conserve the area's unique resources -- including key areas for Peninsular bighorn sheep (PBS) -- while also accommodating public uses of State lands. Under the transaction, nine parcels currently owned by the California State Lands Commission (CSLC) will be acquired by the California Department of Parks and Recreation (State Parks), consolidated with other lands owned by State Parks, and added to Anza-Borrego Desert State Park (ABDSP) and Ocotillo Wells State Vehicular Recreation Area (OWSVRA).

State lands north of the boundary shown on Figure DC-A will go to ABDSP; State lands south of the boundary will go to OWSVRA. This division of lands was determined by State Parks working in cooperation with environmental and recreation groups and in consultation with CDFG and USFWS. Table DC-1 estimates ownership north and south of the boundary before and after the transaction. See Figures DC-1 through DC-6 for additional information about the transaction area and mitigation parcel.

FIGURE DC-A. DESERT CAHUILLA TRANSACTION AREA

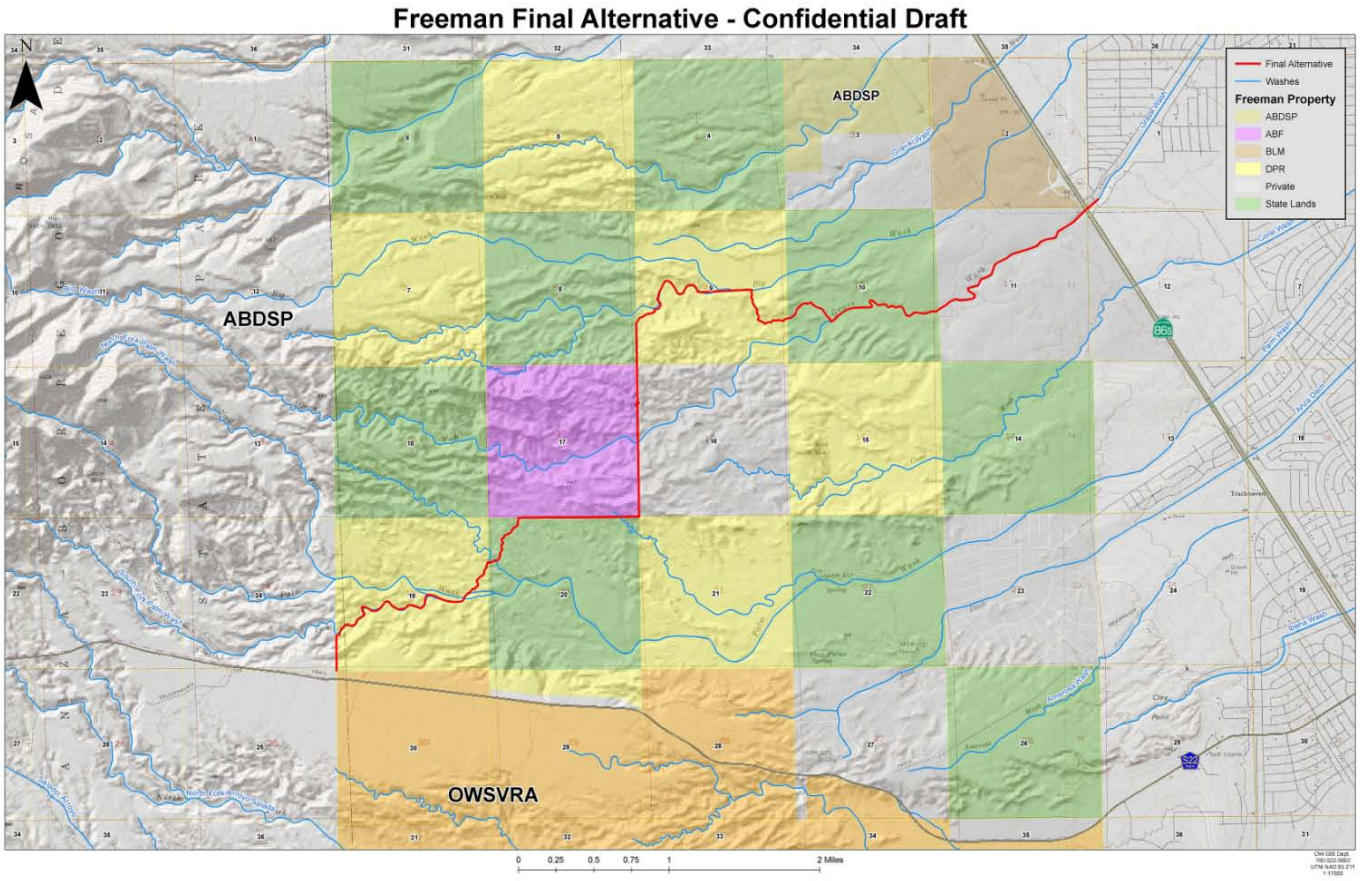


TABLE DC-1. PRE- AND POST-TRANSACTION OWNERSHIP IN THE TRANSACTION AREA

Existing (Pre-Transaction)	North Tier (acres)	South Tier (acres)	Total (acres)
Anza-Borrego Desert State Park	356.73	0	356.73
Anza-Borrego Foundation	650.50	0	650.50
BLM	388.42	0	388.42
California State Lands Commission	3,082.16	2,809.92	5,892.08
Ocotillo Wells SVRA	0	410.00	410.00
Private	537.45	2,551.39	3,088.84
State Parks[1]	2,032.58	1,973.23	4,005.80
TOTAL	**7,047.83**	**7,744.54**	**14,792.38**
Post Transaction			
Anza-Borrego Desert State Park[2]	5,471.46	0	5,471.46
Anza-Borrego Foundation	650.50	0	650.50
BLM	388.42	0	388.42
California State Lands Commission	0	0	0
Ocotillo Wells SVRA[3]	0	5,193.15	5,193.15
Private	537.45	2,551.39	3,088.84
State Parks[4]	0	0	0
TOTAL	7,047.83	7,744.54	14,792.38

Notes

1 Includes properties acquired by State Parks for expansion of OCSVRA prior to 2010.
2 Includes existing ABDSP lands, plus northern tier CSLC and State Parks property.
3 Includes existing OWSVRA lands, plus southern tier CSLC and State Parks property.
4 Assumes all of State Parks' ownership (including the 9 acquired CSLC parcels) will be divided between ABDSP and OCSRVA.

The northern tier currently includes ABDSP lands, a parcel owned by the Anza-Borrego Foundation, and a combination of CSLC and State Park holdings. This area also encompasses includes all key areas for PBS, including designated critical habitat and known movement corridors. The ABDSP lands to the west are designated as Wilderness Area. The private lands and BLM lands are not part of the transaction. However, State Parks anticipates that over time some or all of the private lands would be acquired from willing sellers and added to ABDSP and that a land exchange or management agreement would be proposed for the BLM lands.

The southern tier currently includes OWSVRA lands, a combination of CSLC and State Park holdings, and a substantial amount of private lands. The existing SVRA extends from the southern border. ABDSP is to the west; private lands and a BLM parcel are to the east. As in the northern tier, State Parks anticipates that over time private lands would be acquired from willing sellers and added to the SVRA.

MITIGATION FUNCTION

SDG&E's role in the transaction is to provide funding for the acquisition of the nine CSLC parcels and management of the lands added to ABDSP. One of the acquired parcels (APN 0070100101) will be designated as a mitigation area for the impacts of SDG&E's Sunrise Powerlink Project (Project) on dry washes, desert scrub, and PBS habitat. In addition, the funding for the acquisition and for the management of lands added to ABDSP will serve as mitigation for the Project's impacts on PBS connectivity. SDG&E's participation is conditioned on USFWS and CDFG approval of the mitigation for impacts to PBS and U.S. Army Corps of Engineers' approval of the dry wash preservation on the mitigation parcel. The California Public Utilities Commission and U.S. Department of Interior Bureau of Land Management, the lead agencies for the Project, also must agree that the mitigation meets the requirements specified for the Project. SDG&E has discussed the matter with these agencies and has their preliminary concurrence, conditioned on documentation and assurances regarding how the dry wash and PBS values will be preserved over time.

MANAGEMENT AND FUNDING COMMITMENTS

SDG&E proposes to enter into an agreement with State Parks that includes the following provisions:

1. SDG&E will provide a total of $2,000,000 for the acquisition of the nine parcels. This amount is based on the estimated appraisal value of the lands. If actual acquisition costs are less than $2,000,000, State Park will allocate the remainder to the management of the lands added to ABDSP (see item 2b below).

2. SDG&E will provide $4,500,000 for State Parks to manage the lands added to ABDSP within the transaction area, including the parcel identified as the Project mitigation area.

    a. $1,000,000 of the management funds will be designated for initial and ongoing management of the designated Project mitigation area, with $750,000 allocated for a non-wasting endowment for ongoing management. Enforcement patrols on the parcel will occur as part of the management of the other lands added to the ABDSP and will not be funded by the $1,000,000. PBS monitoring is not a required task on the parcel and will not be funded by the $1,000,000.

        i. Initial management tasks (years 1-5) will include:

            1. Installation of signage (year 1) and maintenance (as needed).

            2. Installation of fencing (6,000 linear feet in selective areas in years 1 and 2) and maintenance of the fencing (as needed).

            3. Assessment of dry wash and desert scrub conditions, including mapping of exotic invasive plants and any problem areas (completed in year 2).

4. Decommissioning and rehab of existing road on parcel (12,000 linear feet) (completed by year 5).

5. Monitoring of dry wash and desert scrub vegetation for presence and spread of exotic invasive species (annual) and identification of appropriate control measures to be implemented as part of ongoing management.

6. Preparation of annual work plans and annual reports on management activities.

ii. Ongoing management tasks will include:

1. Maintenance and replacement of signage and fencing (as needed).

2. Periodic habitat assessments and mapping updates (every 5 years).

3. Invasive plant species monitoring (every 2 years).

4. Implementation of invasive plant species control measures (where needed, as determined by monitoring task and within limits of available funding).

5. Preparation of annual work plans and annual reports on management activities.

b. $3,500,000 will be designated for management activities on the other lands added to ABDSP within the transaction area. The funding is being provided as mitigation for the Project's impacts on PBS connectivity and will be used for management activities that protect and enhance PBS connectivity on and across the lands added to ABDSP. Such activities will include:

i. Signage to mark the boundaries between the ABDSP and OWSVRA and indicate allowable uses;

ii. Enforcement patrols/access controls to deter illegal uses in ABDSP and promote compliance with the land use restrictions;

iii. PBS habitat enhancement (e.g., addition or management of watering locations);

iv. PBS monitoring after year 10 (see item 3 below); and

v. Road decommissioning to improve habitat conditions and limit access to certain areas.

Use of the funding for other tasks will require the concurrence of USFWS and CDFG in advance of the expenditure.

State Parks will prepare an expenditure plan that identifies the proposed allocation of funds for types of tasks; estimates annual expenditures for staffing, equipment, and materials; and estimates the duration of the funding. Establishing park boundaries and land use controls is a critical step in establishing the expanded ABDSP and also is crucial to preserving PBS connectivity across the area. It is anticipated that State Parks will use the funding for management activities over a 5 to 10 year period, when establishing boundaries and land use controls will be critical to shaping the expanded park and to preserving PBS connectivity across the area.

3. As a separate but related mitigation measure for the Project's impacts, SDG&E is funding a 10-year PBS monitoring program. The program will be implemented by USFWS and CDFG. USFWS and CDFG have agreed to include the lands added to ABDSP, including the mitigation parcel, in the program. After the 10-year monitoring program is completed, the funding provided for management of the lands added to ABDSP may be used for PBS monitoring on those lands. This assumes that State Parks will not expend all of the funds by year 10.

4. State Parks will attach a mitigation overlay to APN 0070100101. The overlay will identify the parcel as the Project mitigation area and the area where the $1,000,000 will be used for management activities. The overlay also will limit allowable land uses to those consistent with preserving the dry wash, desert scrub, and PBS values on the property. During the first five years of managing the parcel, State Parks also will prepare an amendment to the SBDSP General Plan to designate the parcel as a Wilderness Zone.

STATUS OF THE TRANSACTION

State Parks has initiated discussions with CSLC. An agreement between SDG&E and State Parks is being drafted.

PART 3

PROPERTY ANALYSIS RECORDS FOR THE PROPERTIES

INTRODUCTION

Because the properties are located in different ecoregions and support different sensitive vegetation communities and species, each mitigation property requires its own suite of management and monitoring tasks that will supplement the general management that will be performed at each site to mitigate project impacts. The costs to perform these management tasks are produced by a PAR, which identifies the individual tasks and assigns labor and materials costs for each task. Management is conducted in two phases. Phase 1 is a five-year start-up period during which initial access control measures are installed, baseline inventory surveys are conducted, and intensive management actions are taken to bring the property to a condition that provides the baseline for future monitoring. Phase 2 is ongoing management, which consists of annual maintenance in perpetuity. Phase 2 costs are given as an average annual estimate of implementation. The PAR then calculates an endowment amount that would yield enough interest (at a conservative rate) to cover the annual in-perpetuity management costs without having to use the principal (i.e., a non-wasting endowment).

GENERAL ASSUMPTIONS FOR COST ANALYSIS

The cost analysis incorporates several general. Any changes to these assumptions would require a re-evaluation of the cost estimate.

Land Assumptions

1. *Total Acreage* is the acreage of the mitigation land that will be managed on each property, which does not include permanent or temporary project impacts or the right-of-way, if they occur on the property. *Land Stewardship* activities will be conducted on this acreage in perpetuity..

2. Taxes, district fees and other levies are the responsibility of the land owner and are not included in this analysis.

3. Management of storm water conveyance structures will not be the responsibility of the Land Manager.

Funding Assumptions

1. Funding will be through a one-time payment for five-year start-up costs and interest earned on endowments provided by SDG&E for annual ongoing management costs.

2. Management and monitoring tasks in this cost analysis are based on requirements outlined in the MMCRP and conditions of the BO issued by the USFWS

3. A separate cost analysis has been conducted for each property, and reflects the specific mitigation requirements and property site conditions.

COST JUSTIFICATION AND LINE ITEM ASSUMPTIONS

The cost breakdown for biological management and monitoring is divided into the following sections: Facilities Maintenance and Access Control, Biological Inventory and Monitoring, Habitat and Land Management, Preserve Management Plan and Reporting, and Contingencies and Administration. As described in the individual HMPs, "land stewardship," which is the overall management of the property as a whole, consist of access control (Facilities Management and Access Control section of the PAR), general condition monitoring (a line item within Biological Inventory and Biological Monitoring sections of the PAR), and trash removal (a line item within the Habitat/Land Management section of the PAR). The dollar amount required for management is based on the analysis below.

Each PAR is presented in two components: Start-up Costs and Annual Costs in Perpetuity. Start-up costs cover the initial investment in infrastructure and surveys to begin monitoring and reporting, and maintenance, monitoring and reporting that would occur in the first 5 years of implementation. Annual Costs in Perpetuity provides an average annual estimate of implementation of the HMP. An annual inflation rate (3.0%) is applied to the annual cost which is used to generate an estimate of an endowment that would yield an amount, assuming a 5% return, to pay for the annual management and monitoring. To this endowment estimate the start-up cost is added to provide a total initial endowment estimate.

Facilities Maintenance and Access Control

Gates, fencing, and signs are included in the cost analysis as needed to protect mitigated species or habitats from unauthorized access. The HMP includes the start-up and long-term maintenance costs for facilities other than those provided by SDG&E for Operations and Maintenance (e.g., gates for maintenance access roads).

Fencing

Fencing will be an important aspect of land management, since unauthorized use can destroy sensitive resources and undermine the biological value of the mitigation. Several assumptions have been made for the cost analysis. Some properties (e.g. Lightner and Long Potrero) will require fencing whereas others (e.g. Chocolate Canyon, Desert Cahuilla Land Transaction, El Capitan, Hamlet, Lakeside, Nabi and Suckle) will not. Fencing discussed in this section is limited to the perimeter or portions of the

properties. The entire perimeter of each parcel will not need to be fenced as there is steep topography, adjacent protected land, vacant land or existing fencing associated with private property present at the property boundaries. Details for each property are provided in the individual PARs. A combination of smooth wire or chain link will be used for the mitigation sites. Fencing costs are estimated at $15 per linear foot and based on the average cost of the two types of fencing. It is estimated that 10% of the fencing installed during the start-up period will need to be replaced annually.

Gates and Barriers

Gates will be required to block unauthorized access but allow access for the Land Managers and emergency services personnel. Gates will be installed on the perimeter at main access points into the property if needed. High quality 16-foot swinging arm gates firmly planted into the ground are recommended since they are most resistant to vandalism and destruction. A typical 16-foot swinging arm gate will cost about $5,000 including installation. These gates will need to be serviced annually and replaced every 20 years.

Concrete bollards are fixed barriers to vehicular access that are firmly planted into the ground to resist being removed or pushed over by vehicles. They will be used to prevent vehicles from bypassing gates. Four bollards are expected to be needed at $75 per bollard for each gate. Long-term maintenance consists of replacement every 10 years.

Signage

Signage will be used to indicate boundaries, cite regulations, and identify areas of habitat restoration. Signs are estimated at $15 per sign, which is an average cost for small signs of this type (e.g., 8 in. by 13.5 in.). Signage is susceptible to vandalism and/or removal; therefore, in addition to initial installation, it is expected that an average of 20% of signs will need replacement each year.

Biological Monitoring

Monitoring costs include baseline inventory surveys to be conducted during the first five-years and long-term monitoring for mitigated species and habitats. For the purpose of this cost analysis, the following definitions are used. A *baseline survey* is conducted at a certain point in time and is used as the benchmark against which subsequent surveys will be compared. *Baseline surveys* can take place during a single year or can be conducted over a period of time to encompass the natural fluctuation in the density or distribution of a population or structure of a plant or animal community. *Monitoring surveys* are conducted over a given period of time or in perpetuity, and are compared to the baseline survey results to indicate changes in populations or habitat conditions over time. Negative changes over time (e.g., showing a more restricted sensitive species population distribution) will alert the land manager and may trigger specific remedial management actions. Note that long-term monitoring may be conducted less frequently than surveys conducted during the five-year start-up period if appropriate for a given species.

Habitat-Related Monitoring

Habitat-related monitoring includes general condition monitoring, general wildlife habitat assessment, vegetation mapping, invasive species mapping, and species-specific habitat assessment. Some of these

activities can be conducted concurrently as described below. Unless otherwise specified, the estimated survey rate (acres/hour) includes field preparation and travel time.

General Condition Monitoring and Wildlife Habitat Assessment

General condition monitoring will be conducted to identify threats to sensitive habitats and species. Threats may include invasive species, erosion problems, illegal trespass (e.g., off-road vehicles or graffiti, etc.), trash or illegal dumping. In addition, the general overall health a quality of wildlife habitat will be assessed during this effort. One visit will be conducted annually at an estimated rate of 10 acres/hour.

Vegetation Communities and Invasive Species Mapping

Baseline mapping of vegetation communities and invasive species will be conducted during the start-up period and updated annually for the remainder of this period. Updates will continue every three years thereafter. This effort is expected to be more intense than that described for general condition monitoring, in which general presence/absence information will be recorded for invasive species. Mapping will consist of defining boundaries and noting the density, species, and level of threat. This effort is estimated to be conducted at 7.5 acres/hour

Species-specific Habitat Assessments

Some species may require ongoing habitat assessments to inform species-specific monitoring. This type of assessment is more specific than that described for general condition monitoring, as it takes into consideration the particular habitat needs of a given species. For example, a habitat assessment for the least Bell's vireo and southwestern willow flycatcher might focus on such habitat characteristics as canopy structure or dominant plant species. This type of assessment is expected to be conducted concurrently with vegetation communities and invasive species mapping, as this is a more intense effort than general condition monitoring.

Information gathered from the general conditions monitoring and invasive species mapping will be used to prepare a vegetation management plan, which will include a list and assessment of threats to biological resources, management priorities, and a work plan for habitat management. The plan will be updated annually.

Focused Species Survey Methods

Surveys for mitigated species will be conducted according to established protocols (either USFWS presence/absence protocols or preserve-specific monitoring protocols[1]), USGS guidelines, or recommendations of species experts. A brief summary of each approach is provided below. Field preparation and travel time is built into the estimated number of acres covered per hour.

- Felt-leaved monardella, modified from McEarchen (in progress and 2009). Baseline surveys for felt-leaved monardella will be conducted on the Lightner property twice during the start-up period. The surveys will be conducted to assess the current condition and extent of the population, potential threats, and condition of the surrounding habitat. Each survey is expected to be conducted in 10 hours.

[1] If not otherwise specified, preserve-specific monitoring protocols include USFWS presence/absence protocols that have been specifically modified to fulfill long-term preserve monitoring goals.

- Lakeside Ceanothus. Baseline surveys for Lakeside ceanothus will be conducted on the El Capitan property. The surveys will assess the current condition of the population, level of seedling recruitment, potential threats, and condition of the surrounding habitat. Each survey will take 30 hours, and be conducted twice during the start-up period.

- Quino: USFWS protocol (2002). Baseline surveys and long-term monitoring of the Quino checkerspot butterfly will be conducted every three years on the Long Potrero and Lightner properties. The Hermes butterfly will be surveyed on the Lightner property concurrently. Each flight season (usually between late February and late April) consists of five field visits which are conducted one week apart at 15 hours/acre. Surveys will occur within scrub and grassland habitats (the survey acreage may be reduced if a habitat assessment is conducted to determine excludible habitat.). A report will be prepared and submitted to the USFWS 45 days after the last survey.

- Arroyo Toad: USFWS MSCP Animal Survey Protocol (USFWS 2009) and USGS Monitoring Protocol for the arroyo toad (USGS 2003). Baseline surveys and long-term monitoring will be conducted for the arroyo toad on the Long Potrero property every three years. Three field visits per survey will be conducted during the breeding season (March through June) at an estimated 2.5 acres/hr of suitable habitat. Report due to USFWS 30 days after final surveys or positive sighting. To be conducted every three years during start-up and ongoing management periods.

- Barefoot banded gecko: CDFG protocol (in prep). Baseline surveys and long-term monitoring of the barefoot banded gecko will be conducted on the Suckle property. Surveys will consist of four visits between May 1 and July 31 at an estimated rate of 2.5 acres/hr. Ten percent of the site will be surveyed. Surveys will be conducted annually during the start-up period, and every three years thereafter.

- Gnatcatcher: modified USFWS survey protocol (1997). Focused species surveys will be conducted on the Lakeside property. Surveys will consist of one visit during the breeding season (February 15 – August 30) at an estimated rate of 10 acres/hr. A report is due to USFWS within 45 days of the final survey. Surveys will be conducted every three years during start-up and ongoing monitoring periods.

- Least Bell's vireo: USFWS Survey Guidelines (2001) as modified. Least Bell's vireo surveys will be conducted on the Chocolate Canyon property. Three survey visits will be conducted 10 days apart, between April 15 and July 31 at an estimated rate of 3 acres/hr in riparian scrub, forest, or woodland habitat. A report is due to USFWS 45 days after the last survey. Surveys will be conducted annually during the start-up period and every three years thereafter.

