Biological Resources Damage Assessment Within Murrieta Creek in Relation to the Temecula Valley Regional Water Reclamation Facility December 25, 2009 Sewage Spill

City of Temecula, Riverside County, California
USGS – Murrieta and Temecula topographic quadrangles
Township 8 South, Range 3 West

Prepared for:

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CERTIFICATION: *"I hereby certify that the statements furnished herein and in the attached exhibits present the data and information required for this biological resources damage assessment, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief. Fieldwork conducted for this assessment was performed by me or under my direct supervision. I certify that I have not signed a non-disclosure or consultant confidentiality agreement with the project applicant or applicant's representative and that I have no financial interest relative to the spill event."*

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Prepared on January 05, 2010
Updated, revised and finalized on January 25, 2010

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1. Introduction

The following biological resources damage assessment has been prepared by Tom Dodson & Associates (TDA) on behalf of Eastern Municipal Water District (EMWD or District) for potential impacts to Murrieta Creek resulting from an inadvertent sewage spill from the Temecula Valley Regional Water Reclamation Facility (TVRWRF) on December 25 and 26, 2009. This document presents background information and a basic analysis of impacts to biological resources within Murrieta Creek, from Winchester Road downstream 1,000 feet past Rancho California Road. EMWD, in coordination with the San Diego Regional Water Quality Control Board, is providing the sampling, analyses and documentation of impacts to water quality. This report only addresses potential impacts to biological resources and does provide an analysis of impacts to surface or ground water quality.

The impact and study areas can be found on the San Bernardino and Riverside Counties Thomas Guide on page 958, grids F5, G5, G6, H6, H7 and within Township 8 South, Range 3 West, Sections 11, 12, and 2 SBBM as shown on the USGS - Murrieta and Temecula Quadrangle, 7.5 Minute Series topographic maps in the City of Temecula, Riverside County, California (Figures 1-3).

The EMWD incorporated on October 16, 1950 to secure additional water for a lightly populated area of Riverside County. On May 15, 1951, EMWD annexed into Metropolitan Water District of Southern California (MWD). In the 1960s, EMWD began to expand of its responsibilities of providing freshwater to include sewage collection and treatment, and eventually water reclamation activities. Presently, EMWD provides sewage collection and treatment services to customers within its approximately 555 square mile service area. To provide this wastewater collection and treatment service, EMWD operates five regional water reclamation facilities. One of the EMWD plants, is the TVRWRF located in the City of Temecula.

The TVRWRF was constructed in the early 1970s with a treatment capacity of about one million gallons per day (MGD). To meet the growing wastewater treatment requirements of its service area, the TVRWRF has undergone several upgrades since its construction. The TVRWRF has recently undergone expansion to an 18 MGD treatment capacity. The TVRWRF is situated within the corporate limits of the City of Temecula, Riverside County, California.

At 6:30 am, on Saturday, December 26, 2009 EMWD staff discovered sewage overflowing from the influent structure at the TVRWRF. Upon discovery of the release, it was found that the release had entered into Murrieta Creek. Plant staff responded by diverting the influent flow through the by-pass screen stopping the release. Staff also blocked the flow to Murrieta Creek by sandbagging a storm channel and closed Via Montezuma Road where it crosses Murrieta Creek. Collection staff was mobilized utilizing vactor trucks and portable pumps to recover flows in and around Murrieta Creek and return them back to the collection system. In particular, 6 inch portable pumps where placed at pooling areas in Murrieta Creek at Via Montezuma Road and Rancho California Road. An estimated volume of 966,800 gallons was successfully recovered from Murrieta Creek. Murrieta Creek had low flow conditions at this time and the release did not

flow past the pumping location at Rancho California Road. The pumper trucks were mobilized on, December 26, 2009 at 12:40pm at Via Montezuma and at 3:04pm at Rancho California Road. The EMWD staff finished pumping on December 27, 2009 at 5:19am.

The volume of the release reported to the Emergency Management Agency (EMA) on December 26, 2009 was 5 to 7 million gallons of sewage. After carefully reviewing the plant's influent and effluent flow meters and comparing the flows on the day prior to the release and the day after the release, EMWD revised their initial estimate, of 5 to 7 million gallons of sewage released from the influent structure, to approximately 2.4 million gallons of sewage. It was determined that a majority of the flow did go through the plant and only a portion of the influent was released. The initial estimated volume was erroneously based on total influent flows.