- Southwestern willow flycatcher: USFWS monitoring protocol (2010) as modified. To be conducted concurrently with least Bell's vireo surveys

- Peninsular Bighorn Sheep Project Monitoring will be conducted independently by California State Parks and is not part of this HMP Surveyors will enter all the data into a spreadsheet or GIS database, analyze the data, and create survey reports for each survey season as required by the USFWS. The additional cost of reporting and data management is calculated at 25% of the total survey effort.

HABITAT/LAND MANAGEMENT

Habitat management consists of actions that are directed at maintaining habitat quality for mitigated species through invasive species control, erosion control, trash removal, and minor habitat remediation, as described below.

Invasive Species Control

Control of invasive plant species will be one of the most important aspects of habitat management. The common non-native plant species in the dominant habitats (coastal sage scrub, grassland and chaparral) are usually non-native grasses, mustards (*Brassica* ssp and *Hirschfeldia incana*), star-thistle (*Centaurea melintensis*), fennel (*Foeniculum vulgare*) and many others. Non-native plant species that occur in riparian areas, such as arundo (*Arundo donax*), pampas (*Cortaderia selloana*) and tamarisk (*Tamarix* spp.), will be removed through the jurisdictional resources habitat mitigation Plan. This cost analysis assumes that there will be an initial intensive effort to remove the most damaging invasive species (as per California Invasive Plant Council (CalIPC)) recommendations, and that invasive species removal will most likely be a continual process in perpetuity. Although invasive species removal can be conducted by laborers, this activity must be supervised by a qualified biologist to ensure that sensitive species and habitats are not damaged during the removal process.

Difficult-to-remove or widespread invasive species:
The cost estimate assumes that a small staff of laborers will be needed for widespread and/or difficult to remove invasive species. Cost assumptions include: 25 acres/crew day, $1,600 per crew day (5 laborers/crew, $64/ hour labor cost plus equipment cost), on approximately one to ten percent of the total property in a given year. The activity may include mowing, herbicide treatment, hand removal, debris removal, etc. Equipment needed for this activity may include weed-whips, gardening tools, chain saws and other tools as well as rental equipment such as mowers for removal of non-native grasses. The frequency of treatment varies from annually to every five years depending on the local conditions of a given property.

Other invasive species:
Smaller scale infestations and/or species that are less difficult to remove can be conducted by laborers at an estimated cost of $45/hour at an estimated rate of 0.25 acre per hour. Much of this work will likely be done by hand or with small equipment. Generally, this level of invasive species removal is expected to occur annually on one to five percent of the property depending on local conditions.

Erosion Control and Road Maintenance

Erosion control and road maintenance for this cost estimate is meant to cover minor problems, for example erosion repairs along degraded habitat or near unused or old trails. It does not include the construction of erosion control devices, such as cement berms or culverts, or any measures that would require permits, engineering or major contracting. In general, maintenance of roads is not the responsibility of the Land Manager, except for existing roads that are required for management access and not already maintained by SDG&E for access to the transmission line and related structures.

Erosion control materials are estimated to cost $600 per acre. Materials will consist of gravel bags (250 bags at $1.50/bag), fiber roles and stakes (12 rolls at $28/roll), and silt fencing (500 feet at $25/100-ft roll). This management task can be conducted by laborers, and assumes $45/hour at a rate of eight labor hours per acre on five percent of the property on an annual basis. As with invasive species removal, this activity must be supervised by a qualified biologist to ensure that sensitive species and habitats are not damaged during erosion control activities.

Trash Removal

Trash removal is a land steward task that is more important in open space areas that are more accessible to the public (e.g. Suckle) as compared to areas that are far from public facilities (e.g., El Capitan). Because the Sunrise mitigation parcels will not be open to the public, the need for trash removal is lower than for a property that has active recreation. Trash removal is based on a cost of $100/acre for one percent to five percent of the property and will be conducted every one to five years depending on the property.

Habitat Remediation

Habitat remediation consists of minor rehabilitation of habitat from the effects of erosion, unauthorized access or removal of exotics; it not considered ecological habitat restoration or creation. This task may include seeding with native seeds, raking, or weed removal. Remedial restoration may also include the restoration of closed trails or roads. Due to the high level of disturbance and compaction, a closed road or trail can take a substantially greater amount of time to revert back to the surrounding native vegetation community without active seeding, weeding, and soil preparation. Therefore, remedial restoration for decommissioned roads and trails will be somewhat active (e.g., may include soil decompaction, seeding with the imprinting method, more active exotic species control etc.), but will not include irrigation as part of this HMP. Major restoration, restoration for mitigation purposes (e.g., those identified in the Habitat Mitigation Monitoring Plan (HMMP) for this Project) and/or the development of restoration plans are not included in this HMP.

Habitat remediation is included during the start-up period for most properties and is also an integral part of the habitat management in perpetuity. Costs are estimated based on one percent to five percent of the total acreage of each property every two to five years. Remediation efforts, including labor and materials, will vary in cost between $300/acre for minor habitat repair and $1,000/acre for a more active effort, which is required to restore decommissioned roads and trails.

PRESERVE MANAGEMENT PLANS AND REPORTING

Annual Reports

Annual reports will include a threats assessment, work plan, budget plan, and a financial summary (including the status of endowments). Reporting will be prepared annually and be submitted to the appropriate wildlife, or other public agency. Preparation of annual reports is expected to take approximately 20 hours during the start up period and 10 hours thereafter.

Five Year Work Programs

Using the results from the general condition monitoring, wildlife habitat assessments, vegetation communities mapping, invasive species mapping and species-specific habitat assessments, 50year work programs will be prepared and regularly updated. The plan will include a threats assessment, prioritization, monitoring protocols and schedules, and a work plan. The plan is expected to be completed in year three and updated annually thereafter. Some interim land management will occur during years one and two. Initial report preparation is estimated to take 30 to 60 hours during the start-up period, and updates will take 10 to 30 hours annually.

GIS Database Management

GIS tasks will include the management of survey data submitted by the surveyors (including GPS data), and the preparation of maps and graphics to assist in the data analysis, to be conducted by the land manager, and in the preparation of annual reports and preserve management plans. GIS-related activities are estimated to take 8 hours annually during the start up period and 4 hours thereafter.

CONTINGENCIES AND ADMINISTRATION

This cost estimate includes a provision for contingencies at a rate of 10% of the budgeted expenses to provide a cushion for extra and unforeseen costs. There is also a provision for administrative overhead at 15% to provide for the cost of maintaining an office, office supplies, and administrative staff to assist with paperwork and other administrative costs.

LABOR RATE ASSUMPTIONS

The following table summarizes the labor rate assumptions used for this cost analysis. Labor rates usually vary from organization to organization which should be considered during discussion of this cost analysis. The cost analysis is based on 'fully burdened' labor rates, which includes labor costs and overhead to allow for staffing, materials, and equipment.

Position	Hourly Rate*
Land Manager	$100
Plant Ecologist	$90
Entomologist	$90
Herpetologist	$90
Ornithologist	$90
Mammalogist	$90
Biological Supervisor	$160
Laborer	$45
GIS Specialist	$90

* Charge rates, not pay rates - includes benefits, including health care, 3% matching in a 401k, vacation (120 days), sick (40 hours) and paid holidays (72 hours).

ENDOWMENTS

SDG&E will establish "non-wasting" endowments for each mitigation property, based on this cost analysis, to provide for the management and monitoring of biological resource. Start-up costs will be provided through an initial one-time payment into the endowment account. Annual ongoing management costs will be funded through annual interest earned on the endowment principal. It is assumed that the cost of ongoing management will increase by approximately 3.0% annually, based on the average annual U.S. Bureau of Labor Statistics Consumer Price Index inflation rates over the last 20 years (e.g., between 1989 and 2009). The average annual rate of return is estimated to be 5%. The average estimated reinvestment is estimated at 3%.

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Nabi Start Up Costs (First Five Years)

* Acreage for parcel is exclusive of substation

Facilities Maintenance/Access Control

	Specification	Unit	No. Units	Cost/Unit	Frequency (for 5 years)	Total 5-Yr Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Sign - initial installation	Boundary 8" x 13.5	Item	10	$15.00	1	$150.00	$30.00	Average cost for signs. Sign types: boundary, regulations, habitat restoration. One-time cost for initial installation (10 signs).	
Sign - replacement	Boundary 8" x 13.5	Item	2	$15.00	4	$120.00	$24.00	Average cost for signs. Sign types: boundary, regulations, habitat restoration. Replacement of 20% annually for the remaining 4 years	
SUBTOTAL CAPITAL IMPROVEMENTS						***$270.00***	***$54.00***		

Biological Inventory (Baseline Surveys)

	Specification	Unit	No. Units	Labor rate	Frequency (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Land Manager	General condition monitoring and wildlife habitat assessment	Acres	93.46	$100.00	5	$4,673.00	$934.60	One visit annually to identify threats to habitat and species (comprehensive). 100 acres/day; 10 hour days (=10 acres/hour)	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 year period).
Plant Ecologist	Vegetation communities and invasive species mapping	Acres	93.46	$90.00	5	$5,607.60	$1,121.52	Baseline mapping of vegetation communities (one time) and annual invasive species mapping; to be conducted concurrently the first year; 7.5 acres/hour	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 year period).
Herpetologist	Arroyo toad	L. Hours	10	$90.00	9	$8,100.00	$1,620.00	3 visits at 10 hours each, including travel time; three survey seasons	**Formula:** Hours * Labor Rate * Frequency
Surveyors	Data entry, analysis and reporting	N/A	N/A	N/A	N/A	$4,595.15	$919.03	(25%) * (total survey effort)	**Formula:** 25% of time spent for (general condition monitoring; mapping, and species surveys)
SUBTOTAL BIOLOGICAL MONITORING						***$22,975.75***	***$4,595.15***		

Habitat/Land Management

* or cost per unit

	Specification	Unit	No. Units	Labor rate*	Frequency (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Exotic Plant Control	Difficult to remove species (palms, Eucalyptus trees, artichoke thistle)	Acres	5	$64.00	2	$640.00	$128.00	25 acres/crew day; $1,600 per crew day (5 laborers/crew, $64/ hour labor cost; plus equipment cost); 5% of total property . Mowing, herbicide treatment, hand removal, debris removal, etc. One treatment per 5 years.	**Formula:** Total Cost = (5% total acres/25 ac per crew day) * (labor cost per crew day) * (no. treatments in 5 year period).
Exotic Plant Control	Other species, labor	Acres	5	$45.00	5	$4,500.00	$900.00	Laborer; 0.25 acre/hour; 5% of total property per year. Cal-IPC high and moderate risk species.	**Formula:** Total Cost = (5% total acres/ ac per hour) * (labor cost per hour) * (no. treatments in 5 year period).
Erosion Control	Materials	Acres	5	$600.00	1	$3,000.00	$600.00	Gravel bags (250 @ $1/bag), fiber rolls and stakes (12 @ $28/roll), silt fencing (500 ft @$25/100 ft roll) = $600/acre per 5 years, 5% property.	**Formula:** Total Cost = 5% total acres * cost per acre * no. treatments in 5 year period.
Erosion Control/ Road Maintenance	Labor	Acres	5	$45.00	5	$9,000.00	$1,800.00	laborer; 8 labor hrs/acre; 5% of property annually	**Formula:** Total Cost = (5% total acres/acres per hr) * labor cost per acre * no. treatments in 5 year period.
Trash Removal	Trash Hauling-load	Acres	5	$100	5	$2,500.00	$500.00	$100/acre every year for 5% of total property	**Formula:** 5% total acres * cost per acre * frequency
Habitat Remediation	Minor habitat enhancement due to erosion, unauthorized access, etc.	Linear Ft.	5	$300	1	$1,500.00	$300.00	$300/acre; 5% of total property per 5 years (eg. minor habitat remediation may include seeding with native seeds, raking, soil preparation, etc.). Preparation of a restoration plan and project management is not included in this cost.	**Formula:** Total Cost = (5% total acres/acres per hr) * (cost per hr) * no. treatments in 5 year period.
Habitat Management - all tasks	Supervision by qualified biologist	L. Hours	5	$160.00	5	$4,000.00	$800.00	A qualified biologist will monitor management activities in areas occupied by, or suitable for, listed species.	**Formula:** Total Cost = (number of hours) *(labor cost per hour) * (annually for 5 year period).
SUBTOTAL BIOLOGICAL MANAGEMENT						***$25,140.00***	***$5,028.00***		

Plan/Reporting

	Specification	Unit	No. Units	Labor rate	Quantity (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Land Manager	Annual Reporting and Coordination	L. Hours	20	$100.00	5	$10,000.00	$2,000.00	Preparation of annual report, to include threats assessment, work plan, budget plan, and status of endowment.	**Formula:** Hours * Labor Rate * Frequency
Land Manager	Prepare and update management plan	L. Hours	30	$100.00	3	$9,000.00	$1,800.00	Using results from general condition monitoring and invasive species mapping, prepare and update management plan. Will include threats assessment, prioritization, and work plan. Assumes plan completed in year 3 and updated in years 4 and 5. Some interim land management will occur in years 1 and 2.	**Formula:** Hours * Labor Rate * Frequency
GIS Specialist	GIS Database Management and reporting	L. Hours	8	$90.00	5	$3,600.00	$720.00	Data management and produce figures for annual report.	**Formula:** Hours * Labor Rate * Frequency
SUBTOTAL REPORTING						***$22,600.00***	***$4,520.00***		

TOTAL	$70,985.75	$14,197.15

Contingencies/ Administration	Total costs	% of Total				Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Contingencies	$70,985.75	10				$7,098.58	$1,419.72		
Administrative Overhead	$70,985.75	15				$10,647.86	$2,129.57	Accountants, technical, clerical, contract managers, lawyers, etc.	
SUBTOTAL CONTINGENCIES/ADMINISTRATION						***$17,746.44***	***$3,549.29***		

	Total Cost	Annual Cost (Total divided by 5 Yrs)	
GRAND TOTAL	**$88,732.19**	**$17,746.44**	

Nabi Annual Cost In-Perpetuity

Facilities Maintenance/Access Control

	Specification	Unit	No. Units	Cost/Unit	Quantity	Total Annual Cost	Assumptions	Comments
Sign	Boundary 8" x 13.5	Item	2	$15.00	1	$30.00	Average cost for signs. Signs types: boundary, regulations, habitat restoration. Aprox. Replacement at 20% per year	**Formula:** Total Cost = (20% total number of signs per property) * (cost per sign) * (number of years installation is needed)
SUBTOTAL CAPITAL IMPROVEMENTS						***$30.00***		

Biological Monitoring

Note: in general, these estimates do not include travel time or field prep

	Specification	Unit	No. Units	Cost/Unit	Frequency	Total Cost	Assumptions	Comments
Land Manager	General condition monitoring and wildlife habitat assessment	Acres	93.46	$100.00	1	$934.60	One visit annually to identify threats to habitat and species (comprehensive). Total acreage = 705.86 ac.; 100 acres/day; 10 hour days (=10 acres/hour)	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency).
Plant Ecologist	Update vegetation communities and invasive species mapping	Acres	93.46	$90.00	0.33	$370.10	Update mapping of vegetation communities and invasive species; to be conducted concurrently; 7.5 acres/hour. Once every three years.	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency).
Herpetologist	Arroyo toad	L. Hours	10	$90.00	1	$900.00	3 visits at 10 hours each, including travel time; every three years	**Formula:** Hours * Labor Rate * Frequency
Surveyors	Data entry, and analysis	N/A	N/A	N/A	N/A	$551.18	25% of the total survey effort required for the property.	**Formula:** 25% of time spent for (general condition monitoring; mapping, and species surveys)
SUBTOTAL BIOLOGICAL MONITORING						***$2,755.88***		

Habitat/Land Management

	Specification	Unit	No. Units	Labor Rate	Frequency	Total Cost	Assumptions	
Exotic Plant Control	Difficult to remove species (palms, Eucalyptus trees, artichoke thistle)	Acres	5	$64.00	0.33	$105.60	25 acres/crew day; $1,600 per crew day (5 laborers/crew, $64/ hour labor cost; plus equipment cost); 5% of total property. Mowing, herbicide treatment, hand removal, debris removal, etc. Treatment every 5 yrs.	**Formula:** Total Cost = (5% total acres/25 ac per crew day) * (labor cost per crew day) * (frequency).
Exotic Plant Control	Other species, Removal by Laborers	Acres	5	$45.00	1	$900.00	Laborer; 0.25 acre/hour; 5% of total property per year. Cal-IPC high and moderate risk species.	**Formula:** Total Cost = (5% total acres/ac per hour) * (labor cost per hour) * (frequency).
Erosion Control	Materials	Acres	5	$600.00	0.20	$600.00	Gravel bags (250 @ $1/bag), fiber rolls and stakes (12 @ $28/roll), silt fencing (500 ft @$25/100 ft roll) = $600/acre per 5 years, 5% property.	**Formula:** Total Cost = 5% total acres * cost per acre * frequency.
Erosion Control/ Road Maintenance	Labor	Acres	5	$45.00	1	$225.00	Laborer; 5 acres/hour; 5% of property annually	**Formula:** Total Cost = (5% total acres/acres per hr) * labor cost per acre * frequency
Trash Removal	Trash Hauling	Acres	5	$100.00	1	$500.00	$100/acre annually for 5% of total property	**Formula:** 5% total acres * cost per acre * frequency
Habitat Remediation	Minor habitat enhancement due to erosion, unauthorized access, etc.	Acre	5	$300.00	0.20	$305.20	$300/hour; 5% of total property per 5 years (eg. minor habitat remediation may include seeding with native seeds, raking, soil preparation, etc.). Preparation of a restoration plan and project management is not included in this cost.	**Formula:** Total Cost = (5% total acres/acres per hr) * (cost per hr) * frequency
Habitat Management - all tasks	Supervision by qualified biologist	L. Hours	5	$160	1	$800.00	A qualified biologist will monitor management activities in areas occupied by, or suitable for, listed species.	**Formula:** Total Cost = (number of hours) *(labor cost per hour) * (frequency).
SUBTOTAL BIOLOGICAL MANAGEMENT						***$3,435.80***		

Plan/Reporting

	Specification	Unit	No. Units	Labor Rate	Frequency	Total Cost	Assumptions	Comments
Land Manager	Annual Reporting and Coordination	L. Hours	10	$100.00	1	$1,000.00	Preparation of annual report, to include threats assessment, work plan, budget plan, and status of endowment.	**Formula:** Hours * Labor Rate * Frequency
Land Manager	Update management plan	L. Hours	10	$100.00	1	$1,000.00	Using results from general condition monitoring and invasive species mapping, update management plan. Will include threats assessment, prioritization, and work plan. Update annually.	**Formula:** Hours * Labor Rate * Frequency
GIS Specialist	GIS Database Management and reporting	L. Hours	4	$90.00	1	$360.00	Data management and produce figures for annual report.	**Formula:** Hours * Labor Rate * Frequency
SUBTOTAL REPORTING						***$2,360.00***		

TOTAL	$8,581.68

Contingencies/ Administration

	Total costs	% of Total				Total Cost	Assumptions	Comments
Contingencies	$8,581.68	10				$858.17		
Administrative Overhead	$8,581.68	15				$1,287.25	Accountants, technical, clerical, contract managers, lawyers, etc.	
SUBTOTAL CONTINGENCIES/ADMINISTRATION						***$2,145.42***		

GRAND TOTAL	**$10,727.10**

ENDOWMENT NEEDED	**$536,354.81**	Assume 5% return on investment and 3.0% inflation yearly

Lakeside Ranch Start Up Costs (First Five Years)

* Acreage for parcel is exclusive of substation

Facilities Maintenance/Access Control

	Specification	Unit	No. Units	Cost/Unit	Frequency (for 5 years)	Total 5-Yr Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Sign - initial installation	Boundary 8" x 13.5	Item	10	$15.00	1	$150.00	$30.00	Average cost for signs. Sign types: boundary, regulations, habitat restoration. One-time cost for initial installation (10 signs).	
Sign - replacement	Boundary 8" x 13.5	Item	2	$15.00	4	$120.00	$24.00	Average cost for signs. Sign types: boundary, regulations, habitat restoration. Replacement of 20% annually for the remaining 4 years (2 sign per year = 8 signs).	
SUBTOTAL CAPITAL IMPROVEMENTS						***$270.00***	***$54.00***		

Biological Baseline Surveys and Monitoring

	Specification	Unit	No. Units	Labor rate	Frequency (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Land Manager	General condition monitoring and wildlife habitat assessment	Acres	420	$100.00	5	$21,000.00	$4,200.00	One visit annually to identify threats to habitat and species (comprehensive). ; 100 acres/day; 10 hour days (=10 acres/hour)	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 year period).
Plant Ecologist	Vegetation communities and invasive species mapping	Acres	420	$90.00	5	$25,200.00	$5,040.00	Baseline mapping of vegetation communities and invasive species; 7.5 acres/hour	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 year period).
Ornithologist	Coastal CA gnatcatcher	Acres	326	$90.00	2	$5,868.00	$1,173.60	Surveys every 3 years; 1 visit/survey; 100 ac/day; 10 hr days; 10 acres/hr; calculated for costal sage scrub habitat only. The inventory will include identifying threats to mitigated species, including cowbirds, starlings and ravens.	Formula: Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 year period)* number of visits per survey).
Surveyors	Data entry, analysis and reporting	N/A	N/A	N/A	N/A	$13,017.00	$2,603.40	(25%) * (total survey effort)	**Formula:** 25% of time spent for (general condition monitoring; mapping, and species surveys)
SUBTOTAL BIOLOGICAL MONITORING						***$65,085.00***	***$13,017.00***		

Habitat/Land Management

* or cost per unit

	Specification	Unit	No. Units	Labor rate*	Frequency (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Exotic Plant Control	Difficult to remove species (palms, Eucalyptus trees, artichoke thistle)	Acres	21	$64.00	5	$6,720.00	$1,344.00	25 acres/crew day; $1,600 per crew day (5 laborers/crew, $64/ hour labor cost; plus equipment cost); 5% of total property per year, total property acreage 705.86. Mowing, herbicide treatment, hand removal, debris removal, etc. Yearly treatment first 5 years.	**Formula:** Total Cost = (5% total acres/25 ac per crew day) * (labor cost per crew day) * (no. treatments in 5 year period).
Exotic Plant Control	Other species, labor	Acres	21	$45.00	5	$18,900.00	$3,780.00	Laborer; .25 acre/hour; 5% of total property per year. Cal-IPC high and moderate risk species.	**Formula:** Total Cost = (1% total acres/ac per hour) * (labor cost per hour) * (no. treatments in 5 year period).
Erosion Control	Materials	Acres	21	$600.00	1	$12,600.00	$2,520.00	Gravel bags (250 @ $1/bag), fiber rolls and stakes (12 @ $28/roll), silt fencing (500 ft @$25/100 ft roll) = $600/acre per 5 years, 5% property.	**Formula:** Total Cost = 5% total acres * cost per acre * no. treatments in 5 year period.
Erosion Control/ Road Maintenance	Labor	Acres	21	$45.00	5	$37,800.00	$7,560.00	Laborer; 8 hours/acre; 5% of property annually	**Formula:** Total Cost = (5% total acres) *8 hours/acre * labor cost per acre * no. treatments in 5 year period.
Trash Removal	Trash Hauling-load	Acres	4	$100	2.5	$1,000.00	$200.00	$100/acre every other year for 1% of total property	**Formula:** 1% total acres * cost per acre * frequency
Habitat Remediation	Minor habitat enhancement/restoration due to erosion, unauthorized access, etc.	Linear Ft.	21	$1,000	1	$21,000.00	$4,200.00	$1000/acre; 5% of total property per 5 years (eg. minor habitat remediation may include soil decompaction, seeding with native seeds by hand or with imprinter, raking, soil preparation, etc.). Preparation of a restoration plan and project management is not included in this cost.	**Formula:** Total Cost = (5% total acres)* cost/acre * (no. treatments in 5 year period).
Habitat Management - all tasks	Supervision by qualified biologist	L. Hours	10	$160.00	5	$8,000.00	$1,600.00	A qualified biologist will monitor management activities in areas occupied by, or suitable for, listed species.	**Formula:** Total Cost = (number of hours) *(labor cost per hour) * (annually for 5 year period).
SUBTOTAL BIOLOGICAL MANAGEMENT						***$106,020.00***	***$21,204.00***		

Plan/Reporting

	Specification	Unit	No. Units	Labor rate	Quantity (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Land Manager	Annual Reporting and Coordination	L. Hours	20	$100.00	5	$10,000.00	$2,000.00	Preparation of annual report, to include threats assessment, work plan, budget plan, and status of endowment.	**Formula:** hours * labor rate * frequency
Land Manager	Prepare and update management plan	L. Hours	40	$100.00	3	$12,000.00	$2,400.00	Using results from general condition monitoring and invasive species mapping, prepareand update management plan. Will include threats assessment, prioritization, and work plan. Assumes plan completed in year 3 and updated in years 4 and 5. Some interim land management will occur in years 1 and 2.	**Formula:** hours * labor rate * frequency
GIS Specialist	GIS Database Management and reporting	L. Hours	8	$90.00	5	$3,600.00	$720.00	Data management and produce figures for annual report.	**Formula:** hours * labor rate * frequency
SUBTOTAL REPORTING						***$25,600.00***	***$5,120.00***		

TOTAL	$196,975.00	$39,395.00

Contingencies/ Administration

	Total costs	% of Total				Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Contingencies	$196,975.00	10				$19,697.50	$3,939.50		
Administrative Overhead	$196,975.00	15				$29,546.25	$5,909.25	Accountants, technical, clerical, contract managers, lawyers, etc.	
SUBTOTAL CONTINGENCIES/ADMINISTRATION						***$49,243.75***	***$9,848.75***		

	Total Cost	Annual Cost (Total divided by 5 Yrs)
GRAND TOTAL	**$246,218.75**	**$49,243.75**

Lakeside Ranch Annual Cost In-Perpetuity

Facilities Maintenance/Access Control

	Specification	Unit	No. Units	Cost/Unit	Quantity	Total Annual Cost	Assumptions	Comments
Sign	Boundary 8" x 13.5	Item	2	$15.00	1	$30.00	Average cost for signs. Signs types: boundary, regulations, habitat restoration. Aprox. Five signs per property. Replacement at 20% per year or 2 sign per year.	**Formula:** Total Cost = (20% total number of signs per property) * (cost per sign) * (number of years installation is needed)
SUBTOTAL CAPITAL IMPROVEMENTS						***$30.00***		

Biological Monitoring

Note: in general, these estimates do not include travel time or field prep

	Specification	Unit	No. Units	Cost/Unit	Frequency	Total Cost	Assumptions	Comments
Land Manager	General condition monitoring and wildlife habitat assessment	Acres	420	$100.00	1	$4,200.00	One visit annually to identify threats to habitat and species (comprehensive). 100 acres/day; 10 hour days (=10 acres/hour)	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency).
Plant Ecologist	Update vegetation communities and invasive species mapping	Acres	420	$90.00	0.33	$1,663.20	Update mapping of vegetation communities and invasive species; 7.5 acres/hour. Once every three years.	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency).
Ornithologist	Coastal CA gnatcatcher	Acres	326	$90.00	0.33	$968.22	Surveys every 3 years; 1 visit/survey; 100 ac/day; 10 hr days 10 acres/hr; calculated for costal sage scrub habitat only. The inventory will include identifying threats to mitigated species, including cowbirds, starlings and ravens.	Formula: Total Cost = (total acres/acres per hour) * (labor cost per hour) * (survey frequency)
Surveyors	Data entry, and analysis	N/A	N/A	N/A	N/A	$1,457.86	25% of the total survey effort required for the property.	**Formula:** 25% of time spent for (general condition monitoring; mapping, and species surveys)
SUBTOTAL BIOLOGICAL MONITORING						***$8,289.28***		

Habitat/Land Management

	Specification	Unit	No. Units	Labor Rate	Frequency	Total Cost	Assumptions	
Exotic Plant Control	Difficult to remove species (palms, Eucalyptus trees, artichoke thistle)	Acres	21	$64.00	0.50	$672.00	25 acres/crew day; $1,600 per crew day (5 laborers/crew, $64/ hour labor cost; plus equipment cost); Mowing, herbicide treatment, hand removal, debris removal, etc. Treatment of 5% of property every other yr.	**Formula:** Total Cost = (5% total acres/25 ac per crew day) * (labor cost per crew day) * (frequency).
Exotic Plant Control	Other species, Removal by Laborers	Acres	21	$45.00	1	$3,780.00	Laborer; 0.25 acre/hour; 5% of total property per year. Cal-IPC high and moderate risk species.	**Formula:** Total Cost = (1% total acres/ac per hour) * (labor cost per hour) * (frequency).
Erosion Control/ Road Maintenance	Materials	Acres	4	$600.00	1	$2,400.00	Gravel bags (250 @ $1/bag), fiber rolls and stakes (12 @ $28/roll), silt fencing (500 ft @$25/100 ft roll) = $600/acre annually, 1% property.	**Formula:** Total Cost = 1% total acres * cost per acre * frequency.
Erosion Control	Labor	Acres	21	$45.00	1	$7,560.00	Laborer; 8 labor hours/acre; 5% of property annually	**Formula:** Total Cost = (5% total acres) * 8hours/acre * labor cost per acre * frequency
Trash Removal	Trash Hauling	Acres	4	$100.00	0.5	$200.00	$100/acre every other year for 1% of total property	**Formula:** 1% total acres * cost per acre * frequency
Habitat Remediation	Minor habitat enhancement/restoration due to erosion, unauthorized access, etc.	Acres	21	$300.00	1	$6,300.00	$300/acre; 5% of total property annually (eg. minor habitat remediation may include soil decompaction seeding with native seeds by hand or with imprinter, raking, soil preparation, etc.). Preparation of a restoration plan and project management is not included in this cost.	**Formula:** Total Cost = (5% total acres) * cost/acre *frequency
Habitat Management - all tasks	Supervision by qualified biologist	L. Hours	10	$160	1	$1,600.00	A qualified biologist will monitor management activities in areas occupied by, or suitable for, listed species.	**Formula:** Total Cost = (number of hours) *(labor cost per hour) * (frequency).
SUBTOTAL BIOLOGICAL MANAGEMENT						***$22,512.00***		

Plan/Reporting

	Specification	Unit	No. Units	Labor Rate	Frequency	Total Cost	Assumptions	Comments
Land Manager	Annual Reporting and Coordination	L. Hours	10	$100.00	1	$1,000.00	Preparation of annual report, to include threats assessment, work plan, budget plan, and status of endowment.	**Formula:** hours * labor rate * frequency
Land Manager	Update management plan	L. Hours	20	$100.00	1	$1,000.00	Using results from general condition monitoring and invasive species mapping, update management plan. Will include threats assessment, prioritization, and work plan. Update annually	**Formula:** hours * labor rate * frequency
GIS Specialist	GIS Database Management and reporting	L. Hours	4	$90.00	1	$360.00	Data management and produce figures for annual report.	**Formula:** hours * labor rate * frequency
SUBTOTAL REPORTING						***$2,360.00***		

TOTAL	$33,191.28

Contingencies/ Administration

	Total costs	% of Total				Total Cost	Assumptions	Comments
Contingencies	$33,191.28	10				$3,319.13		
Administrative Overhead	$33,191.28	15				$4,978.69	Accountants, technical, clerical, contract managers, lawyers, etc.	
SUBTOTAL CONTINGENCIES/ADMINISTRATION						***$8,297.82***		

GRAND TOTAL	**$41,489.09**

ENDOWMENT NEEDED	**$2,074,454.69**	Assume 5% return on investment and 3.0% inflation yearly

Hamlet Start Up Costs (First Five Years)

* Acreage for parcel is exclusive of substation

Facilities Maintenance/Access Control

	Specification	Unit	No. Units	Cost/Unit	Frequency (for 5 years)	Total 5-Yr Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Sign - initial installation	Boundary 8" x 13.5	Item	5	$15.00	1	$75.00	$15.00	Average cost for signs. Sign types: boundary, regulations, habitat restoration. One-time cost for initial installation (10 signs).	
Sign - replacement	Boundary 8" x 13.5	Item	1	$15.00	4	$60.00	$12.00	Average cost for signs. Sign types: boundary, regulations, habitat restoration. Replacement of 20% annually for the remaining 4 years.	
SUBTOTAL CAPITAL IMPROVEMENTS						***$135.00***	***$27.00***		

Biological Inventory (Baseline Surveys)

	Specification	Unit	No. Units	Labor rate	Frequency (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Land Manager	General condition monitoring and general wildlife habitat assessment	Acres	84.35	$100.00	5	$4,217.50	$843.50	One visit annually to identify threats to habitat and species (comprehensive). Total acreage = 84.35 ac.; 100 acres/day; 10 hour days (=10 acres/hour)	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 year period).
Plant Ecologist	Vegetation communities and invasive species mapping; species-specific habitat assessments	Acres	84.35	$90.00	5	$12,652.50	$2,530.50	Baseline mapping of vegetation communities and invasive species; habitat assessment for QCB and CAGN. To be conducted concurrently at 3 acres/hour. See comments for QCB and CAGN.	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 year period).
Surveyors	Data entry, analysis and reporting	N/A	N/A	N/A	N/A	$1,967.50	$393.50	(25%) * (total survey effort)	**Formula:** 25% of time spent for (general condition monitoring; mapping, and species surveys)
SUBTOTAL BIOLOGICAL MONITORING						***$18,837.50***	***$3,767.50***		

Habitat/Land Management

* or cost per unit

	Specification	Unit	No. Units	Labor rate*	Frequency (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Exotic Plant Control	Difficult to remove species (palms, Eucalyptus trees, artichoke thistle)	Acres	4	$64.00	1	$256.00	$51.20	25 acres/crew day; $1,600 per crew day (5 laborers/crew, $64/ hour labor cost; plus equipment cost); 5% of total property per year. Mowing, herbicide treatment, hand removal, debris removal, etc. One treatment during first 5 years.	**Formula:** Total Cost = (5% total acres/25 ac per crew day) * (labor cost per crew day) * (no. treatments in 5 year period).
Exotic Plant Control	Other species, labor	Acres	4	$45.00	5	$3,600.00	$720.00	Laborer; 0.25 acre/hour; 5% of total property per year. Cal-IPC high and moderate risk species.	**Formula:** Total Cost = (5% total acres/ac per hour) * (labor cost per hour) * (no. treatments in 5 year period).
Erosion Control	Materials	Acres	1	$600.00	5	$3,000.00	$600.00	Gravel bags (250 @ $1/bag), fiber rolls and stakes (12 @ $28/roll), silt fencing (500 ft @$25/100 ft roll) = $600/acre per 5 years, 1% property.	**Formula:** Total Cost = 5% total acres * cost per acre * no. treatments in 5 year period.
Erosion Control/ Trash Removal	Labor	Acres	5	$45.00	5	$9,000.00	$1,800.00	Laborer; 8 labor hours per acre; 5% of property per 5 years	**Formula:** Total Cost = (5% total acres)* (8 labor hours/acre) * labor
	Trash Hauling-load	Acres	4	$100	2	$800.00	$160.00	$100/acre every 3 years for 5% of total property	**Formula:** 5% total acres * cost per acre * frequency
Habitat Management - all tasks	Supervision by qualified biologist	L. Hours	5	$160.00	5	$4,000.00	$800.00	A qualified biologist will monitor management activities in areas occupied by, or suitable for, listed species.	**Formula:** Total Cost = (number of hours) *(labor cost per hour) * (annually for 5 year period).
SUBTOTAL BIOLOGICAL MANAGEMENT						***$20,656.00***	***$4,131.20***		

Plan/Reporting

	Specification	Unit	No. Units	Labor rate	Quantity (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Land Manager	Annual Reporting and Coordination	L. Hours	20	$100.00	5	$10,000.00	$2,000.00	Preparation of annual report, to include threats assessment, work plan, budget plan, and status of endowment.	**Formula:** Hours * labor rate * frequency.
Land Manager	Prepare and update management plan	L. Hours	30	$100.00	3	$9,000.00	$1,800.00	Using results from general condition monitoring and invasive species mapping, prepare and update management plan. Will include threats assessment, prioritization, and work plan. Assumes plan completed in year 3 and updated in years 4 and 5. Some interim land management will occur in years 1 and 2.	**Formula:** (hrs to creat report) * labor rate * frequency
GIS Specialist	GIS Database Management and reporting	L. Hours	8	$90.00	5	$3,600.00	$720.00	Data management and produce figures for annual report.	**Formula:** Hours * labor rate * frequency.
SUBTOTAL REPORTING						***$22,600.00***	***$4,520.00***		

TOTAL	$62,228.50	$12,445.70

Contingencies/ Administration

	Total costs	% of Total				Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Contingencies	$62,228.50	10				$6,222.85	$1,244.57		
Administrative Overhead	$62,228.50	15				$9,334.28	$1,866.86	Accountants, technical, clerical, contract managers, lawyers, etc.	
SUBTOTAL CONTINGENCIES/ADMINISTRATION						***$15,557.13***	***$3,111.43***		

	Total Cost	Annual Cost (Total divided by 5 Yrs)
GRAND TOTAL	**$77,785.63**	**$15,557.13**

Hamlet Annual Cost In-Perpetuity

Facilities Maintenance/Access Control

	Specification	Unit	No. Units	Cost/Unit	Quantity	Total Annual Cost	Assumptions	Comments
Sign	Boundary 8" x 13.5	Item	1	$15.00	1	$15.00	Average cost for signs. Signs types: boundary, regulations, habitat restoration. Aprox. Five signs per property. Replacement at 20% per year or 1 sign per year.	**Formula:** Total Cost = (20% total number of signs per property) * (cost per sign) * (number of years installation is needed)
SUBTOTAL CAPITAL IMPROVEMENTS						***$15.00***		

Biological Monitoring

Note: in general, these estimates do not include travel time or field prep

	Specification	Unit	No. Units	Cost/Unit	Frequency	Total Cost	Assumptions	Comments
Land Manager	General condition monitoring and general wildlife habitat assessment	Acres	84.35	$100.00	1	$843.50	One visit annually to identify threats to habitat and species (comprehensive). Total acreage = 705.86 ac.; 100 acres/day; 10 hour days (=10 acres/hour)	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency).
Plant Ecologist	Update vegetation communities and invasive species mapping; species-specific habitat assessments	Acres	84.35	$90.00	0.33	$334.03	Update mapping of vegetation communities and invasive species every three years. Habitat assessment for QCB and CAGN will be conducted concurrently; 3 acres/hour. See comments for QCB and CAGN.	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency).
Surveyors	Data entry, and analysis	N/A	N/A	N/A	N/A	$44.38	25% of the total survey effort required for the property.	**Formula:** 25% of time spent for (general condition monitoring; mapping, and species surveys)
SUBTOTAL BIOLOGICAL MONITORING						***$1,221.91***		

Habitat/Land Management

	Specification	Unit	No. Units	Labor Rate	Frequency	Total Cost	Assumptions	
Exotic Plant Control	Difficult to remove species (palms, Eucalyptus trees, artichoke thistle)	Acres	4	$64.00	0.20	$51.20	25 acres/crew day; $1,600 per crew day (5 laborers/crew, $64/ hour labor cost; plus equipment cost); 5% of total property per year. Mowing, herbicide treatment, hand removal, debris removal, etc. Treatment every 5 yrs.	**Formula:** Total Cost = (5% total acres/25 ac per crew day) * (labor cost per crew day) * (frequency).
Exotic Plant Control	Other species, Removal by Laborers	Acres	4	$45.00	1	$180.00	Laborer; 0.25 acre/hour; 5% of total property per year. Cal-IPC high and moderate risk species.	**Formula:** Total Cost = (5% total acres/ac per hour) * (labor cost per hour) * (frequency).
Erosion Control	Materials	Acres	1	$600.00	1	$600.00	Gravel bags (250 @ $1/bag), fiber rolls and stakes (12 @ $28/roll), silt fencing (500 ft @$25/100 ft roll) = $600/acre per 5 years, 1% property.	**Formula:** Total Cost = 5% total acres * cost per acre * no. treatments in 5 year period.
Erosion Control/ Road Maintenance	Labor	Acres	5	$45.00	1	$1,800.00	Laborer; 8 labor hours per acre; 5% of property per 5 years	**Formula:** Total Cost = (5% total acres)* (8 labor hours/acre) * labor cost per hour * no. treatments in 5 year period.
Trash Removal	Trash Hauling	Acres	4	$100.00	0.33	$132.00	$100/acre every 3 years for 5% of total property	**Formula:** 1% total acres * cost per acre * frequency
Habitat Management - all tasks	Supervision by qualified biologist	L. Hours	5	$160	1	$800.00	A qualified biologist will monitor management activities in areas occupied by, or suitable for, listed species.	**Formula:** Total Cost = (number of hours) *(labor cost per hour) * (frequency).
SUBTOTAL BIOLOGICAL MANAGEMENT						***$2,763.20***		

Plan/Reporting

	Specification	Unit	No. Units	Labor Rate	Frequency	Total Cost	Assumptions	Comments
Land Manager	Annual Reporting and Coordination	L. Hours	10	$100.00	1	$1,000.00	Preparation of annual report, to include threats assessment, work plan, budget plan, and status of endowment.	**Formula:** Hours * labor rate * frequency
Land Manager	Update management plan	L. Hours	10	$100.00	1	$1,000.00	Using results from general condition monitoring and invasive species mapping, update management plan. Will include threats assessment, prioritization, and work plan. Update annually.	**Formula:** Hours * labor rate * frequency
GIS Specialist	GIS Database Management and reporting	L. Hours	4	$90.00	1	$360.00	Data management and produce figures for annual report.	**Formula:** Hours * labor rate * frequency
SUBTOTAL REPORTING						***$2,360.00***		

TOTAL	$6,360.11

Contingencies/ Administration

	Total costs	% of Total				Total Cost	Assumptions	Comments
Contingencies	$6,360.11	10				$636.01		
Administrative Overhead	$6,360.11	15				$954.02	Accountants, technical, clerical, contract managers, lawyers, etc.	
SUBTOTAL CONTINGENCIES/ADMINISTRATION						***$1,590.03***		

GRAND TOTAL	**$7,950.13**	
ENDOWMENT NEEDED	**$397,506.72**	Assume 5% return on investment and 3.0% inflation yearly

El Capitan Start Up Costs (First Five Years)

* Acreage for parcel is exclusive of substation

Facilities Maintenance/Access Control

	Specification	Unit	No. Units	Cost/Unit	Frequency (for 5 years)	Total 5-Yr Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Sign - initial installation	Boundary 8" x 13.5	Item	10	$15.00	1	$150.00	$30.00	Average cost for signs. Sign types: boundary, regulations, habitat restoration. One-time cost for initial installation (5 signs).	
Sign - replacement	Boundary 8" x 13.5	Item	2	$15.00	4	$120.00	$24.00	Average cost for signs. Sign types: boundary, regulations, habitat restoration. Replacement of 20% annually for the remaining 4 years	
SUBTOTAL CAPITAL IMPROVEMENTS						***$270.00***	***$54.00***		

Biological Inventory (Baseline Surveys)

	Specification	Unit	No. Units	Labor rate	Frequency (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Land Manager	General condition monitoring and wildlife habitat assessment	Acres	381.4	$100.00	5	$19,070.00	$3,814.00	One visit annually to identify threats to habitat and species (comprehensive). 100 acres/day; 10 hour days (=10 acres/hour)	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 year period).
Plant Ecologist	Mapping of vegetation communities and invasive species; habitat assessment	Acres	381.4	$90.00	5	$49,037.14	$9,807.43	Baseline mapping of vegetation communities and invasive species; assessment of eagle nesting and foraging habitat; to be conducted concurrently; 3.5 acres/hour. Once during the start-up.	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 year period).
Botanist	Lakeside Ceanothus	L. Hours	30	$90.00	2	$5,400.00	$1,080.00	Monitoring for known populations will be conducted two times during the start up period to assess the condition of the property, level of seedling recruitment, threats to the populations, and condition of the surrounding habitat. Surveys are expected to take approximately 30 hours.	**Formula:** Total Cost = (Total number of hours) * (labor cost per hour) * (number of surveys in 5 year period).
Surveyor	Data entry, analysis and reporting	N/A	N/A	N/A	N/A	$18,376.79	$3,675.36	(25%) * (total survey effort)	**Formula:** 25% of time spent for (general condition monitoring; mapping, and species surveys)
SUBTOTAL BIOLOGICAL MONITORING						***$91,883.93***	***$18,376.79***		

Habitat/Land Management

	Specification	Unit	No. Units	Labor rate	Frequency (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Exotic Plant Control	Difficult to remove species (palms, Eucalyptus trees, artichoke thistle)	Crew day	1	$1,600.00	5	$8,000.00	$1,600.00	$1,600 per crew day (5 laborers/crew, $64/ hour labor cost; plus equipment cost); One crew day per year. Mowing, herbicide treatment, hand removal, debris removal, etc. Annual treatment first 5 years.	**Formula:** Total Cost = (crew days) * (labor cost per crew day) * (no. treatments in 5 year period).
Exotic Plant Control	Other species, labor	Acres	19	$45.00	5	$17,100.00	$3,420.00	Laborer; 0.25 acre/hour; 5% of total property per year; total property acreage 381.4. Cal-IPC high and moderate risk species.	**Formula:** Total Cost = (5% total acres/ac per hour) * (labor cost per hour) * (no. treatments in 5 year period).
Erosion Control	Materials	Acres	4	$600.00	1	$2,400.00	$480.00	Gravel bags (250 @ $1/bag), fiber rolls and stakes (12 @ $28/roll), silt fencing (500 ft @$25/100 ft roll) = $600/acre per 5 years, 1% property.	**Formula:** Total Cost = 1% total acres * cost per acre * no. treatments in 5 year period.
Erosion Control/	Labor	Acres	19	$45.00	5	$34,200.00	$6,840.00	Laborer; 8 labor hours per acre; 5% of property per 5 years	**Formula:** Total Cost = (5% total acres)* (8 labor hours/acre) * labor
Habitat Remediation	Minor habitat enhancement due to erosion, unauthorized access, etc.	Linear Ft.	4	$300	1	$1,200.00	$240.00	$300/acre; 1% property per 5 years (eg. minor habitat remediation may include seeding with native seeds, raking, soil preparation, etc.).	**Formula:** Total Cost = (1% total acres/acres per hr) * (cost per hr) * no. treatments in 5 year period.
Habitat Management - all tasks	Supervision by qualified biologist	L. Hours	10	$160.00	5	$8,000.00	$1,600.00	A qualified biologist will monitor management activities in areas occupied by, or suitable for, listed species.	**Formula:** Total Cost = (number of hours) *(labor cost per hour) * (annually for 5 year period).
SUBTOTAL BIOLOGICAL MANAGEMENT						***$70,900.00***	***$14,180.00***		

Plan/Reporting

	Specification	Unit	No. Units	Labor rate	Quantity (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Land Manager	Annual Reporting and Coordination	L. Hours	20	$100.00	5	$10,000.00	$2,000.00	Preparation of annual report, to include threats assessment, work plan, budget plan, and status of endowment.	**Formula:** Hours * labor rate * frequency.
Land Manager	Prepare and update management plan	L. Hours	40	$100.00	3	$12,000.00	$2,400.00	Using results from general condition monitoring and invasive species mapping, prepare and update management plan. Will include threats assessment, prioritization, and work plan. Assumes plan completed in year 3 and updated in years 4 and 5. Some interim land management will occur in years 1 and 2.	**Formula:** (hrs to create plan * labor rate * (frequency).
GIS Specialist	GIS Database Management and reporting	L. Hours	8	$90.00	5	$3,600.00	$720.00	Data management and produce figures for annual report.	**Formula:** Hours * labor rate * frequency.
SUBTOTAL REPORTING						***$25,600.00***	***$5,120.00***		

TOTAL	$188,653.93	$37,730.79

Contingencies/ Administration	Total costs	% of Total				Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Contingencies	$188,653.93	10				$18,865.39	$3,773.08		
Administrative Overhead	$188,653.93	15				$28,298.09	$5,659.62	Accountants, technical, clerical, contract managers, lawyers, etc.	
SUBTOTAL CONTINGENCIES/ADMINISTRATION						***$47,163.48***	***$9,432.70***		

	Total Cost	Annual Cost (Total divided by 5 Yrs)	
GRAND TOTAL	**$235,817.41**	**$47,163.48**	

El Capitan Annual Cost In-Perpetuity

Facilities Maintenance/Access Control

	Specification	Unit	No. Units	Cost/Unit	Quantity	Total Annual Cost	Assumptions	Comments
Sign	Boundary 8" x 13.5	Item	2	$15.00	1	$30.00	Average cost for signs. Signs types: boundary, regulations, habitat restoration. Aprox. Five signs per property. Replacement at 20% per year or 2 sign per year.	
SUBTOTAL CAPITAL IMPROVEMENTS						***$30.00***		

Biological Monitoring

Note: in general, these estimates do not include travel time or field prep

	Specification	Unit	No. Units	Cost/Unit	Frequency	Total Cost	Assumptions	Comments
Land Manager	General condition monitoring and wildlife habitat assessment	Acres	381.4	$100.00	1	$3,814.00	One visit annually to identify threats to habitat and species (comprehensive). Total acreage = 381.4 ac.; 100 acres/day; 10 hour days (=10 acres/hour)	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 yr period).
Plant Ecologist	Update mapping of vegetation communities and invasive species; habitat assessments	Acres	381.4	$90.00	0.33	$3,236.45	Revise mapping of vegetation communities and assessment of eagle nesting and foraging habitat; 3.5 acres/hour. Once every 3 years.	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency).
Surveyors	Data entry, analysis and reporting	N/A	N/A	N/A	N/A	$1,762.61	(25%) * Data entry and reporting effort estimated at aproximately 25% of the total survey effort required for the property.	**Formula:** 25% of time spent for (general condition monitoring; mapping, and species surveys)
SUBTOTAL BIOLOGICAL MONITORING						***$8,813.06***		

Habitat/Land Management

	Specification	Unit	No. Units	Labor Rate	Frequency	Total Cost	Assumptions	Comments
Exotic Plant Control	Difficult to remove species (palms, Eucalyptus trees, artichoke thistle)	Acres	1	$1,600.00	1	$800.00	$1,600 per crew day (5 laborers/crew, $64/ hour labor cost; plus equipment cost); one crew day per treatment area. Mowing, herbicide treatment, hand removal, debris removal, etc. Treatment every other year.	**Formula:** Total Cost = (Crew days) * (labor cost per crew day) * (frequency).
Erosion Control	Materials	Acres	4	$600.00	1	$2,400.00	Gravel bags (250 @ $1/bag), fiber rolls and stakes (12 @ $28/roll), silt fencing (500 ft @$25/100 ft roll) = $600/acre per 5 years, 1% property.	**Formula:** Total Cost = 1% total acres * cost per acre * no. treatments in 5 year period.
Erosion Control/ Road Maintenance	Labor	Acres	19	$45.00	1	$6,840.00	Laborer; 8 labor hours per acre; 5% of property per 5 years	**Formula:** Total Cost = (5% total acres)* (8 labor hours/acre) * labor cost per hour * no. treatments in 5 year period.
Habitat Management - all tasks	Supervision by qualified biologist	L. Hours	5	$160	1	$800.00	A qualified biologist will monitor management activities in areas occupied by, or suitable for, listed species.	**Formula:** Total Cost = (number of hours) *(labor cost per hour) * (annually for 5 year period).
SUBTOTAL BIOLOGICAL MANAGEMENT						***$10,840.00***		

Plan/Reporting

	Specification	Unit	No. Units	Labor Rate	Frequency	Total Cost	Assumptions	Comments
Land Manager	Annual Reporting and Coordination	L. Hours	10	$100.00	1	$1,000.00	Preparation of annual report, to include threats assessment, work plan, budget plan, and status of endowment.	**Formula:** Hours * labor rate * frequency.
Land Manager	Update management plan	L. Hours	20	$100.00	1	$2,000.00	Using results from general condition monitoring and invasive species mapping, update management plan. Will include threats assessment, prioritization, and work plan. Update annually.	**Formula:** (hrs to create plan *(labor rate) * (frequency).
GIS Specialist	GIS Database Management and reporting	L. Hours	4	$90.00	1	$360.00	Data management and produce figures for annual report.	**Formula:** Hours * labor rate * frequency.
SUBTOTAL REPORTING						***$3,360.00***		

TOTAL	$23,043.06

Contingencies/ Administration

	Total costs	% of Total				Total Cost	Assumptions	Comments
Contingencies	$23,043.06	10				$2,304.31		
Administrative Overhead	$23,043.06	15				$3,456.46	Accountants, technical, clerical, contract managers, lawyers, etc.	
SUBTOTAL CONTINGENCIES/ADMINISTRATION						***$5,760.77***		

GRAND TOTAL	**$28,803.83**	
ENDOWMENT NEEDED	**$1,440,191.52**	Assume 5% return on investment and 3.0% inflation yearly

Chocolate Canyon Start Up Costs (First Five Years)

* Acreage for parcel is exclusive of substation

Facilities Maintenance/Access Control

	Specification	Unit	No. Units	Cost/Unit	Frequency (for 5 years)	Total 5-Yr Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Vehicle Barrier	Concrete Bollards	Item	4	$75.00	1	$300.00	$60.00	Targeted for access points into the preserve. 4 bollards per gate	
Gates	16 ft. Swinging Arm	Item	1	$5,000.00	1	$5,000.00	$1,000.00	Targeted for access points into the preserve.	
Sign - initial installation	Boundary 8" x 13.5	Item	15	$15.00	1	$225.00	$45.00	Average cost for signs. Sign types: boundary, regulations, habitat restoration. One-time cost for initial installation.	
Sign - replacement	Boundary 8" x 13.5	Item	3	$15.00	4	$180.00	$36.00	Average cost for signs. Sign types: boundary, regulations, habitat restoration. Replacement of 20% annually for the remaining 4 years (3 sign per year).	
SUBTOTAL CAPITAL IMPROVEMENTS						***$5,705.00***	***$1,141.00***		

Biological Baseline Surveys and Monitoring

	Specification	Unit	No. Units	Labor rate	Frequency (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Land Manager	General condition monitoring and wildlife habitat assessment	Acres	95	$100.00	5	$4,750.00	$950.00	One visit annually to identify threats to habitat and species (comprehensive). Total acreage = 95.47 ac.; 100 acres/day; 10 hour days (=10 acres/hour)	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 year period).
Plant Ecologist	Mapping of vegetation communities and invasive species; habitat assessments	Acres	95	$90.00	5	$14,250.00	$2,850.00	Baseline mapping of vegetation communities and invasive species; habitat assessment for CAGN, LBV and SWFL; all to be conducted concurrently; 3 acres/hour	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 year period).
Ornithologist	SWF + LBV	Acres	14	$90.00	9	$3,780.00	$756.00	Surveys every 3 years; 3 visits/survey; 3 acres/hr; calculated for suitable habitat only. The inventory will include identifying threats to mitigated species, including cowbirds, starlings and ravens.	**Formula:** Total Cost = acres of habitat/acres per hour) * (labor cost per hour) * (number of visits per survey * survey frequency).
Surveyor	Data entry, analysis and reporting	N/A	N/A	N/A	N/A	$5,695.00	$1,139.00	(25%) * (total survey effort)	**Formula:** 25% of time spent for (general condition monitoring; mapping, and species surveys)
SUBTOTAL BIOLOGICAL MONITORING						***$28,475.00***	***$5,695.00***		

Habitat/Land Management

* or cost per unit

	Specification	Unit	No. Units	Labor rate*	Frequency (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Exotic Plant Control	Difficult to remove species (palms, Eucalyptus trees, artichoke thistle)	Acres	10	$64.00	5	$3,200.00	$640.00	25 acres/crew day; $1,600 per crew day (5 laborers/crew, $64/ hour labor cost; plus equipment cost); 10% of total property per year. Mowing, herbicide treatment, hand removal, debris removal, etc. Yearly treatment first 5 years.	**Formula:** Total Cost = (10% total acres/25 ac per crew day) * (labor cost per crew day) * (no. treatments in 5 year period).
Exotic Plant Control	Other species, labor	Acres	10	$45.00	5	$9,000.00	$1,800.00	Laborer; 0.25 ac/hr; 10% of total property per year. Cal-IPC high and moderate risk species.	**Formula:** Total Cost = (10% total acres/ac per hour) * (labor cost per hour) * (no. treatments in 5 year period).
Erosion Control	Materials	Acres	5	$600.00	1	$3,000.00	$600.00	Gravel bags (250 @ $1/bag), fiber rolls and stakes (12 @ $28/roll), silt fencing (500 ft @$25/100 ft roll) = $600/acre per 5 years, 5% property.	**Formula:** Total Cost = 5% total acres * cost per acre * no. treatments in 5 year period.
Erosion Control/ Road Maintenance	Labor	Acres	5	$45.00	5	$9,000.00	$1,800.00	Laborer; 8 labor hrs/acre; 5% of property per 5 years	**Formula:** Total Cost = (5% total acres)*8 hrs/ac * labor cost * no. treatments in 5 year period.
Trash Removal	Trash Hauling-load	Acres	5	$100	1	$500.00	$100.00	$100/acre every 5 years for 5% of total property	**Formula:** 5% total acres * cost per acre * frequency
Habitat Remediation	Minor habitat enhancement due to erosion, unauthorized access, etc.	Linear Ft.	5	$300	1	$306.00	$61.20	$300; 5% of total property per 5 years (eg. minor habitat remediation may include seeding with native seeds, raking, soil preparation, etc.). Preparation of a restoration plan and project management is not included in this cost.	**Formula:** Total Cost = (5% total acres/acres per hr) * (cost per hr) * no. treatments in 5 year period.
Habitat Management - all tasks	Supervision by qualified biologist	L. Hours	5	$160.00	5	$4,000.00	$800.00	A qualified biologist will monitor management activities in areas occupied by, or suitable for, listed species.	**Formula:** Total Cost = (number of hours) *(labor cost per hour) * (annually for 5 year period).
SUBTOTAL BIOLOGICAL MANAGEMENT						***$29,006.00***	***$5,801.20***		

Plan/Reporting

	Specification	Unit	No. Units	Labor rate	Quantity (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Land Manager	Annual Reporting and Coordination	L. Hours	20	$100.00	5	$10,000.00	$2,000.00	Preparation of annual report, to include threats assessment, work plan, budget plan, and status of endowment.	**Formula:** total hours * labor rate * frequency
Land Manager	Prepare and update management plan	L. Hours	30	$100.00	3	$9,000.00	$1,800.00	Using results from general condition monitoring and invasive species mapping, prepare and update management plan. Will include threats assessment, prioritization, and work plan. Assumes plan completed in year 3 and updated in years 4 and 5. Some interim land management will occur in years 1 and 2.	**Formula:** (hrs to creat plan * labor rate * frequency.
GIS Specialist	GIS Database Management and reporting	L. Hours	8	$90.00	5	$3,600.00	$720.00	Data management and produce figures for annual report.	**Formula:** total hours * labor rate * frequency
SUBTOTAL REPORTING						***$22,600.00***	***$4,520.00***		

TOTAL	$85,786.00	$17,157.20

Contingencies/ Administration

	Total costs	% of Total				Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Contingencies	$85,786.00	10				$8,578.60	$1,715.72		
Administrative Overhead	$85,786.00	15				$12,867.90	$2,573.58	Accountants, technical, clerical, contract managers, lawyers, etc.	
SUBTOTAL CONTINGENCIES/ADMINISTRATION						***$21,446.50***	***$4,289.30***		

	Total Cost	Annual Cost (Total divided by 5 Yrs)
GRAND TOTAL	**$107,232.50**	**$21,446.50**

Chocolate Canyon Annual Cost In-Perpetuity

Facilities Maintenance/Access Control

	Specification	Unit	No. Units	Cost/Unit	Quantity	Total Annual Cost	Assumptions	Comments
Vehicle Barrier	Concrete Bollards	Linear Ft.	4	$75.00	0.1	$30.00	Targeted for access points into the preserve. 3 bollards per gate. To be replaced every 10 years.	
Gates	16 ft. Swinging Arm	Item	1	$5,000.00	0.05	$250.00	Targeted for access points into the preserve. To be replaced every 20 years.	
Sign	Boundary 8" x 13.5	Item	3	$15.00	1	$45.00	Average cost for signs. Signs types: boundary, regulations, habitat restoration. Aprox. Five signs per property. Replacement at 20% per year or 3 signs per year.	
SUBTOTAL CAPITAL IMPROVEMENTS						***$325.00***		

Biological Monitoring

Note: in general, these estimates do not include travel time or field prep

	Specification	Unit	No. Units	Cost/Unit	Frequency	Total Cost	Assumptions	Comments
Land Manager	General condition monitoring and wildlife habitat assesssment	Acres	76	$100.00	1	$760.00	One visit annually to identify threats to habitat and species (comprehensive). Total acreage = 95.47 ac.; 100 acres/day; 10 hour days (=10 acres/hour)	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency).
Plant Ecologist	Update vegetation communities and invasive species mapping	Acres	76	$90.00	0.33	$300.96	update mapping of vegetation communities and invasive species; 7.5 acres/hour. Once every three years.	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency).
Ornithologist	SWF + LBV	Acres	14	$90.00	1	$420.00	Surveys every 3 years. 3 visits/survey; 3 acres/hr; calculated for CSS only. The inventory will include identifying threats to mitigated species, including cowbirds, starlings and ravens.	**Formula:** Total Cost = acres of habitat/acres per hour) * (labor cost per hour) * (number of visits per survey * survey frequency), where frequency = 3 visits every 3 years (3 * 0.33)
Surveyor	Data entry, analysis and reporting	N/A	N/A	N/A	N/A	$370.24	(25%) * Data entry and reporting effort estimated at aproximately 25% of the total survey effort required for the property.	**Formula:** 25% of time spent for (general condition monitoring; mapping, and species surveys)
SUBTOTAL BIOLOGICAL MONITORING						***$1,851.20***		

Habitat/Land Management

	Specification	Unit	No. Units	Labor Rate	Frequency	Total Cost	Assumptions	
Exotic Plant Control	Difficult to remove species (palms, Eucalyptus trees, artichoke thistle)	Acres	10	$64.00	0.20	$128.00	25 acres/crew day; $1,600 per crew day (5 laborers/crew, $64/ hour labor cost; plus equipment cost); 10% of total property per year. Mowing, herbicide treatment, hand removal, debris removal, etc. Treatment every 5 yrs.	**Formula:** Total Cost = (10% total acres/25 ac per crew day) * (labor cost per crew day) * (frequency).
Exotic Plant Control	Other species, Removal by Laborers	Acres	5	$45.00	1	$900.00	Laborer; 0.25 acre/hour; 5% of total property per year. Cal-IPC high and moderate risk species.	**Formula:** Total Cost = (5% total acres/ac per hour) * (labor cost per hour) * (frequency).
Erosion Control	Materials	Acres	1	$600.00	1	$600.00	Gravel bags (250 @ $1/bag), fiber rolls and stakes (12 @ $28/roll), silt fencing (500 ft @$25/100 ft roll) = $600/acre per 5 years, 1% property.	**Formula:** Total Cost = 1% total acres * cost per acre * frequency.
Erosion Control/ Road Maintenance	Labor	Acres	5	$45.00	1	$1,800.00	Laborer; 8 labor hrs/ac; 5% of property per 5 years	**Formula:** Total Cost = (5% total acresr) * 8 hrs/ac* labor cost per acre * frequency
Trash Removal	Trash Hauling	Acres	5	$100.00	1	$500.00	$100/acre annually for 5% of total property	**Formula:** 5% total acres * cost per acre * frequency
Habitat Remediation	Minor habitat enhancement due to erosion, unauthorized access, etc.	Acre	5	$300.00	0.20	$305.20	$300/acre; 5% of total property per 5 years (eg. minor habitat remediation may include seeding with native seeds, raking, soil preparation, etc.). Preparation of a restoration plan and project management is not included in this cost.	**Formula:** Total Cost = (5% total acres/acres per hr) * (cost per hr) * frequency
Habitat Management - all tasks	Supervision by qualified biologist	L. Hours	5	$160	1	$800.00	A qualified biologist will monitor management activities in areas occupied by, or suitable for, listed species.	**Formula:** Total Cost = (number of hours) *(labor cost per hour) * (frequency).
SUBTOTAL BIOLOGICAL MANAGEMENT						***$5,033.20***		

Plan/Reporting

	Specification	Unit	No. Units	Labor Rate	Frequency	Total Cost	Assumptions	Comments
Land Manager	Annual Reporting and Coordination	L. Hours	10	$100.00	1	$1,000.00		**Formula:** total hours * labor rate * frequency
Land Manager	Update management plan	L. Hours	10	$100.00	1	$1,000.00	Using results from general condition monitoring and invasive species mapping, update management plan. Will include threats assessment, prioritization, and work plan. Update annually.	**Formula:** total hrs * labor rate * frequency
GIS Specialist	GIS Database Management and reporting	L. Hours	4	$90.00	1	$360.00		**Formula:** total hours * labor rate * frequency
SUBTOTAL REPORTING						***$2,360.00***		

TOTAL	$9,569.40

Contingencies/ Administration

	Total costs	% of Total				Total Cost	Assumptions	Comments
Contingencies	$9,569.40	10				$956.94		
Administrative Overhead	$9,569.40	15				$1,435.41	Accountants, technical, clerical, contract managers, lawyers, etc.	
SUBTOTAL CONTINGENCIES/ADMINISTRATION						***$2,392.35***		

GRAND TOTAL	**$11,961.75**	
ENDOWMENT NEEDED	**$598,087.50**	Assume 5% return on investment and 3.0% inflation yearly

Lightner Start Up Costs (First Five Years)

* Acreage for parcel is exclusive of substation

Facilities Maintenance/Access Control

	Specification	Unit	No. Units	Cost/Unit	Frequency (for 5 years)	Total 5-Yr Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Fencing	Smooth strand wire or chain link	Linear Ft.	100	$15.00	1	$1,500.00	$300.00	initial installation of 100 linear feet	
Vehicle Barrier	Concrete Bollards	Item	4	$75.00	1	$300.00	$60.00	Targeted for access points into the preserve. 4 bollards per gate	
Gates	16 ft. Swinging Arm	Item	1	$5,000.00	1	$5,000.00	$1,000.00	Targeted for access points into the preserve.	
Sign - initial installation	Boundary 8" x 13.5	Item	10	$15.00	1	$150.00	$30.00	Average cost for signs. Sign types: boundary, regulations, habitat restoration. One-time cost for initial installation (10 signs).	
Sign - replacement	Boundary 8" x 13.5	Item	2	$15.00	4	$120.00	$24.00	Average cost for signs. Sign types: boundary, regulations, habitat restoration. Replacement of 20% annually for the remaining 4 years.	
SUBTOTAL CAPITAL IMPROVEMENTS						***$7,070.00***	***$1,414.00***		

Biological Inventory (Baseline Surveys)

	Specification	Unit	No. Units	Labor rate	Frequency (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Land Manager	General condition monitoring and wildlife habitat assessment	Acres	705.86	$100.00	5	$35,293.00	$7,058.60	One visit annually to identify threats to habitat and species (comprehensive). 100 acres/day; 10 hour days (=10 acres/hour)	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 year period).
Plant Ecologist	Vegetation communities and Invasive species mapping	Acres	705.86	$90.00	5	$42,351.60	$8,470.32	Baseline mapping of vegetation communities and invasive species; 7.5 acres/hour; to be updated annually	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 year period).
Botanist	Felt-leaved monardella	L. Hours	10	$90.00	2	$1,800.00	$360.00	Survey populations of felt-leaved monardella in two locations twice during start-up period; assess the condition of the population and surrounding habitat. Estimated time: 10 hours, including travel.	
Entomologist	Quino checkerspot/hermes butterflies	Acres	22.5	$90.00	3	$18,225.00	$3,645.00	Surveys for Quino and Hermes butterflies will be conducted by walking transects during 5 weekly visit; 3 hrs per visit; every other year	**Formula:** Total Cost = (total acres) * (labor cost per hour) * hrs/visit* (number of survey visits in 5 year period).
Surveyors	Data entry, analysis and reporting	N/A	N/A	N/A	N/A	$24,417.40	$4,883.48	(25%) * (total survey effort)	**Formula:** 25% of time spent for (general condition monitoring; mapping, and species surveys)
SUBTOTAL BIOLOGICAL MONITORING						***$122,087.00***	***$24,417.40***		

Habitat/Land Management

* or cost per unit

	Specification	Unit	No. Units	Labor rate*	Frequency (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Exotic Plant Control	Difficult to remove species (palms, Eucalyptus trees, artichoke thistle)	Acres	35	$64.00	5	$11,200.00	$2,240.00	25 acres/crew day; $1,600 per crew day (5 laborers/crew, $64/ hour labor cost; plus equipment cost); 5% of total property. Mowing, herbicide treatment, hand removal, debris removal, etc. Yearly treatment first 5 years.	**Formula:** Total Cost = (5% total acres/25 ac per crew day) * (labor cost per crew day) * (no. treatments in 5 year period).
Exotic Plant Control	Other species, labor	Acres	35	$45.00	5	$31,500.00	$6,300.00	$45/hour for each laborer; 0.25 acre/hour; 5% of total property per year. Cal-IPC high and moderate risk species.	**Formula:** Total Cost = (5% total acres/0.25 ac per hour) * (labor cost per hour) * (no. treatments in 5 year period).
Erosion Control	Materials	Acres	14	$600.00	1	$8,400.00	$1,680.00	Gravel bags (250 @ $1/bag), fiber rolls and stakes (12 @ $28/roll), silt fencing (500 ft @$25/100 ft roll) = $600/acre per 5 years, 2% property.	**Formula:** Total Cost = 2% total acres * cost per acre * no. treatments in 5 year period.
Erosion Control/ Road Maintenance	Labor	Acres	35	$45.00	5	$63,000.00	$12,600.00	$45/hour for each laborer; 8 labor hours/acre; 5% of property per 5 years	**Formula:** Total Cost = (5% total acres/acres per hr) * labor cost per acre * no. treatments in 5 year period.
Trash Removal	Trash Hauling-load	Acres	7	$100	1	$700.00	$140.00	$100/acre every 5 years for 1% of total property	**Formula:** 1% total acres * cost per acre * frequency
Habitat Remediation	Minor habitat restoration of decommissioned roads and degraded areas.	Acres	14	$1,000	1	$14,000.00	$2,800.00	$1000/acre; 2% of total property per 5 years (eg. minor habitat remediation may include soil decompacting, seeding with native seeds by hand or imprinting, raking, soil preparation, etc.). Includes labor cost and materials. Preparation of a restoration plan and project management is not included in this cost.	**Formula:** Total Cost = (2% total acresr) * (cost per acre) * no. treatments in 5 year period.
Habitat Management - all tasks	Supervision by qualified biologist	L. Hours	10	$160.00	5	$8,000.00	$1,600.00	A qualified biologist will monitor management activities in areas occupied by, or suitable for, listed species. Approximately 10 hours annually.	**Formula:** Total Cost = (number of hours) *(labor cost per hour) * (annually for 5 year period).
SUBTOTAL BIOLOGICAL MANAGEMENT						***$136,800.00***	***$27,360.00***		

Plan/Reporting

	Specification	Unit	No. Units	Labor rate	Quantity (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Land Manager	Annual Reporting and Coordination	L. Hours	20	$100.00	5	$10,000.00	$2,000.00	Preparation of annual report, to include threats assessment, work plan, budget plan, and status of endowment.	**Formula:** hrs to prepare report * labor rate * frequency
Land Manager	Prepare and update management plan	L. Hours	40	$100.00	3	$12,000.00	$2,400.00	Using results from general condition monitoring and invasive species mapping, prepare and update management plan. Will include threats assessment, prioritization, and work plan. Assumes plan completed in year 3 and updated in years 4 and 5. Some interim land management will occur in years 1 and 2.	**Formula:** hrs to prepare plan * labor rate * frequency
GIS Specialist	GIS Database Management and reporting	L. Hours	8	$90.00	5	$3,600.00	$720.00	Data management and produce figures for annual report.	**Formula:** hrs required for GIS work * labor rate * frequency
SUBTOTAL REPORTING						***$25,600.00***	***$5,120.00***		

TOTAL	$291,557.00	$58,311.40

Contingencies/ Administration

	Total costs	% of Total				Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Contingencies	$291,557.00	10				$29,155.70	$5,831.14		
Administrative Overhead	$291,557.00	15				$43,733.55	$8,746.71	Accountants, technical, clerical, contract managers, lawyers, etc.	
SUBTOTAL CONTINGENCIES/ADMINISTRATION						***$72,889.25***	***$14,577.85***		

	Total Cost	Annual Cost (Total divided by 5 Yrs)
GRAND TOTAL	**$364,446.25**	**$72,889.25**

Lightner Annual Cost In-Perpetuity

Facilities Maintenance/Access Control

	Specification	Unit	No. Units	Cost/Unit	Quantity	Total Annual Cost	Assumptions	Comments
Fencing	Smooth strand wire or chain link	Linear Ft.	10	$15.00	1	$150.00	Annual replacement of 10% of fencing installed during start-up (100)	
Vehicle Barrier	Concrete Bollards	Linear Ft.	4	$75.00	0.1	$30.00	maintenance incudes replacement every 10 years	
Gates	16 ft. Swinging Arm	Item	1	$5,000.00	0.05	$250.00	Targeted for access points into the preserve. To be replaced every 20 years.	
Sign	Boundary 8" x 13.5	Item	2	$15.00	1	$30.00	Average cost for signs. Signs types: boundary, regulations, habitat restoration. Aprox. Five signs per property. Replacement at 20% per year.	**Formula:** Total Cost = (total number of signs per property) * (cost per sign) * (number of years installation is needed)
SUBTOTAL CAPITAL IMPROVEMENTS						***$460.00***		

Biological Monitoring

Note: in general, these estimates do not include travel time or field prep

	Specification	Unit	No. Units	Cost/Unit	Frequency	Total Cost	Assumptions	Comments
Land Manager	General condition monitoring and wildlife habitat assessment	Acres	705.86	$100.00	1	$7,058.60	One visit annually to identify threats to habitat and species (comprehensive). 100 acres/day; 10 hour days (=10 acres/hour)	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency).
Plant Ecologist	Update of vegetation communities and Invasive species mapping	Acres	705.86	$90.00	0.33	$2,795.21	Update mapping of vegetation communities and invasive species every three years; 7.5 acres/hour.	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency).
Entomologist	Quino checkerspot/cermes butterflies	Acres	22.5	$90.00	0.33	$2,004.75	Surveys for Quino and Hermes butterflies will be conducted by walking transects during 5 weekly visits. 3 hrs/visit; every three	**Formula:** Total Cost = (total acres) * (labor cost per hour) * hrs/survey*(number of survey visits in 5 year period).
Land Manager	Data entry, analysis and reporting	N/A	N/A	N/A	N/A	$2,964.64	(25%) * Data entry and reporting effort estimated at aproximately 25% of the total survey effort required for the property.	**Formula:** 25% of time spent for (general condition monitoring; mapping, and species surveys)
SUBTOTAL BIOLOGICAL MONITORING						***$14,823.19***		

Habitat/Land Management

	Specification	Unit	No. Units	Labor Rate	Frequency	Total Cost	Assumptions	
Exotic Plant Control	Difficult to remove species (palms, Eucalyptus trees, artichoke thistle)	Acres	7	$64.00	0.33	$147.84	25 acres/crew day; $1,600 per crew day (5 laborers/crew, $64/ hour labor cost; plus equipment cost); 1% of total property. Mowing, herbicide treatment, hand removal, debris removal, etc. Treatment every 3 yrs.	**Formula:** Total Cost = (1% total acres/25 ac per crew day) * (labor cost per crew day) * (frequency).
Exotic Plant Control	Other species, Removal by Laborers	Acres	7	$45.00	1	$315.00	$45/hour for each laborer; 1 acre/hour; 1% of total property per year. Cal-IPC high and moderate risk species.	**Formula:** Total Cost = (1% total acres/1 ac per hour) * (labor cost per hour) * (frequency).
Erosion Control	Materials	Acres	7	$600.00	0.33	$1,386.00	Gravel bags (250 @ $1/bag), fiber rolls and stakes (12 @ $28/roll), silt fencing (500 ft @$25/100 ft roll) = $600/acre per 5 years, 1% property every 3 years.	**Formula:** Total Cost = 1% total acres * cost per acre * frequency.
Erosion Control/ Road Maintenance	Labor	Acres	35	$45.00	1	$1,575.00	$45/hour for each laborer; 5 acres/hour; 5% of property annually	**Formula:** Total Cost = (5% total acres/acres per hr) * labor cost per acre * frequency
Trash Removal	Trash Hauling	Acres	7	$100.00	1	$700.00	$100/acre annually for 1% of total property annually	**Formula:** 1% total acres * cost per acre * frequency
Habitat Remediation	Minor restoration due to erosion, unauthorized access, etc.	Acre	7	$300.00	0.33	$307.33	$300/acre; 1% of total property per 3 years (eg. minor habitat remediation may include seeding with native seeds, raking, soil preparation, etc.). Preparation of a restoration plan and project management is not included in this cost.	**Formula:** Total Cost = (1% total acres) * cost/acre* frequency
Habitat Management - all tasks	Supervision by qualified biologist	L. Hours	10	$160	1	$1,600.00	A qualified biologist will monitor management activities in areas occupied by, or suitable for, listed species. Approximately 10 hours annually.	**Formula:** Total Cost = (number of hours) *(labor cost per hour) * (frequency).
SUBTOTAL BIOLOGICAL MANAGEMENT						***$6,031.17***		

Plan/Reporting

	Specification	Unit	No. Units	Labor Rate	Frequency	Total Cost	Assumptions	Comments
Preserve Manager	Annual Reporting and Coordination	L. Hours	10	$100.00	1	$1,000.00	Preparation of annual report, to include threats assessment, work plan, budget plan, and status of endowment.	**Formula:** hrs to update report * labor rate * frequency
Land Manager	Update management plan	L. Hours	20	$100.00	1	$1,000.00	Using results from general condition monitoring and invasive species mapping, prepare and update management plan. Will include threats assessment, prioritization, and work plan. Every other year.	**Formula:** hrs to update plan * labor rate * frequency
GIS Specialist	GIS Database Management and reporting	L. Hours	4	$90.00	1	$360.00	Data management and produce figures for annual report.	**Formula:** hrs required for GIS work * labor rate * frequency
SUBTOTAL REPORTING						***$2,360.00***		

TOTAL	$23,674.36

Contingencies/ Administration

	Total costs	% of Total				Total Cost	Assumptions	Comments
Contingencies	$23,674.36	10				$2,367.44		
Administrative Overhead	$23,674.36	15				$3,551.15	Accountants, technical, clerical, contract managers, lawyers, etc.	
SUBTOTAL CONTINGENCIES/ADMINISTRATION						***$5,918.59***		

GRAND TOTAL	**$29,592.96**

ENDOWMENT NEEDED	**$1,479,647.78**	Assume 5% return on investment and 3.0% inflation yearly

Long Potrero Start Up Costs (First Five Years)

* Acreage for parcel is exclusive of substation

Facilities Maintenance/Access Control

	Specification	Unit	No. Units	Cost/Unit	Frequency (for 5 years)	Total 5-Yr Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Fencing	Smooth strand wire or chain link	Linear Ft.	450	$15.00	1	$6,750.00	$1,350.00	Cost per year estimated at approximately 1% of the total perimeter of the property	**Formula:** Total Cost = (total perimeter * 1%) * (cost per linear foot)* (number of years installation is needed)
Sign - initial installation	Boundary 8" x 13.5	Item	20	$15.00	1	$300.00	$60.00	Average cost for signs. Sign types: boundary, regulations, habitat restoration. One-time cost for initial installation (10 signs).	
Sign - replacement	Boundary 8" x 13.5	Item	4	$15.00	4	$240.00	$48.00	Average cost for signs. Sign types: boundary, regulations, habitat restoration. Replacement of 20% annually for the remaining 4 years.	**Formula:** Total Cost = (20% total number of signs per property) * (cost per sign) * (number of years installation is needed)
SUBTOTAL CAPITAL IMPROVEMENTS						***$7,290.00***	***$1,458.00***		

Biological Inventory (Baseline Surveys)

	Specification	Unit	No. Units	Labor rate	Frequency (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Land Manager	General condition monitoring and wildlife habitat assessment	Acres	1212	$100.00	5	$60,600.00	$12,120.00	One visit annually to identify threats to habitat and species (comprehensive). Total acreage = 393.4ac.; 100 acres/day; 10 hour days (=10 acres/hour)	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 year period).
Plant Ecologist	Vegetation communities and Invasive species mapping	Acres	1212	$90.00	5	$72,720.00	$14,544.00	Baseline mapping of vegetation communities and invasive species; to be conducted concurrently; 7.5 acres/hour	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 year period).
Entomologist	Quino Checkerspot	Acres	197	$90.00	10	$11,820.00	$2,364.00	Every three years to include weekly site visits for 5 weeks (5 visits) ; 15 acres/hour. Acreage based on upland scrub and grassland habitats. **This acreage will drop if a habitat assesment is conducted to determine suitable habitat .**	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency)
Herpetologist	Arroyo toad	Acres	25	$90.00	6	$5,400.00	$1,080.00	One survey every three years; 3 visits/survey; Acreage based on non-vegetated channel habitat; 2.5 acres/hr.	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of visits in a 5 year period)
Surveyors	Data entry, analysis and reporting	N/A	N/A	N/A	N/A	$37,635.00	$7,527.00	(25%) * (total survey effort)	**Formula:** 25% of time spent for (general condition monitoring; mapping, and species surveys)
SUBTOTAL BIOLOGICAL MONITORING						***$188,175.00***	***$37,635.00***		

Habitat/Land Management

* or cost per unit

	Specification	Unit	No. Units	Labor rate*	Frequency (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Exotic Plant Control	Difficult to remove species (palms, Eucalyptus trees, artichoke thistle)	Acres	36	$64.00	5	$11,520.00	$2,304.00	25 acres/crew day; $1,600 per crew day (5 laborers/crew, $64/ hour labor cost; plus equipment cost); 3% of total property per year. Mowing, herbicide treatment, hand removal, debris removal, etc. Yearly treatment first 5 years.	**Formula:** Total Cost = (3% total acres/25 ac per crew day) * (labor cost per crew day) * (no. treatments in 5 year period).
Exotic Plant Control	Other species, labor	Acres	60	$45.00	5	$54,000.00	$10,800.00	Laborer; 0.25 acre/hour; 5% of total property per year. Cal-IPC high and moderate risk species.	**Formula:** Total Cost = (5% total acres/ac per hour) * (labor cost per hour) * (no. treatments in 5 year period).
Erosion Control	Materials	Acres	12	$600.00	5	$36,000.00	$7,200.00	Gravel bags (250 @ $1/bag), fiber rolls and stakes (12 @ $28/roll), silt fencing (500 ft @$25/100 ft roll) = $600/acre per 5 years, 1% property.	**Formula:** Total Cost = 1% total acres * cost per acre * no. treatments in 5 year period.
Erosion Control/ Road Maintenance	Labor	Acres	60	$45.00	5	$13,500.00	$2,700.00	Laborer; 8 labor hrs/acre; 5% of property per 5 years	**Formula:** Total Cost = (5% total acres/acres per hr) * labor cost per acre * hrs/acre*no. treatments in 5 year period.
Habitat Remediation	Minor restoration due to decommissioned roads, erosion, etc.	Linear Ft.	60	$1,000	1	$60,000.00	$12,000.00	$1000/acre; 5% of total property per 5 years (eg. minor habitat remediation may include decompacting, seeding by hand or imprinter, raking, soil preparation, etc.). Preparation of a restoration plan and project management is not included in this cost.	**Formula:** Total Cost = (acres/acres per hr) * (cost per hr) * no. treatments in 5 year period.
Habitat Management - all tasks	Supervision by qualified biologist	L. Hours	10	$160.00	5	$8,000.00	$1,600.00	A qualified biologist will monitor management activities in areas occupied by, or suitable for, listed species	**Formula:** Total Cost = (number of hours) *(labor cost per hour) * (annually for 5 year period).
SUBTOTAL BIOLOGICAL MANAGEMENT						***$183,020.00***	***$36,604.00***		

Plan/Reporting

	Specification	Unit	No. Units	Labor rate	Quantity (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Land Manager	Annual Reporting and Coordination	L. Hours	40	$100.00	5	$20,000.00	$4,000.00	Preparation of annual report, to include threats assessment, work plan, budget plan, and status of endowment.	**Formula:** (hrs to prepare report) * labor rate * (frequency)
Land Manager	Prepare and update management plan	L. Hours	60	$100.00	3	$18,000.00	$3,600.00	Using results from general condition monitoring and invasive species mapping, prepare/update management plan. Will include threats assessment, prioritization, and work plan. Assumes plan completed in year 3 and updated in years 4 and 5. Some interim land management will occur in years 1 and 2.	**Formula:** (hrs to prepare plan) * labor rate * (frequency)
GIS Specialist	GIS Database Management	L. Hours	12	$90.00	5	$5,400.00	$1,080.00	Data management and produce figures for annual report.	**Formula:** Hrs to conduct GIS work* labor rate * (frequency)
SUBTOTAL REPORTING						***$43,400.00***	***$8,680.00***		

TOTAL	$421,885.00	$84,377.00

Contingencies/ Administration

	Total costs	% of Total				Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Contingencies	$421,885.00	10				$42,188.50	$8,437.70		
Administrative Overhead	$421,885.00	15				$63,282.75	$12,656.55	Accountants, technical, clerical, contract managers, lawyers, etc.	
SUBTOTAL CONTINGENCIES/ADMINISTRATION						***$105,471.25***	***$21,094.25***		

	Total Cost	Annual Cost (Total divided by 5 Yrs)	
GRAND TOTAL	**$527,356.25**	**$105,471.25**	

Long Potrero Annual Cost In-Perpetuity

Facilities Maintenance/Access Control

	Specification	Unit	No. Units	Cost/Unit	Quantity	Total Annual Cost	Assumptions	Comments
Fencing	Smooth strand wire or chain link	Linear Ft.	45	$15.00	1	$675.00	Annual replacement of 10% of fencing installed during start-up	**Formula:** Total Cost = (total perimeter * 1%) * (cost per linear foot)* (number of years installation is needed)
Sign	Boundary 8" x 13.5	Item	4	$15.00	1	$60.00	Average cost for signs. Signs types: boundary, regulations, habitat restoration. Aprox. Replacement at 20% per year.	**Formula:** Total Cost = (20% total number of signs per property) * (cost per sign) * (number of years installation is needed)
SUBTOTAL CAPITAL IMPROVEMENTS						***$735.00***		

Biological Monitoring

Note: in general, these estimates do not include travel time or field prep

	Specification	Unit	No. Units	Cost/Unit	Frequency	Total Cost	Assumptions	Comments
Land Manager	General condition monitoring and wildlife habitat assessment	Acres	1212	$100.00	1	$12,120.00	One visit annually to identify threats to habitat and species (comprehensive). Total acreage = 393.4 ac.; 100 acres/day; 10 hour days (=10 acres/hour)	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency).
Plant Ecologist	Uupdate of vegetation communities and Invasive species mapping	Acres	1212	$90.00	0.33	$4,799.52	Revise mapping for invasive species and vegetation communities every 3 years; 7.5 acres/hour	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency).
Entomologist	Quino Checkerspot	Acres	197	$90.00	1.65	$1,950.30	Every three years to include weekly site visits for 5 weeks (5 visits) ; 15 acres/hour. Acreage based on upland scrub and grassland habitats. **This acreage will drop if a habitat assesment is conducted to determine suitable habitat .**	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency), where freqency = 5 visits every three years (5*0.33)
Herpetologist	Arroyo toad	Acres	25	$90.00	0.99	$891.00	One survey every three years; 3 visits/survey; Acreage based on no nvegetated channel habitat; 5 acres/hr.	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency), where frequency = 3 visits every three years (3*.33)
Surveyors	Data entry, and analysis	N/A	N/A	N/A	N/A	$4,565.21	25% of the total survey effort required for the property.	**Formula:** 25% of time spent for (general condition monitoring; mapping, and species surveys)
SUBTOTAL BIOLOGICAL MONITORING						***$24,326.03***		

Habitat/Land Management

	Specification	Unit	No. Units	Labor Rate	Frequency	Total Cost	Assumptions	
Exotic Plant Control	Difficult to remove species (palms, Eucalyptus trees, artichoke thistle)	Acres	36	$64.00	1	$2,304.00	25 acres/crew day; $1,600 per crew day (5 laborers/crew, $64/ hour labor cost; plus equipment cost); 3% of total property per year; Mowing, herbicide treatment, hand removal, debris removal, etc. Treatment every yr.	**Formula:** Total Cost = (3% total acres/25 ac per crew day) * (labor cost per crew day) * (frequency).
Exotic Plant Control	Other species, Removal by Laborers	Acres	60	$45.00	1	$10,800.00	Laborer 0.25 acre/hour; 5% of total property per year. Cal-IPC high and moderate risk species.	**Formula:** Total Cost = (5% total acres/0.25ac per hour) * (labor cost per hour) * (frequency).
Erosion Control	Materials	Acres	12	$600.00	0.2	$1,440.00	Gravel bags (250 @ $1/bag), fiber rolls and stakes (12 @ $28/roll), silt fencing (500 ft @$25/100 ft roll) = $600/acre per 5 years, 1% property.	**Formula:** Total Cost = 1% total acres * cost per acre * frequency.
Erosion Control/ Road Maintenance	Labor	Acres	60	$45.00	1	$2,700.00	Laborer; 8 hrs/acre; 5% of property per 5 years	**Formula:** Total Cost = (5% total acres/acres per hr) * labor cost per acre * hrss/ac*frequency
Trash Removal	Trash Hauling	Acres	12	$100.00	1	$1,200.00	$100/acre annually for 1% of total property	**Formula:** 1% total acres * cost per acre * frequency
Habitat Remediation	Minor restoration due to erosion, unauthorized access, etc.	Acre	60	$300.00	0.20	$3,600.00	$300/acre; 5% of total property per 5 years (eg. minor habitat remediation may include seeding with native seeds, raking, soil preparation, etc.). Preparation of a restoration plan and project management is not included in this cost.	**Formula:** Total Cost = (acres/acres per hr) * (cost per hr) * frequency
Habitat Management - all tasks	Supervision by qualified biologist	L. Hours	10	$160	1	$1,600.00	A qualified biologist will monitor management activities in areas occupied by, or suitable for, listed species.	**Formula:** Total Cost = (number of hours) *(labor cost per hour) * (frequency).
SUBTOTAL BIOLOGICAL MANAGEMENT						***$23,644.00***		

Plan/Reporting

	Specification	Unit	No. Units	Labor Rate	Frequency	Total Cost	Assumptions	Comments
Land Manager	Annual Reporting and Coordination	L. Hours	10	$100.00	1	$1,000.00	Preparation of annual report, to include threats assessment, work plan, budget plan, and status of endowment.	**Formula:** (hrs to prepare report) * labor rate * (frequency)
Land Manager	Update management plan	L. Hours	30	$100.00	1	$1,500.00	Using results from general condition monitoring and invasive species mapping, update management plan. Will include threats assessment, prioritization, and work plan. Update annually.	**Formula:** (hrs to prepare plan) * labor rate * (frequency)
GIS Specialist	GIS Database Management and reporting	L. Hours	14	$90.00	1	$1,260.00	Data management and produce figures for annual report.	**Formula:** Hrs to conduct GIS work* labor rate * (frequency)
SUBTOTAL REPORTING						***$3,760.00***		

TOTAL	$52,465.03

Contingencies/ Administration

	Total costs	% of Total				Total Cost	Assumptions	Comments
Contingencies	$52,465.03	10				$5,246.50		
Administrative Overhead	$52,465.03	15				$7,869.75	Accountants, technical, clerical, contract managers, lawyers, etc.	
SUBTOTAL CONTINGENCIES/ADMINISTRATION						***$13,116.26***		

GRAND TOTAL	**$65,581.28**

ENDOWMENT NEEDED	**$3,279,064.06**	Assume 5% return on investment and 3.0% inflation yearly

Suckle Start Up Costs (First Five Years)

* Acreage for parcel is exclusive of substation

Facilities Maintenance/Access Control

	Specification	Unit	No. Units	Cost/Unit	Frequency (for 5 years)	Total 5-Yr Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Vehicle Barrier	Concrete Bollards	Item	8	$75.00	1	$600.00	$120.00	Targeted for access points into the preserve. 4 bollards per gate	
Gates	16 ft. Swinging Arm	Item	2	$5,000.00	1	$10,000.00	$2,000.00	Targeted for access points into the preserve.	
Sign - initial installation	Boundary 8" x 13.5	Item	10	$15.00	1	$150.00	$30.00	Average cost for signs. Sign types: boundary, regulations, habitat restoration. One-time cost for initial installation (10 signs).	
Sign - replacement	Boundary 8" x 13.5	Item	2	$15.00	4	$120.00	$24.00	Average cost for signs. Sign types: boundary, regulations, habitat restoration. Replacement of 20% annually for the remaining 4 years	**Formula:** Total Cost = (20% total number of signs per property) * (cost per sign) * (number of years installation is needed)
SUBTOTAL CAPITAL IMPROVEMENTS						***$10,870.00***	***$2,174.00***		

Biological Inventory (Baseline Surveys)

	Specification	Unit	No. Units	Labor rate	Frequency (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Land Manager	General condition monitoring and wildlife assessment	Acres	199.4	$100.00	5	$9,970.00	$1,994.00	One visit annually to identify threats to habitat and species (comprehensive). 100 acres/day; 10 hour days (=10 acres/hour)	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 year period).
Plant Ecologist	Update of vegetation communities and invasive species mapping	Acres	199.4	$90.00	5	$11,964.00	$2,392.80	Baseline mapping of vegetation communities and invasive species; to be conducted concurrently; 7.5 acres/hour	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (number of surveys in 5 year period).
Herpetologist	Barefoot banded gecko	Acres	20	$90.00	20	$14,400.00	$2,880.00	Baseline surveys: annually for 5 years. 4 visits/year May 1 - July 31. Assume 10% of property surveyed per year @ 2.5 acres per hour. Annual habitat assessments will be conducted during vegetation communities surveys	**Formula:** Total Cost = (habitat acres/acres per hour) * (labor cost per hour) * (number of visits in 5 year period).
Mammalogist	Peninsular bighorn sheep	L. Hours	16	$90.00	5	$7,200.00	$1,440.00	1 survey locations, 2 times per year, 4 hours per location plus 2 hours travel time; to be conducted annually. Annual habitat assessments will be conducted during vegetation communities surveys.	**Formula:** Hours/year * labor rate
Surveyors	Data entry, analysis and reporting	N/A	N/A	N/A	N/A	$10,883.50	$2,176.70	(25%) * (total survey effort)	**Formula:** 25% of time spent for (general condition monitoring; mapping, and species surveys)
SUBTOTAL BIOLOGICAL MONITORING						***$54,417.50***	***$10,883.50***		

Habitat /Land Management

* or cost per unit

	Specification	Unit	No. Units	Labor rate*	Frequency (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Exotic Plant Control	Other species, labor	Acres	10	$45.00	5	$9,000.00	$1,800.00	Laborer; 0.25 acre/hour; 5% of total property annually. Cal-IPC high and moderate risk species.	**Formula:** Total Cost = (5% total acres/ac per hour) * (labor cost per hour) * (no. treatments in 5 year period).
Erosion Control	Materials	Acres	2	$600.00	5	$6,000.00	$1,200.00	Gravel bags (250 @ $1/bag), fiber rolls and stakes (12 @ $28/roll), silt fencing (500 ft @$25/100 ft roll) = $600/acre per 5 years, 1% property.	**Formula:** Total Cost = 1% total acres * cost per acre * no. treatments in 5 year period.
Erosion Control/ Road Maintenance	Labor	Acres	10	$45.00	5	$2,250.00	$450.00	Laborer; 8 labor hrs/acre; 5% of property per 5 years	**Formula:** Total Cost = (5% total acres) * 8 labor hrs/acre* labor cost per acre * no. treatments in 5 year period.
Trash Removal	Trash Hauling-load	Acres	10	$100	1	$1,000.00	$200.00	$100/acre every 1 years for 5% of total property	**Formula:** 5% total acres * cost per acre * frequency
Habitat Remediation	Minor habitat enhancement	Acres	10	$300	3	$9,000.00	$1,800.00	$300/acre; 5% of total property every other year. (eg. may include maintenance of water sources for BHS etc.). Preparation of a restoration plan and project management is not included in this cost.	**Formula:** Total Cost = (5% total acres) * (cost per acrer) * no. treatments in 5 year period.
Habitat Management - all tasks	Supervision by qualified biologist	L. Hours	5	$160.00	5	$4,000.00	$800.00	A qualified biologist will monitor management activities in areas occupied by or suitable for listed species. Approximately 5 hours annually.	**Formula:** Total Cost = (number of hours) *(labor cost per hour) * (annually for 5 year period).
SUBTOTAL BIOLOGICAL MANAGEMENT						***$31,250.00***	***$6,250.00***		

Plan/Reporting

	Specification	Unit	No. Units	Labor rate	Quantity (for 5 years)	Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Land Manager	Annual Reporting and Coordination	L. Hours	20	$100.00	5	$10,000.00	$2,000.00	Preparation of annual report, to include threats assessment, work plan, budget plan, and status of endowment.	**Formula:** hrs to update report * labor rate * frequency
Land Manager	Prepare and update management plan	L. Hours	30	$100.00	3	$9,000.00	$1,800.00	Using results from general condition monitoring and invasive species mapping, prepare and update management plan. Will include threats assessment, prioritization, and work plan. Assumes plan completed in year 3 and updated in years 4 and 5. Some interim land management will occur in years 1 and 2.	**Formula:** hrs to update plan * labor rate * frequency
GIS Specialist	GIS Database Management and reporting	L. Hours	8	$90.00	5	$3,600.00	$720.00	Data management and produce figures and maps for annual report and management plan.	**Formula:** hrs to conduct GIS work * labor rate * frequency
SUBTOTAL REPORTING						***$22,600.00***	***$4,520.00***		

TOTAL	$119,137.50	$23,827.50

Contingencies/ Administration

	Total costs	% of Total				Total Cost	Annual Cost (Total divided by 5 Yrs)	Assumptions	Comments
Contingencies	$119,137.50	10				$11,913.75	$2,382.75		
Administrative Overhead	$119,137.50	15				$17,870.63	$3,574.13	Accountants, technical, clerical, contract managers, lawyers, etc.	
SUBTOTAL CONTINGENCIES/ADMINISTRATION						***$29,784.38***	***$5,956.88***		

	Total Cost	Annual Cost (Total divided by 5 Yrs)	
GRAND TOTAL	**$148,921.88**	**$29,784.38**	

Suckle Annual Cost In-Perpetuity

Facilities Maintenance/Access Control

	Specification	Unit	No. Units	Cost/Unit	Quantity	Total Annual Cost	Assumptions	Comments
Vehicle Barrier	Concrete Bollards	Linear Ft.	8	$75.00	0.1	$60.00	Targeted for access points into the preserve. 4 bollards per gate. To be replaced every 10 years.	
Gates	16 ft. Swinging Arm	Item	2	$5,000.00	0.05	$500.00	Targeted for access points into the preserve. To be replaced every 20 years.	
Sign	Boundary 8" x 13.5	Item	2	$15.00	1	$30.00	Average cost for signs. Signs types: boundary, regulations, habitat restoration. Aprox. Replacement at 20% per year	**Formula:** Total Cost = (20% total number of signs per property) * (cost per sign) * (number of years installation is needed)
SUBTOTAL CAPITAL IMPROVEMENTS						***$590.00***		

Biological Monitoring

Note: in general, these estimates do not include travel time or field prep

	Specification	Unit	No. Units	Cost/Unit	Frequency	Total Cost	Assumptions	Comments
Land Manager	General condition monitoring and wildlife habitat assessment	Acres	199.4	$100.00	1	$1,994.00	One visit annually to identify threats to habitat and species (comprehensive). Total acreage = 705.86 ac.; 100 acres/day; 10 hour days (=10 acres/hour)	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency).
Plant Ecologist	Update of vegetation communities and Invasive species mapping	Acres	199.4	$90.00	0.33	$789.62	Baseline mapping of vegetation communities and invasive species (general) to be conducted concurrently; 7.5 acres/hour. Once every three years.	**Formula:** Total Cost = (total acres/acres per hour) * (labor cost per hour) * (frequency).
Herpetologist	Barefoot banded gecko	Acres	20	$90.00	1.3	$936.00	Baseline surveys: every three years. 4 visits/ysurvey May 1 - July 31. Assume 10% of property surveyed per year @ 2.5 acres per hour. Annual habitat assessments will be conducted during vegetation communities surveys	**Formula:** Total Cost = (habitat acres/acres per hour) * (labor cost per hour) * (number of visits annually).
Mammalogist	Peninsular bighorn sheep	L. Hours	16	$90.00	1	$1,440.00	1 survey locations, 2 times per year, 4 hours per location plus 2 hours travel time; to be conducted annually. Annual habitat assessments will be conducted during vegetation communities surveys.	**Formula:** Hours/year * labor rate
Surveyors	Data entry, and analysis	N/A	N/A	N/A	N/A	$1,289.91	25% of the total survey effort required for the property.	**Formula:** 25% of time spent for (general condition monitoring; mapping, and species surveys)
SUBTOTAL BIOLOGICAL MONITORING						***$6,449.53***		

Habitat/Land Management

	Specification	Unit	No. Units	Labor Rate	Frequency	Total Cost	Assumptions	
Exotic Plant Control	Difficult to remove species (palms, Eucalyptus trees, artichoke thistle)	Acres	0	$64.00	0.00	$0.00	25 acres/crew day; $1,600 per crew day (5 laborers/crew, $64/ hour labor cost; plus equipment cost); 5% of total property per year, total property acreage 705.86. Mowing, herbicide treatment, hand removal, debris removal, etc. Treatment every 5 yrs.	
Exotic Plant Control	Other species, Removal by Laborers	Acres	10	$45.00	1	$1,800.00	Laborer; 0.25 acre/hour; 5% of total property per year. Cal-IPC high and moderate risk species.	**Formula:** Total Cost = (5% total acres/ac per hour) * (labor cost per hour) * (frequency).
Erosion Control	Materials	Acres	2	$600.00	1	$1,200.00	Gravel bags (250 @ $1/bag), fiber rolls and stakes (12 @ $28/roll), silt fencing (500 ft @$25/100 ft roll) = $600/acre per 5 years, 1% property.	
Erosion Control/ Road Maintenance	Labor	Acres	10	$45.00	1	$450.00		
Trash Removal	Trash Hauling	Acres	2	$100.00	1	$200.00	$100/acre annually for 5% of total property	**Formula:** 1% total acres * cost per acre * frequency
Habitat Remediation	Minor habitat enhancement	Acre	2	$300.00	1	$600.00	$300/acre; 1% of total property per annually (eg. minor habitat remediation and maintenance of water sources for BHS etc.).	**Formula:** Total Cost = (1% total acre) * (cost per acre) * frequency
Habitat Management - all tasks	Supervision by qualified biologist	L. Hours	5	$160	1	$800.00	A qualified biologist will monitor management activities in areas occupied by or suitable for listed species. Approximately 5 hours annually.	**Formula:** Total Cost = (number of hours) *(labor cost per hour) * (frequency).
SUBTOTAL BIOLOGICAL MANAGEMENT						***$5,050.00***		

Plan/Reporting

	Specification	Unit	No. Units	Labor Rate	Frequency	Total Cost	Assumptions	Comments
Land Manager	Annual Reporting and Coordination	L. Hours	10	$199.00	1.00	$1,990.00	Preparation of annual report, to include threats assessment, work plan, budget plan, and status of endowment.	**Formula:** hrs to update report * labor rate * frequency
Land Manager	Update management plan	L. Hours	10	$100.00	1.0	$1,000.00	Using results from general condition monitoring and invasive species mapping, update management plan. Will include threats assessment, prioritization, and work plan. Update annually.	**Formula:** hrs to update plan * labor rate * frequency
GIS Specialist	GIS Database Management and reporting	L. Hours	5	$90.00	1.00	$450.00	Data management and produce figures and maps for annual report and management plan.	**Formula:** hrs to conduct GIS work * labor rate * frequency
SUBTOTAL REPORTING						***$3,440.00***		

TOTAL	$15,529.53

Contingencies/ Administration

	Total costs	% of Total				Total Cost	Assumptions	Comments
Contingencies	$15,529.53	10				$1,552.95		
Administrative Overhead	$15,529.53	15				$2,329.43	Accountants, technical, clerical, contract managers, lawyers, etc.	
SUBTOTAL CONTINGENCIES/ADMINISTRATION						***$3,882.38***		

GRAND TOTAL	**$19,411.91**

ENDOWMENT NEEDED	**$970,595.63**	Assume 5% return on investment and 3.0% inflation yearly

PART 4

PROPERTY LEGAL DESCRIPTIONS

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Lakeside Ranch

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EXHIBIT "A"

All that certain real property situated in the County of San Diego, State of California, described as follows:

Lots 3 and 4 and the North half of the Northwest Quarter of Fractional Section 8, Township 15 South, Range 1 East, San Bernardino Base and Meridian, in the County of San Diego, State of California, according to the Official Plat thereof, more particularly described as follows:

Beginning at the Northwest corner of said Fractional Section 8 as shown on County of San Diego Tract No. 3702-2, according to the Map thereof No. 10202 on file in the Office of the County Recorder of said County, said Northwest corner also being a corner on the boundary of Lot 266 of said Map No.10202;
Thence Southwesterly along the Westerly line of said Fractional Sectional 8, also being the Easterly line of said Lot 266, to the Southeasterly corner of said Lot 266;
Thence continuing Southwesterly along said Westerly line of Fractional Section 8 to a point on the Northerly line of Rancho El Cajon, according to United States government Survey, said line also being the Southerly line of said Fractional Section 8;
Thence Northeasterly along said Rancho Boundary and said Southerly line to the Southeasterly corner of said Lot 3;
Thence Northerly along the Easterly line of said Lot 3 and the Easterly line of said North half of the Northwest Quarter to the Northerly line of said Fractional Section 8;
Thence Westerly along said Northerly line to the said Northwest corner of Fractional Section 8, said point being the point of beginning.

Assessor's Parcel Number: **391-030-09**

14763

Exhibit A

All that certain real property situated in the County of San Diego, State of California, described as follows:

Parcel 1:

The South one-half of the South-East Quarter, Tract 55, Section 36, Township 14 South, Range 1 East, San Bernardino Base and Meridian, in the County of San Diego, State of California, according to the Official Plat thereof.

Reserving to the State of California all oil, gas, oil shale, coal, phosphate, sodium, gold, silver and all other mineral deposits contained in said land, and further reserving to the State of California and persons authorized by the State, the right to drill for and extract such deposits of oil and gas, or gas, and to prospect for, mine and remove such deposits of other minerals from land to occupy and use so much of the surface of said land as may be required therefor, upon compliance with the conditions and subject to the provisions and limitations of Chapter 5, Part I, Division 6 of the Public Resources Code.

Parcel 2:

The North one-half of the South-East one-quarter of Tract 55, Section 36, Township 14 South, Range 1 East San Bernardino Base and Meridian Line and Meridian in the County of San Diego, State of California, according to the Official Plat thereof.

Reserving to the State of California all oil, gas, oil shale, coal, phosphate, sodium, gold, silver and all other mineral deposits contained in said land, and further reserving to the State of California and persons authorized by the State, the right to drill for and extract such deposits of oil and gas, or gas, and to prospect for, mine and remove such deposits of other minerals from land to occupy and use so much of the surface of said land as may be required therefor, upon compliance with the conditions and subject to the provisions and limitations of Chapter 5, Part I, Division 6 of the Public Resources Code.

Parcel 3:

The East one-half of the Southwest Quarter of Tract 55, Section 36 Township 14 Range 1 East, San Bernardino Base and Meridian, in the County of San Diego, State of California, according to the Official Plat thereof.

Reserving to the State of California all oil, gas, oil shale, coal, phosphate, sodium, gold, silver and all other mineral deposits contained in said land, and further reserving to the State of California and persons authorized by the State, the right to drill for and extract such deposits of oil and gas, or gas, and to prospect for, mine and remove such deposits of other minerals from land to occupy and use so much of the surface of said land as may be required therefor, upon compliance with the conditions and subject to the provisions and limitations of Chapter 5, Part I, Division 6 of the Public Resources Code.

Parcel 4:

The North East Quarter of Tract 55, Section 36, Township 14 South, Range 1 East, San Bernardino Base and Meridian, in the County of San Diego, State of California, according to the Official Plat thereof.

Reserving to the State of California all oil, gas, oil shale, coal, phosphate, sodium, gold, silver and all other mineral deposits contained in said land, and further reserving to the State of California and persons authorized by the State, the right to drill for and extract such deposits of oil and gas, or gas, and to prospect for, mine and remove such deposits of other minerals from land to occupy and use so much of the surface of said land as may be required therefor, upon compliance with the conditions and subject to the provisions and limitations of Chapter 5, Part I, Division 6 of the Public Resources Code.

Assessor's Parcel Nos.: 330-110-12; 330-110-13; 330-110-14 and 330-111-02

File No: 05724235

EXHIBIT "A"

All that certain real property situated in the County of San Diego, State of California, described as follows:

Parcel 1: 402-211-01

All that portion of the Northwest quarter of the Southwest quarter of Section 20, Township 15 South, Range 2 East, San Bernardino Meridian and that portion of the Northeast quarter of the Southeast quarter of Section 19, Township 15 South, Range 2 East, San Bernardino Meridian in the County of San Diego, State of California, according to the United States Government Survey, described as follows:

Beginning at station 12 plus 34.42 in the centerline of the 60 foot county road, as shown on the map thereof of Road Survey No. 836, on the file in the Office of the County Surveyor of the County of San Diego, State of California;
Thence North 61°53' west, 30 feet to a point on the Westerly line of said county road;
Thence North 50°12'30" west, 650 feet;
Thence South 33°24'15" west, 524.51 feet to the westerly line of said section 20, and the True Point of Beginning;
Thence continuing South 33°24'15" West, 137.95 feet;
Thence South 50°12'30" East, 352.28 feet to a point on the Northerly right-of-way line of California Interstate Route 8;
Thence Northwesterly along said right-of-way line to a point on the Northerly line of the Northeast quarter of the Southeast quarter of said Section 19, distant thereon South 89°32'37" West, 627.84 feet, along said Northerly line, from the East quarter corner of said Section 19;
Thence North 89°32'37" East, along said Northerly line, 627.84 feet to said quarter corner;
Thence South 03°26'05" East, 628.31 feet to the True Point of Beginning.

Parcel 1A:

A 40.00 foot wide strip of land lying within that portion of the Southeast quarter of Section 19, and of that portion of the Southwest quarter of Section 29, both in Township 15 South, Range 2 East, San Bernardino Meridian, according to the Official Plat thereof, the centerline of said 40.00 foot strip described as follows:

Beginning at the West quarter corner of said Section 20 as shown on Record of Survey Map No. 14076 on file in the Office of the County Recorder of San Diego County;
Thence along the Westerly line of said Section 20, South 03°26'05" East, 586.03 feet to the True Point of Beginning of said centerline being a point on the arc of a 30.00 foot radius curve, concave Southwesterly, the radial of which bears South 28°28'36" East;

File No: 05724235

Thence Southeasterly along the arc of said curve, through a central angle of 84°38'36" a distance of 44.32 feet;
Thence tangent to said curve South 33°50' East, 32.77 feet to the beginning of a tangent 100.00 foot radius curve, concave southwesterly;
Thence Southeasterly along the arc of said curve through a central angle 22°20', a distance of 38.98 feet;
Thence tangent to said curve South 11°30'East, 85.43 feet to the beginning of a tangent 30.00 foot radius curve, concave Northerly;
Thence Easterly along the arc of said curve through a central angle of 127°30', a distance of 66.76 feet;
Thence tangent to said curve North 41° East, 36.88 feet to the beginning of a tangent 35.00 foot radius curve, concave Southerly;
Thence Northeasterly along the arc of said curve through a central angle of 88°50' a distance of 54.27 feet;
Thence tangent to said curve South 50°10' East, 154.54 feet to the beginning of a tangent 200.00 foot radius curve, concave Northeasterly;
Thence Easterly along the arc of said curve through a central angle of 20°30' a distance of 71.56 feet;
Thence tangent to said curve South 70°39'59" East, 43.55 feet to the beginning of a tangent 115.00 foot radius curve, concave Southwesterly;
Thence easterly along the arc of said curve through a central angle of 20°, a distance of 40.14 feet;
Thence tangent to said curve South 50°40' East, 41.37 feet to the beginning of a tangent 60.00 foot radius curve, concave Northerly;
Thence Easterly along the arc of said curve through a central angle of 65°10' a distance of 68.24 feet;
Thence tangent to said curve South 64°10' East, along the centerline of an existing bridge, 61.02 feet to the beginning of a tangent 59.73 foot radius curve, concave Northwesterly;
Thence Northeasterly along the arc of said curve through a central angle of 41°30' a distance of 43.26 feet;
Thence tangent to said curve North 22°40' East 132.50 feet to the beginning of a tangent 400.00 foot radius curve, concave Easterly;
Thence Northerly along said curve through a central angle of 11°40' a distance of 81.45 feet;
Thence tangent to said curve North 34°19'57" East, 24.08 feet to the beginning of a tangent 35.00 foot radius curve, concave Southeasterly;
Thence Northeasterly along said curve through a central angle of 43°03'36" a distance of 26.30 feet to an intersection with the Northerly right-of-way line of Peutz Valley Road. The sidelines of said 40.00 foot strip to commence on a line bearing South 03°26'05" East from the Point of Beginning and the end of the Northerly right-of-way line of Peutz Valley Road.

File No: 05724235

Parcel 2: 402-220-11

All that portion of the Northwest quarter of the Southwest quarter of Section 20, Township 15 South, Range 2 East, San Bernardino Meridian and that portion of the Northeast quarter of the Southeast quarter of Section 19, Township 15 South, Range 2 East, San Bernardino Meridian in the County of San Diego, State of California, according to the United States Government Survey, described as follows:

Beginning at Station 12 Plus 34.42 in the centerline of the 60 foot county road, as shown on the map thereof of Road Survey No. 836, on file in the Office of the County Surveyor of the County of San Diego, State of California;
Thence North 61°53', West 30 feet to a point on the Westerly line of said county road, which is the True Point of Beginning;
Thence North 50°12'30" West, 650 feet;
Thence South 33°24'15" West, 662.50 feet;
Thence South 50°12'30" East, 352.38 feet to a point on the Northerly right-of-way line of California Interstate Route 8;
Thence Easterly along said right-of-way line South 63°28'37" East, 335.8 feet to a point on the Westerly line of said 60 foot county road;
Thence Northeasterly along the Westerly line of said 60 foot county road to the True Point of Beginning.

Parcel 3: 402-220-09 and 402-220-10

All that portion of the Northwest Quarter of the Southwest Quarter of Section 20, Township 15 South, Range 2 East, San Bernardino Base and Meridian, in the County of San Diego, State of California, according to United States Government Survey, described as follows:

Beginning at Station 12 plus 34.42, in the Centerline of the 60 foot County Road, as shown on the map thereof of Road Survey No. 836, on file in the Office of the County Surveyor of the County of San Diego, State of California;
Thence North 61° 53' West, 30 feet to a point on the Westerly line of said County Road, which is the True Point of Beginning;
Thence North 50° 12' 30" West, 650 feet;
Thence South 33° 24' 15" West, 524.51 feet to the Westerly line o said Section 20;
Thence Northerly along said Westerly line of said Section 20, North 03° 26' 05" West, 628.831 feet to the West Quarter Corner of said Section 20;
Thence Easterly along the Northerly line of the Southwest Quarter of said Section 20, South 89° 10' 41" East, 1093.95 feet to the Northwesterly boundary of afore mentioned Road Survey No. 836;
Thence Southwesterly along the Northwesterly boundary of said Road Survey 836 to the True Point of Beginning.

Assessor's Parcel Number: **402-211-01, 402-220-09, 402-220-10 402-220-11**

EXHIBIT "A"

All that certain real property situated in the County of San Diego, State of California, described as follows:

PARCEL 1:

THAT PORTION OF THE WEST HALF OF THE NORTHWEST QUARTER OF SECTION 20, TOWNSHIP 15 SOUTH, RANGE 2 EAST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO UNITED STATES GOVERNMENT SURVEY, DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF SAID SECTION 20; THENCE EASTERLY ALONG THE NORTH LINE OF SECTION 20 TO THE NORTHEAST CORNER OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SAID SECTION 20; THENCE SOUTHERLY ALONG THE EAST LINE OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER, 1138 FEET; THENCE DEFLECTING TO THE RIGHT 66°30' 400 FEET; THENCE DEFLECTING TO THE RIGHT 33°00' TO A POINT ON THE WEST LINE OF SAID SECTION 20; THENCE NORTHERLY AlONG THE WEST LINE OF SAID SECTION 20, 1076 FEET, MORE OR LESS, TO THE POINT OF BEGINNING. EXCEPTING THEREFROM ALL COAL AND OTHER MINERALS AS RESERVED BY UNITED STATES OF AMERICA IN PATENT RECORDED MARCH 26, 1928 IN BOOK 15, PAGE 29 OF PATENTS, RECORDS OF SAN DIEGO COUNTY.

PARCEL 2:

AN EASEMENT AND RIGHT OF WAY FOR ROAD AND UTILITY PURPOSES OVER, UNDER, ALONG AND ACROSS A STRIP OF LAND 40 FEET IN WIDTH LYING WITHIN THE NORTHEAST QUARTER OF SECTION 19, TOWNSHIP 15 SOUTH, RANGE 2 EAST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO OFFICIAL PLAT THEREOF, DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE NORTH LINE OF THE SOUTHEAST QUARTER OF SAID NORTHEAST QUARTER, DISTANT THEREOF NORTH 87°25'55" WEST, 807.05 FEET (RECORD NORTH 87°47'11" WEST, 807.11 FEET) FROM THE NORTHEAST CORNER THEREOF, BEING THE SOUTHEASTERLY CORNER OF LAND DESCRIBED IN DEED TO JOHN FRANKLIN HEIN, RECORDED JUNE 13, 1977 AS FILE NO. 77-230444 OF OFFICIAL RECORDS; THENCE ALONG THE BOUNDARY OF SAID HEIN LAND NORTH 01°56'09" WEST (RECORD NORTH 2°17'25" WEST) 80.31 FEET; NORTH 67°03'10" WEST, 368.82 FEET. (RECORD 375.00 FEET) TO THE TRUE POINT OF BEGINNING; THENCE CONTINUING ALONG SAID HEIN BOUNDARY (DEED FILE NO. 77-230444) SOUTH 88°46'47" WEST 117.84 FEET; THENCE SOUTH 1°13'13" EAST 20.00 FEET; THENCE SOUTH 75°19'34" WEST TO A POINT OF INTERSECTION WITH A LINE THAT IS PARALLEL WITH AND 40 FEET, MEASURED AT RIGHT ANGLES FROM THAT NORTHERLY LINE OF SAID HEIN' S LAND, BEING BEARING SOUTH 88°46'47" WEST, DESCRIBED ABOVE; THENCE ALONG SAID PARALLEL LINE NORTH 88°46'47" EAST TO A LINE THAT BEARS SOUTH 67°03'10" EAST FROM THE TRUE POINT OF BEGINNING; THENCE NORTH 67°03'10" WEST TO THE TRUE POINT OF BEGINNING.

PARCEL 3:

AN EASEMENT AND RIGHT OF WAY FOR ROAD AND UTILITY PURPOSES OVER, UNDER, ALONG AND ACROSS A STRIP OF LAND 60 FEET IN WIDTH LYING WITHIN THE NORTHEAST

EXHIBIT "A" - Continued

QUARTER OF SECTION 19, TOWNSHIP 15 SOUTH, RANGE 2 EAST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO OFFICIAL PLAT THEREOF, THE CENTERLINE OF SAID 60 FOOT STRIP BEING DESCRIBED AS FOLLOWS:

BEGINNING AT THE MOST EASTERLY CORNER OF THAT LAND DESCRIBED IN DEED TO JOHN FRANKLIN HEIN, RECORDED JUNE 13, 1977 AS FILE NO. 77-230444 OF OFFICIAL RECORDS, SAID POINT BEING NORTH 87°25'55" WEST 807.05 FEET (DEED - NORTH 87°47'11" EAST 807.11 FEET) FROM THE SOUTHEAST CORNER OF THE NORTH HALF OF THE SAID NORTHEAST QUARTER; THENCE ALONG THE SOUTH LINE OF HEIN'S LAND NORTH 87°25'55" WEST, 32.13 FEET TO A POINT HEREIN DESIGNATED POINT "A"; THENCE RETRACING ALONG SAID SOUTH LINE OF HEIN' S LAND SOUTH 87°25'55'" EAST 32.13 FEET TO THE SOUTHEASTERLY CORNER OF HEIN' S LAND; THENCE ALONG THE EASTERLY AND NORTHERLY BOUNDARY OF SAID HEIN' S LAND NORTH 01°56'09" WEST (RECORD NORTH 2°17'25" WEST) 80.31 FEET, NORTH 67°03'10" WEST, 368.82 FEET (RECORD 375.00 FEET) AND SOUTH 88°46'47" WEST, (RECORD SOUTH 88°29'50" WEST) 75.00 FEET TO THE TRUE POINT OF BEGINNING OF THE HEREIN DESCRIBED CENTERLINE; THENCE SOUTH 67°03'10" EAST, ALONG A LINE THAT IS PARALLEL WITH AND 30 FEET MEASURED AT RIGHT ANGLES FROM THE NORTHEASTERLY BOUNDARY OF SAID HEIN LAND (SAID NORTHEASTERLY BOUNDARY BEING BEARING NORTH 67°03'10" WEST AS DESCRIBED ABOVE) 391.73 FEET TO A LINE THAT BEARS NORTH 18°25'55" WEST FROM SAID POINT "A"; THENCE SOUTH 18°25 '55" EAST 72.03 FEET, MORE OR LESS, TO SAID POINT "A"; THENCE CONTINUING SOUTH 18°25 '55" EAST 100 FEET TO THE BEGINNING OF A TANGENT 150 FOOT RADIUS CURVE, CONCAVE WESTERLY; THENCE SOUTHERLY ALONG THE ARC OF SAID CURVE THROUGH AN ANGLE OF 55°20'00", A DISTANCE OF 139.30 FEET TO THE BEGINNING OF A REVERSE 150 FOOT RADIUS CURVE, CONCAVE; THENCE SOUTHERLY ALONG THE ARC OF SAID CURVE THROUGH A CENTRAL ANGLE OF 47°00'00" A DISTANCE OF 119.63 FEET; THENCE TANGENT TO SAID CURVE SOUTH 10°05'55" EAST, 135 FEET TO THE BEGINNING OF A TANGENT 500 FOOT RADIUS CURVE, CONCAVE WESTERLY; THENCE SOUTHERLY ALONG THE ARC OF SAID CURVE THROUGH A CENTRAL ANGLE OF 34°00'00", A DISTANCE OF 292.37 FEET; THENCE TANGENT TO SAID CURVE SOUTH 23°54 '05" WEST 100 FEET, MORE OR LESS, TO A POINT OF INTERSECTION WITH A LINE THAT IS PARALLEL WITH AND 30 FEET NORTHEASTERLY MEASURED AT RIGHT ANGLES FROM THAT COURSE IN THE SOUTHWESTERLY BOUNDARY OF THE LAND DESCRIBED IN DEED TO JOHN FRANKLIN HEIN, ET AL, RECORDED NOVEMBER 22, 1976 AS FILE NO. 76-389904 OF OFFICIAL RECORDS, SAID COURSE IN THE SOUTHWESTERLY BOUNDARY BEING SOUTH 30°56'03" EAST 70.00 FEET FROM SAID POINT OF INTERSECTION AND PARALLEL WITH AND 30 FEET NORTHEASTERLY MEASURED AT RIGHT ANGLES FROM THE SOUTHWESTERLY BOUNDARY OF HEIN'S LAND (FILE NO. 76-389904) SOUTH 30°56'03" EAST 107.46 FOOT AND SOUTH 02°45'00" EAST 37.53 FOOT TO POINT OF TERMINUS.

THE SIDE LINES OF SAID 60 FOOT STRIP TO LENGTHEN OR SHORTEN NORTHERLY TO INTERSECT THE NORTHWESTERLY BOUNDARY OF HEIN'S LAND (FILE NO. 77-230444).

PARCEL 4:

AN EASEMENT AND RIGHT OF WAY FOR ROAD PURPOSES, 40.00 FOOT IN WIDTH, ACROSS AND THROUGH THE SOUTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 19, AND THE NORTHWEST QUARTER OF SECTION 20, ALL IN TOWNSHIP 15 SOUTH, RANGE 2 EAST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, AS GRANTED TO THE CITY OF SAN DIEGO, JULY 27, 1932 IN BOOK 145, PAGE

EXHIBIT "A" - Continued

162 OF OFFICIAL RECORDS, THE CENTER LINE OF SAID 40.00 FOOT EASEMENT BEING DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE EASTERLY RIGHT OF WAY LINE OF EXISTING STATE HIGHWAY DIV. VII, ROUTE 12, SECTION C AS SHOWN ON PLAT OF SAID STATE HIGHWAY, APPROVED MARCH 8, 1920, SAID POINT BEING NORTH 81°55'45" EAST 147.24 FROM THE SOUTHWEST CORNER OF THE SOUTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 19, TOWNSHIP 15 SOUTH, RANGE 2 EAST; THENCE NORTH 67°01'18" EAST 11.2 FEET; THENCE NORTH 3°18'18" EAST 143.8 FEET; THENCE NORTH 19° 15' EAST 72.0 FEET; THENCE NORTH 5°52' WEST 74.33 FEET; THENCE NORTH 38°00'42" WEST 38.0 FEET TO A POINT OF CURVATURE; THENCE ALONG A CURVE THE RIGHT, HAVING A RADIUS OF 30 FEET, FOR A DISTANCE OF 94.25 FEET ; THENCE SOUTH 38°00'42" EAST 52.69 FEET ; THENCE SOUTH 42°17'42" EAST 182.58 FEET; THENCE SOUTH 79°47'42" EAST 60.67 FEET; THENCE NORTH 61°36'18" EAST 122.10 FEET; THENCE NORTH 24°36'18" EAST 167.26 FEET; THENCE NORTH 71°9'18" EAST 202.13 FEET; THENCE NORTH 19°13'18" EAST 108.40 FEET; THENCE NORTH 26°46'42" WEST 39.67 FEET TO A POINT OF CURVATURE; THENCE ALONG A CURVE TO THE RIGHT, HAVING A RADIUS OF 40 FEET, FOR A DISTANCE OF 95.00 FEET; THENCE SOUTH 70°57'12" EAST 77.61 FEET; THENCE SOUTH 85°53'12" EAST 115.41 FEET; THENCE NORTH 56°32'48" EAST 220.03 FEET; THENCE NORTH 53°45'48" EAST 200.00 FEET; THENCE NORTH 43°03'48" EAST 148.74 FEET; THENCE SOUTH 83°46'12" EAST 208.86 FEET; THENCE NORTH 68°45'48" EAST 207.40 FEET; THENCE NORTH 32°10'48" EAST 180.00 FEET; THENCE NORTH 39°22'12" WEST 66.90 FEET; THENCE NORTH 57°7'12" WEST 63.60 FEET TO A POINT OF CURVATURE; THENCE ALONG A CURVE TO THE RIGHT WITH A RADIUS OF 40 FEET A DISTANCE OF 74.50 FEET; THENCE NORTH 49°57'18" EAST 425.00 FEET; THENCE SOUTH 88°3'28" EAST 134.54 FEET; THENCE NORTH 27°34'28" EAST 188.81 FEET; THENCE NORTH 57°33'18" EAST 30.24 FEET; THENCE NORTH 45°18'3" EAST 53.73 FEET; THENCE NORTH 6°11'13" EAST 114.66 FEET ; THENCE NORTH 42°21'53" EAST 159.00 FEET; THENCE NORTH 8°59'7" WEST 41.24 FEET; THENCE NORTH 51°29'53" EAST 167.39 FEET; THENCE NORTH 36°45'48" EAST 102.00 FEET ; THENCE NORTH 48°04'18" EAST 100.00 Ebb THENCE NORTH 59°22'48" EAST 102.00 FEET ; THENCE NORTH 40°43'48" EAST 78.24 FEET; THENCE NORTH 8°45'42" WEST 39.50 FEET; THENCE NORTH 55°55'42" WEST 74.01 TO A POINT OF CURVATURE; THENCE ALONG A CURVE TO THE RIGHT, WITH A RADIUS OF 30 FEET, FOR A DISTANCE OF 61.40 FEET ; THENCE NORTH 61°20 '18" EAST 110.91 FEET; THENCE NORTH 88°14'48" EAST 196.64 FEET; THENCE NORTH 47°29'18" EAST 44.09 FEET. TO AN INTERSECTION WITH THE SOUTH LINE OF SECTION 17, TOWNSHIP 15 SOUTH, RANGE 2 EAST, SAID INTERSECTION BEING NORTH 87°44'15" WEST 843.04 FEET FROM THE SOUTH QUARTER CORNER OF SECTION 17, TOWNSHIP 15 SOUTH, RANGE 2 EAST, SAN BERNARDINO BASE AND MERIDIAN.

EXCEPTING THEREFROM ALL THAT PORTION LYING WESTERLY AND SOUTHWESTERLY OF THE FOLLOWING DESCRIBED LINE:

BEGINNING AT A CONCRETE MONUMENT, WITH BRASS PLATE MARKED L. S. 2341, SET FOR THE NORTHWEST CORNER OF SAID SOUTHEAST QUARTER OF THE NORTHEAST QUARTER OF SAID SECTION 19; THENCE ALONG THE FOLLOWING NUMBERED COURSES:

(1) SOUTH 05°20'22" WEST, 121.76 FEET;
(2) SOUTH 30°58'36" EAST, 62.44 FEET;
(3) SOUTH 20°33'15" EAST, 173.86 FEET;
(4) SOUTH 31°31'31" EAST, 313.02 FEET;
(5) SOUTH 13°11'18" EAST, 237.63 FEET;

EXHIBIT "A" - Continued

(6) SOUTH 30°56'00" EAST, 42.62 FEET;
(7) SOUTH 52°44'07" EAST, 87.30 FEET;
(8) SOUTH 30°56'00" EAST, 70.00 FEET;
(9) SOUTH 02°45'18" EAST, 158.82 FEET;
(10) SOUTH 26°21'33" EAST, 125.40 FEET;
(11) SOUTH 30°56'00" EAST, 111.96 FEET TO A POINT ON THE SOUTH LINE OF THE NORTHEAST QUARTER OF SAID SECTION 19, DISTANT SOUTH 89°32'37" WEST, 627.84 FEET FROM A STONE, WITH A CHISELED "X" ON THE WEST FACE, SET FOR THE EAST QUARTER CORNER OF SAID SECTION 19;
(12) SOUTH 30°56'00" EAST, 606.02 FEET TO A POINT DISTANT NORTH 59°04'00" EAST, 116.00 FEET FROM ENGINEER'S STATION 444+52.98 B.C. ON THE CENTERLINE OF THE STATE FREEWAY, ROAD 11-SD-8 BETWEEN EL CAJON AND ALPINE.

THE BEARING AND DISTANCE USED IN THE ABOVE DESCRIPTION ARE ON THE CALIFORNIA COORDINATE SYSTEM, ZONE 6. MULTIPLY DISTANCES SHOWN BY 1.0000682 TO OBTAIN GROUND LEVEL DISTANCES.

EXCEPTING THEREFROM THAT PORTION LYING WITHIN PARCEL 1 HEREINABOVE DESCRIBED.

Assessor's Parcel Number: **402-221-08**

EXHIBIT "A"

All that certain real property situated in the County of San Diego, State of California, described as follows:

Parcel 1:

All of the Southeast quarter of the Northeast quarter of Section 19, Township 15 South, Range 2 East, San Bernardino Meridian, in the County of San Diego, State of California, according to United States Government Survey.

Excepting therefrom that portion lying Northwesterly of a line described as follows:

Commencing at the Southwest corner of the Southeast quarter of the Northeast quarter of said Section 19;
Thence along the Westerly line of said Southeast quarter of the Northeast quarter, North 04°58'10" East 152.87 feet to the most Southerly corner of land described in deed to Gayle Ratcliff, et ux, recorded December 13, 1950 in Book 3896, Page 77 of Official Records and the True Point of Beginning;
Thence along the Southerly and Southeasterly boundary of said Ratcliff's land as follows: North 85°18'30" East 964.87 feet to an angle point therein and North 32°53'00" East 757.98 feet to an intersection with the Easterly line of said Section 19.

Also excepting therefrom that portion lying Southwesterly of a line, described as follows:

Beginning at the intersection of the South line of the Northeast quarter of said Section and the Northeasterly line of the land described in the deed to the State of California, recorded January 29, 1932 in Book 80, Page 258 San Diego County Official Records, said Intersection bearing North 89°32'37" East, 351.50 feet from a one-inch iron pipe set for the Southwest corner of the Southeast quarter of the Northeast quarter of said section, said Southwest corner being at Coordinates X-249, 672.763 feet and X-1827, 862.743 feet;
Thence along said Northeasterly line, North 29°39'56" West, 193.01 feet to the Southerly line of the land described in the deed to Martha H. Ratcliff, et al, recorded December 13, 1950 in Book 3896, Page 77 of San Diego County, Official Records;
Thence along said Southerly line North 85°40'04" East 316.16 feet to the True Point of Beginning of the herein described line, being also a point in the Northeasterly line of land described in deeds to the State of California, recorded April 27, 1968 as File Nos. 74038 and 74039, respectively or Official Records;
Thence Southeasterly along said Northeasterly boundary as follows:

South 26°21'33" East, 103.77 feet;
Thence South 30°56'00" East, 111.96 feet to the South line of said Southeast quarter of the Northeast quarter and the termination of the herein described line.

Parcel 2: (Intentionally deleted)

Parcel 3:

All that portion of the West half of the Northwest quarter of Section 20, Township 15 North, Range 2 East, San Bernardino Meridian, in the County of San Diego, State of California, according to United States Government Survey, lying Northerly and Northwesterly of the

EXHIBIT "A" - Continued

Southerly and Southeasterly line of Old Road Survey Nos. 27 and 188, according to plat thereof, filed in the Office of the County Engineer of San Diego County, as said Old Road Surveys existed December 16, 1968.

Excepting therefrom all coal and other minerals as reserved by the United State of America in deed recorded March 26, 1928 in Book 15, Page 29 of Patents, Records of San Diego County.

Also excepting therefrom that portion lying Easterly of the following described line:

Beginning at the Northeast corner of the Southeast quarter of the Northwest quarter of said Section 20;
Thence Westerly along the North line of the Southeast quarter of the Northwest quarter of said Section 20, to the Northwest corner of the Southeast quarter of the Northwest quarter of said Section 20;
Thence deflecting to the left 53°00' 490 feet;
Thence deflecting to the left 73°00' to a point on the West line of the Southeast quarter of the Northwest quarter of said Section 20;
Thence Southerly along the West line of the Southeast quarter of the Northwest quarter of said Section 20, to a point on the Southerly line of Old Road Survey Nos. 27 and 188, according to plat thereof, filed in the Office of the County Engineer of San Diego County, as said Old Road Surveys existed December 16, 1968.

Also excepting therefrom that portion lying Northerly of the following described line:

Beginning at the Northeast corner of the Northwest quarter of the Northwest quarter of said Section 20;
Thence Southerly along the East line of the Northwest quarter of the Northwest quarter, 1138 feet;
Thence deflecting to the right 66°30', 400 feet;
Thence deflecting to the right 33°00' to a point on the West line of said Section 20.

Parcel 4:

An easement and right-of-way for road and utility purposes over, under, along and across that portion of the easement and right-of-way for road purposes, 40 feet in width, granted to the City of San Diego recorded July 27, 1932, in Book 145, Page 162 of Official Records lying within that parcel of land described in deed to John Franklin Hein, et al, recorded November 22, 1976 as File No. 76-389904 of Official Records in Section 19, Township 15 North, Range 2 East, San Bernardino Meridian, in the County of San Diego, State of California, according to United States Government Survey.

Excepting therefrom those portion lying within Parcels 1 and 3 above.

Parcel 5:

An easement and right-of-way for road and utility purposes over, under, along and across a strip of land 40 feet in width lying within the Northeast quarter of Section 19, Township 15 South, Range 2 East, San Bernardino Meridian, in the County of San Diego, State of California, according to Official Plat thereof, described as follows:

Beginning at a point on the North line of the Southeast quarter of said Northeast quarter, distant thereof North 87°25'55" West, 807.05 feet (record North 87°47'11" West, 807.11

feet) from the Northeast corner thereof; being the Southeasterly corner of land described in deed to John Franklin Hein, recorded June 13, 1977 as File No. 77-230444 of Official Records;
Thence along the boundary of said Hein land North 01°56'09" West (record North 2°17'25" West) 80.31 feet;
North 67°03'10" West, 368.82 feet (recorded 375.00 feet) to the True Point of Beginning;
Thence continuing along said Hein boundary (Deed File No. 77-230444) South 88°46'47" West 117.84 feet;
Thence South 1°13'13" East 20.00 feet;
Thence South 75°19'34" West to a point of intersection with a line that is parallel with and 40 feet, measured at right angles from that Northerly line of said Hein's Land, being bearing South 88°46'47" West, described above;
Thence along said parallel line North 88°46'47" East to a line that bears South 67°03'10" East from the True Point of Beginning;
Thence North 67°03'10" West to the True Point of Beginning.

Parcel 6:

An easement and right-of-way for road and utility purposes over, under, along and across a strip of land 60 feet in width lying within the Northeast quarter of Section 19, Township 15 South, Range 2 East, San Bernardino Meridian, in the County of San Diego, State of California, according to Official Plat thereof, the centerline of said 60 foot strip being described as follows:

Beginning at the most Easterly corner of that land described in deed to John Franklin Hein, recorded June 13, 1977 as File No. 77-230444 of Official Records, said point being North 87°25'55" West 807.05 feet (Deed - North 87°47'11" East 807.11 feet) from the Southeast corner of the North half of the said Northeast quarter;
Thence along the South line of Hein's land North 87°25'55" West 32.13 feet to a point herein designated Point "A";
Thence retracing along said South line of Hein's land South 87°25'55" East 32.13 feet to the Southeasterly corner of Hein's land;
Thence along the Easterly and Northerly boundary of said Hein land North 01°56'09" West (record North 2°17'25" West) 80.31 feet; North 67°03'10" West, 368.82 feet (record 375.00 feet) and South 88°46'47" West, record South 88°29'50" West) 75.00 feet to the True Point of Beginning of the herein described centerline;
Thence South 67°03'10" East, along a line that is parallel with and 30 feet measured at right angles from the Northeasterly boundary of said Hein land (said Northeasterly boundary being bearing North 67°03'10" West as described above) 391.73 feet to a line that bears North 18°25'55" West from said Point "A";
Thence South 18°25'55" East 72.03 feet, more or less, to said Point "A";
Thence continuing South 18°25'55" East 100 feet to the beginning of a tangent 150 foot radius curve, concave Westerly;
Thence Southerly along the arc of said curve through an angle of 55°20'00", a distance of 139.30 feet to the beginning of a reverse 150 foot radius curve;
Thence Southerly along the arc of said curve through a central angle of 47°00'00", a distance of 119.63 feet;
Thence tangent to said curve South 10°05'55" East, 135 feet to the beginning of a tangent 500 foot radius curve, concave Westerly;
Thence Southerly along the arc of said curve through a central angle of 34°00'00", a distance of 292.37 feet;
Thence tangent to said curve South 23°54'05" West 100 feet, more or less, to a point of intersection with a line that is parallel with and 30 feet Northeasterly measured at right

EXHIBIT "A" - Continued

angles from that course in the Southwesterly boundary of the land described in deed to John Franklin Hein, et al, recorded November 22, 1976 as File No. 76-389904, said course in the Southwesterly boundary being South 30°56'03" East 70.00 feet;
Thence from said point of intersection and parallel with and 30 feet Northeasterly measured at right angles from the Southwesterly boundary of Hein's Land (File No. 76-389904) South 30°56'03" East 107.46 feet and South 02°45'10" East 37.53 feet to point of terminus.

The side lines of said 60 foot strip to lengthen or shorten Northerly to intersect the Northwesterly boundary of Hein's Land (File No. 77-230444).

EXHIBIT "A"

All that certain real property situated in the County of San Diego, State of California, described as follows:

PARCEL 1: (523-020-01)

THE SOUTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 5, TOWNSHIP 16 SOUTH, RANGE 3 EAST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF.

PARCEL 1A:

AN EASEMENT FOR ROAD, ACCESS AND UTILITIES THIRTY (30) FEET IN WIDTH OVER AND ACROSS THE NORTH HALF OF SECTION 3, TOWNSHIP 16 SOUTH, RANGE 3 EST, THE CENTERLINE OF THE EASEMENT BEING THE CENTERLINE OF THE EXISTING "BELL BLUFF TRUCK TRAIL" AS MORE FULLY DESCRIBED IN DEED RECORDED FEBRUARY 7, 2001 AS FILE NO. 2001-0071903 OF OFFICIAL RECORDS. THIS EASEMENT IS APPURTENANT TO PARCEL 1 ABOVE.

PARCEL 1B:

A NONEXCLUSIVE EASEMENT FOR INGRESS, EGRESS, ROAD AND UTILITY PURPOSES, OVER A PORTION OF THE EAST HALF AND THE SOUTHERLY 495 FEET OF THE WEST HALF OF THE NORTHWEST QUARTER OF SECTION 2, TOWNSHIP 16 SOUTH, RANGE 3 EAST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA ACCORDING TO THE OFFICIAL PLAT THEREOF, AS CONVEYED TO THE COUNTY OF SAN DIEGO PER DEED RECORDED IN THE OFFICE OF THE SAN DIEGO COUNTY RECORDER DECEMBER 01, 1976 AS INSTRUMENT NO. 76400536 AND LAND PATENT RECORDED IN SAID RECORDERS OFFICE, JUNE 06, 1977 AS INSTRUMENT NO. 77219429 OF OFFICIAL RECORDS, ALONG AND ACROSS THE EXISTING ROAD KNOWN AS "BELL BLUFF TRUCK TRAIL", BEING A STRIP OF LAND 40 FEET IN WIDTH, LYING 20 FEET ON EITHER SIDE AS MEASURED AT RIGHT ANGLES AND PERPENDICULAR TO THE FOLLOWING DESCRIBED CENTERLINE:

BEGINNING AT A POINT ON THE EASTERLY LINE OF SAID EASTERLY HALF OF THE NORTHWEST QUARTER OF SECTION 2 BEING APPROXIMATELY 2640

FEET, SOUTH 9° WEST FROM THE NORTH QUARTER CORNER OF SAID SECTION 2, SAID POINT ALSO BEING THE BEGINNING OF A 30 FOOT EASEMENT RESERVED TO THE UNITED STATES OF AMERICA IN SAID LAND PATENT; THENCE WESTERLY ALONG THE ALIGNMENT OF THE DIRT ROAD AS IT EXISTS AT THE TIME OF THE RECORDATION OF THIS DOCUMENT, TO A POINT ON THE WESTERLY LINE OF SAID SECTION 2 AND THE POINT OF TERMINUS AS MORE PARTICULARLY DESCRIBED IN DEED RECORDED OCTOBER 3, 2005 AS FILE NO. 20050853224 OF OFFICIAL RECORDS.

THIS EASEMENT IS APPURTENANT TO PARCEL 1 ABOVE.

PARCEL 1C:

A NONEXCLUSIVE EASEMENT FROM THE EASTERN LIMIT OF SECTION 4, TOWNSHIP 16 SOUTH, RANGE 3 EAST TO THE EASTERN LIMIT OF SECTION 5, TOWNSHIP 16 SOUTH, RANGE 3 EAST FOR ROAD, ACCESS, AND UTILITIES OVER AND ACROSS SAN DIEGO COUNTY TAX ASSESSOR'S PARCEL NOS. 52303009 AND 52303010 AND LYING WITHIN THE NORTH HALF OF SAID SECTION 4, TOWNSHIP 16 SOUTH, RANGE 3 EAST IN THE COUNTY OF SAN DIEGO. THIS EASEMENT SHALL BE 30 FEET IN WIDTH WITH THE CENTERLINE BEING THE CENTERLINE OF THE EXISTING ROAD LYING WITHIN THE SOUTH 50 FEET OF APN 52303009 AND THE NORTH 700 FEET OF APN 52303010. THIS EASEMENT IS APPURTENANT TO PARCEL 1 ABOVE.

PARCEL 2: (523-020-06)

PARCEL "C" OF A CERTIFICATE OF COMPLIANCE RECORDED AUGUST 12, 2004, AS FILE NO. 20040766910 OF OFFICIAL RECORDS, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

THE NORTH HALF OF THE NORTHEAST QUARTER; THE NORTH HALF OF THE NORTH HALF OF THE SOUTHEAST QUARTER OF THE NORTHEAST QUARTER; THE NORTH HALF OF SOUTHWEST QUARTER OF THE NORTHEAST QUARTER AND THE NORTH HALF OF THE SOUTH HALF OF SOUTHWEST QUARTER OF THE NORTHEAST QUARTER ALL IN SECTION 5, TOWNSHIP 16 SOUTH, RANGE 3 EAST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF.

PARCEL 2A:

AN EASEMENT FOR ROAD, ACCESS AND UTILITIES THIRTY (30) FEET IN WIDTH OVER AND ACROSS THE NORTH HALF OF SECTION 3, TOWNSHIP 16 SOUTH, RANGE 3 EAST, THE CENTERLINE OF THE EASEMENT BEING THE CENTERLINE OF THE EXISTING "BELL BLUFF TRUCK TRAIL", AS MORE FULLY DESCRIBED IN DEED RECORDED FEBRUARY 7, 2001 AS FILE NO. 20010071903 OF OFFICIAL RECORDS.

THIS EASEMENT IS APPURTENANT TO PARCEL 2 ABOVE.

PARCEL 2B:

A NONEXCLUSIVE EASEMENT FOR INGRESS, EGRESS, ROAD AND UTILITY PURPOSES, OVER A PORTION OF THE EAST HALF AND THE SOUTHERLY 495 FEET OF THE WEST HALF OF THE NORTHWEST QUARTER OF SECTION 2, TOWNSHIP 16 SOUTH, RANGE 3 EAST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA ACCORDING TO THE OFFICIAL PLAT THEREOF, AS CONVEYED TO THE COUNTY OF SAN DIEGO PER DEED RECORDED IN THE OFFICE OF THE SAN DIEGO COUNTY RECORDER DECEMBER 01, 1976 AS INSTRUMENT NO. 76400536 AND LAND PATENT RECORDED IN SAID RECORDERS OFFICE, JUNE 06, 1977 AS INSTRUMENT NO. 77219429 OF OFFICIAL RECORDS, ALONG AND ACROSS THE EXISTING ROAD KNOWN AS "BELL BLUFF TRUCK TRAIL", BEING A STRIP OF LAND 40 FEET IN WIDTH, LYING 20 FEET ON EITHER SIDE AS MEASURED AT RIGHT ANGLES AND PERPENDICULAR TO THE FOLLOWING DESCRIBED CENTERLINE:

BEGINNING AT A POINT ON THE EASTERLY LINE OF SAID EASTERLY HALF OF THE NORTHWEST QUARTER OF SECTION 2 BEING APPROXIMATELY 2640 FEET, SOUTH 9° WEST FROM THE NORTH QUARTER CORNER OF SAID SECTION 2, SAID POINT ALSO BEING THE BEGINNING OF A 30 FOOT EASEMENT RESERVED TO THE UNITED STATES OF AMERICA IN SAID LAND PATENT; THENCE WESTERLY ALONG THE ALIGNMENT OF THE DIRT ROAD AS IT EXISTS AT THE TIME OF THE RECORDATION OF THIS DOCUMENT, TO A POINT ON THE WESTERLY LINE OF SAID SECTION 2 AND THE POINT OF TERMINUS, AS MORE PARTICULARLY DESCRIBED IN DEED RECORDED OCTOBER 3, 2005 AS FILE NO. 20050853224 OF OFFICIAL. RECORDS

THIS EASEMENT IS APPURTENANT TO PARCEL 2 ABOVE.

PARCEL 2C:

A NONEXCLUSIVE EASEMENT FROM THE EASTERN LIMIT OF SECTION 4, TOWNSHIP 16 SOUTH, RANGE 3 EAST TO THE EASTERN LIMIT OF SECTION 5, TOWNSHIP 16 SOUTH, RANGE 3 EAST FOR ROAD, ACCESS, AND UTILITIES OVER AND ACROSS SAN DIEGO COUNTY TAX ASSESSOR'S PARCEL NOS. 52303009 AND 52303010 AND LYING WITHIN THE NORTH HALF OF SAID SECTION 4, TOWNSHIP 16 SOUTH, RANGE 3 EAST IN THE COUNTY OF SAN DIEGO. THIS EASEMENT SHALL BE 30 FEET IN WIDTH WITH THE CENTERLINE BEING THE CENTERLINE OF THE EXISTING ROAD LYING WITHIN THE SOUTH 50 FEET OF APN 52303009 AND THE NORTH 700 FEET OF APN 52303010.

THIS EASEMENT IS APPURTENANT TO PARCEL 2 ABOVE.

PARCEL 3: (523-020-07)

PARCEL "D" OF A CERTIFICATE OF COMPLIANCE RECORDED AUGUST 12, 2004, AS FILE NO. 20040766910 OF OFFICIAL RECORDS, MORE PARTICULARLY DESCRIBED FOLLOWS:

THE NORTH HALF OF THE SOUTHEAST QUARTER; THE SOUTH HALF OF THE SOUTH HALF OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER; THE SOUTH HALF OF THE SOUTHEAST QUARTER OF THE NORTHEAST QUARTER AND THE SOUTH HALF OF THE NORTH HALF OF THE SOUTHEAST QUARTER OF THE NORTHEAST QUARTER ALL IN SECTION 5, TOWNSHIP 16 SOUTH, RANGE 3 EAST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDTNG TO THE OFFICIAL PLAT THEREOF.

PARCEL 3A:

AN EASEMENT FOR ROAD, ACCESS AND UTILITIES THIRTY (30) FEET IN WIDTH OVER AND ACROSS THE NORTH HALF OF SECTION 3, TOWNSHIP 16 SOUTH, RANGE 3 EAST, THE CENTERLINE OF THE EASEMENT BEING THE CENTERLINE OF THE EXISTING "BELL BLUFF TRUCK TRAIL", AS MORE FULLY DESCRIBED IN DEED RECORDED FEBRUARY 7, 2001 AS FILE NUMBER 2001-0071903 OF OFFICIAL RECORDS.

THIS EASEMENT IS APPURTENANT TO PARCEL 3 ABOVE.

PARCEL 3B:

A NONEXCLUSIVE EASEMENT FOR INGRESS, EGRESS, ROAD AND UTILITY PURPOSES, OVER A PORTION OF THE EAST HALF AND THE SOUTHERLY 495 FEET OF THE WEST HALF OF THE NORTHWEST QUARTER OF SECTION 2, TOWNSHIP 16 SOUTH, RANGE 3 EAST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA ACCORDING TO THE OFFICIAL PLAT THEREOF, AS CONVEYED TO THE COUNTY OF SAN DIEGO PER DEED RECORDED IN THE OFFICE OF THE SAN DIEGO COUNTY RECORDER DECEMBER 01, 1976 AS INSTRUMENT NO. 76400536 AND LAND PATENT RECORDED IN SAID RECORDERS OFFICE, JUNE 06, 1977 AS INSTRUMENT NO. 77219429 OF OFFICIAL RECORDS, ALONG AND ACROSS THE EXISTING ROAD KNOWN AS "BELL BLUFF TRUCK TRAIL", BEING A STRIP OF LAND 40 FEET IN WIDTH, LYING 20 FEET ON EITHER SIDE AS MEASURED AT RIGHT ANGLES AND PERPENDICULAR TO THE FOLLOWING DESCRIBED CENTERLINE:

BEGINNING AT A POINT ON THE EASTERLY LINE OF SAID EASTERLY HALF OF THE NORTHWEST QUARTER OF SECTION 2 BEING APPROXIMATELY 2640 FEET, SOUTH 9° WEST FROM THE NORTH QUARTER CORNER OF SAID SECTION 2, SAID POINT ALSO BEING THE BEGINNING OF A 30 FOOT EASEMENT RESERVED TO THE UNITED STATES OF AMERICA IN SAID LAND PATENT; THENCE WESTERLY ALONG THE ALIGNMENT OF THE DIRT ROAD AS IT EXISTS AT THE TIME OF THE RECORDATION OF THIS DOCUMENT, TO A POINT ON THE WESTERLY LINE OF SAID SECTION 2 AND THE POINT OF TERMINUS, AS MORE PARTICULARLY DESCRIBED IN DEED RECORDED OCTOBER 3, 2005 AS FILE NO. 20050853224 OF OFFICIAL. RECORDS.

THIS EASEMENT IS APPURTENANT TO PARCEL 3 ABOVE.

PARCEL 3C:

A NONEXCLUSIVE EASEMENT FROM THE EASTERN LIMIT OF SECTION 4, TOWNSHIP 16 SOUTH, RANGE 3 EAST TO THE EASTERN LIMIT OF SECTION 5, TOWNSHIP 16 SOUTH, RANGE 3 EAST FOR ROAD, ACCESS, AND UTILITIES OVER AND ACROSS SAN DIEGO COUNTY TAX ASSESSOR'S PARCEL NOS. 52303009 AND 52303010 AND LYING WITHIN THE NORTH HALF OF SAID SECTION 4, TOWNSHIP 16 SOUTH, RANGE 3 EAST IN THE COUNTY OF SAN DIEGO. THIS EASEMENT SHALL BE 30 FEET IN WIDTH WITH THE CENTERLINE BEING THE CENTERLINE OF THE EXISTING ROAD LYING WITHIN THE SOUTH 50 FEET OF APN 52303009 AND THE NORTH 700 FEET OF APN 52303010.

THIS EASEMENT IS APPURTENANT TO PARCEL 3 ABOVE.

PARCEL 4: (523-030-12)

LOT 2 AND THE EASTERLY ONE THIRD OF LOT 3, WITH THE WESTERLY LINE OF SAID EASTERLY ONE THIRD PARALLEL TO THE WESTERLY LINE OF LOT 3, OF SECTION 4, TOWNSHIP 16 SOUTH, RANGE 3 EAST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF SAN DIEGO, AS SHOWN ON RECORD OF SURVEY NO. 9006.

PARCEL 5: (523-030-13)

ALL OF SECTION 4, TOWNSHIP 16 SOUTH, RANGE 3 EAST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF SAN DIEGO, AS SHOWN ON RECORD OF SURVEY NO. 9006, EXCEPTING THEREFROM THE FOLLOWING FIVE PARCELS:

1. 1. LOT I OF THE SAID SECTION 4, TOWNSHIP 16 SOUTH, RANGE 3 EAST, SAN BERNARDINO MERIDIAN;
2. 2. LOT 2 AND THE EASTERLY ONE THIRD OF LOT 3, WITH THE WESTERLY LINE OF SAID EASTERLY ONE THIRD PARALLEL TO THE WESTERLY LINE OF LOT 3, OF THE SAID SECTION 4, TOWNSHIP 16 SOUTH, RANGE 3 EAST. SAN BERNARDINO MERIDIAN;
3. 3. THE EASTERLY ONE HALF OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER AND THE WESTERLY ONE HALF OF THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER OF THE SAID SECTION 4, TOWNSHIP 18 SOUTH, RANGE 3 EAST, SAN BERNARDINO MERIDIAN;
4. 4. THE EAST HALF OF THE SOUTHEAST QUARTER OF THE SAID SECTION 4, TOWNSHIP 16 SOUTH, RANGE 3 EAST, SAN BERNARDINO MERIDIAN;
5. 5. THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER AND THE SOUTH HALF OF THE SOUTHWEST QUARTER OF THE SAID SECTION 4, TOWNSHIP 16 SOUTH, RANGE 3 EAST, SAN BERNARDINO MERIDIAN.

PARCEL 5: (523-030-14)

THE EASTERLY ONE HALF OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER AND THE WESTERLY ONE HALF OF THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 4, TOWNSHIP 16 SOUTH, RANGE 3 EAST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF SAN DIEGO, AS SHOWN ON RECORD OF SURVEY NO.

9006.

PARCEL 6: (523-030-09)

LOT 1 OF FRACTIONAL SECTION 4, TOWNSHIP 16 SOUTH, RANGE 3 EAST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, AS SHOWN ON RECORD OF SURVEY MAP NO. 9006, RECORDED IN THE OFFICE OF SAN DIEGO COUNTY RECORDER, APRIL 22, 1982 AS INSTRUMENT NO. 1982114805 OF OFFICIAL RECORDS , DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHEAST CORNER OF SAID SECTION 4; THENCE ALONG THE NORTHERLY LINE OF SECTION 4 NORTH 89°22'48" WEST, 1307.33 FEET; THENCE LEAVING SAID NORTHERLY LINE, SOUTH 07°26'55" WEST, 1524.82 FEET; THENCE SOUTH 88°54'16" EAST, 1309.29 FEET TO THE EASTERLY LINE OF SAID SECTION 4; THENCE ALONG SAID EASTERLY LINE NORTH 07°19'45" WEST, 1535.39 FEET TO THE POINT OF BEGINNING, AS DESCRIBED AS PARCEL "A" IN CERTIFICATE OF COMPLIANCE, RECORDED FEBRUARY 22, 2007 AS INSTRUMENT NO. 20070120606, OF OFFICIAL RECORDS, AND IDENTIFIED THEREIN AS A.P.N. 52303009.

Day Parcel A: (523-020-03)

THE NORTH ONE-HALF OF THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 5, TOWNSHIP 16 SOUTH, RANGE 3 EAST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO UNITED STATES GOVERNMENT SURVEY THEREOF.

Day Parcel B: (523-020-04)

THE SOUTH HALF OF THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 5, TOWNSHIP 16 SOUTH, RANGE 3 EAST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO UNITED STATES GOVERNMENT SURVEY THEREOF.

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EXHIBIT "A" TO GRANT DEED
LEGAL DESCRIPTION OF THE PROPERTY

PARCEL A: (APN 604-110-01)

THE NORTH HALF OF THE NORTHWEST QUARTER AND THE SOUTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 33, TOWNSHIP 17 SOUTH, RANGE 4 EAST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO OFFICIAL PLAT THEREOF.

PARCEL B: (APN 604-110-04)

THE EAST HALF OF THE NORTHEAST QUARTER OF SECTION 33, TOWNSHIP 17 SOUTH, RANGE 4 EAST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF.

PARCEL C: (APN 604-110-05)

THE NORTH HALF OF THE NORTHWEST QUARTER OF THE SOUTHEAST QUARTER AND THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 33 IN TOWNSHIP 17 SOUTH, RANGE 4 EAST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO OFFICIAL PLAT THEREOF.

PARCEL D: (APN 604-120-03)

THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 34, (SAID NORTHWEST QUARTER OF THE NORTHWEST QUARTER NOW PURPORTED TO BE TRACT 64 PER GOVERNMENT RESURVEY APPROVED NOV. 26, 1927), IN TOWNSHIP 17 SOUTH, RANGE 4 EAST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO OFFICIAL PLAT THEREOF.

EXCEPTING FROM SAID NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 34 THAT PORTION LYING WITHIN THE FOLLOWING DESCRIBED BOUNDARY:

BEGINNING AT CORNER NO. 4 OF SAID TRACT NO. 64, AS SHOWN ON UNITED STATES GOVERNMENT INDEPENDENT RESURVEY OF TOWNSHIP 17 SOUTH, RANGE 4 EAST, SAN BERNARDINO BASE AND MERIDIAN, APPROVED NOVEMBER 26,1927; THENCE ALONG THE SOUTH LINE OF SAID TRACT 64, WEST, 700.00 FEET; THENCE, PARALLEL WITH THE EAST LINE OF SAID TRACT 64, NORTH 620.00 FEET; THENCE, PARALLEL WITH THE SOUTH LINE OF SAID TRACT 64, EAST 700.00 FEET TO THE EAST LINE OF SAID TRACT 64; THENCE, ALONG SAID EAST LINE, SOUTH 620.00 FEET TO THE POINT OF BEGINNING.

PARCEL E: (APN 604-110-07)

THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 28, AND THE WEST HALF OF THE NORTHEAST QUARTER, AND THE SOUTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 33, TOWNSHIP 17 SOUTH, RANGE 4 EAST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO OFFICIAL PLAT THEREOF.

END OF LEGAL DESCRIPTION

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To be inserted

Desert Cahuilla

To be inserted