The Emergency Management Agency (EMA# 09-8567), California Department of Public Health, Riverside County Department of Environmental Health, Riverside County Flood Control, Regional Water Quality Control Board (RWQCB), Rancho California Water District, Fallbrook Public Utilities District, Marine Corps Base Camp Pendleton and California Department of Fish and Game (CDFG) were notified of this release. Following the required agency notifications, EMWD contacted TDA to conduct and prepare a biological resources damage assessment. The RWQCB provided EMWD with information that this type of assessment, in coordination with the CDFG, would be required.

2. Site Inspection

TDA Biologist, Shay Lawrey, met with Alfred Javier, Senior Environmental Analyst for the EMWD on Tuesday, December 29, 2009 at 9:30 AM. Mr. Javier provided Ms. Lawrey with a detailed orientation to the spill and remediation efforts. After gathering details of the spill, Mr. Javier and Ms. Lawrey conducted a reconnaissance level survey between the spill inlet into Murrieta Creek, downstream to its confluence with Temecula Creek and Santa Margarita River. This reconnaissance survey allowed Ms. Lawrey to visually note the extent of disturbance and develop a work plan to conduct a detailed survey the next day.

On Wednesday, December 30, 2009 Shay Lawrey and Craig Lawrey conducted an intensive visual examination of the impact area in Murrieta Creek. Weather conditions were fair with 100% cloud cover, light rain and cool temperatures ranging from 49 to 54 Fahrenheit. From Winchester Road to 1,000 feet downstream of Rancho California Road, a total of fifteen (15) 150 meter transects were set to characterize the stream morphology (Figure 4). Within each transect the following habitat characteristics were noted:

1. Gross estimation of visible pollutants
2. Vegetation
    a. Estimated percent coverage of rooted plants
    b. Vegetative class
    c. Vegetative type
    d. Species composition
3. Substrate

   a. Estimated percent composition of the submerged stream substrate type (sand, gravel, cobble)
4. Bank
   a. Bank stability
5. Flow Habitat
   a. Qualitative description of water flow ranging from trickle/none to fast.
   b. Channel type
6. Width
   a. Channel (bankfull) width
   b. Wetted channel width
7. Depth
   a. average stream channel depth
8. Human Influence
9. Photographs

3. Setting of Murrieta Creek

With a drainage area in excess of 220 square miles, Murrieta Creek traverses the cities of Wildomar, Murrieta, and Temecula and unincorporated County areas in the densely populated southwest region of Riverside County. At its confluence with Temecula Creek, it forms the Santa Margarita River which flows through Camp Pendleton Marine Corps Base and on to the Pacific Ocean. The ecological resources of Murrieta Creek have been identified as a resource of extremely high concern, as it is considered one of the last high quality riverine environments in Southern California. Murrieta Creek flows from the north-northwest which historically filled a large, flat alluvial valley covered with extensive riparian gallery forest. These forests were removed by agricultural practices in the early 1900s. Today, suburban development in Temecula and surrounding communities has replaced the agricultural uses. Through Temecula, Murrieta Creek is channelized and maintained for flood control purposes. Downstream of Temecula where Murrieta Creek has its confluence with Temecula Creek and forms the Santa Margarita River, the overall stream ecology is physically undisturbed and remains in natural condition. The gradient of the creek is fairly level through the Temecula Valley.

4. Description of study area

The channel gradient, elevation, width, substrate, in-stream habitat, flow habitat, and disturbance characteristics are fairly uniform between Winchester Road and Rancho California Road. Downstream of Rancho California Road, the in-stream habitat and flow habitat transitions into a dry stream with a sandy river bottom.

The study area is shallow with a substrate consisting mostly of mud, sand, and rocks. Intermediate sized substrate, namely gravel and cobble, are rare. When present this intermediate sized substrate is mixed with 20 to 80 percent finer material, usually sand. Elevations in the study area range from 996 to 1000 feet above mean sea level and the average bankfull width of the channel is 200 (ft) or 61 meters (m) wide.

The habitat types within the channel, in vicinity of the spill, include marsh/wetland, riparian, annual grassland, and sandy river wash. Riverside County Flood Control District maintains the affected reach of Murrieta Creek by mowing an approximate 150 ft or 45 m wide center-flow channel. The Creek was mowed, prior to the spill, sometime in the fall around October. As a result, the channel is devoid of any measureable canopy structure. The percent vegetative cover was calculated by using rooted vegetation that was mowed and is emergent. The vast majority of identifiable vegetation consists of sedges (*Sparghanium*), tules (*Scirpus*), cattails (*Typha*), and willows (*Salix* ssp.). Small patches of annual grassland habitat are interspersed among the dense stands of *Typha*. The primary plant species growing along both banks include mule fat *(Baccharis salicifolia),* willow *(Salix exigua* and S. *gooddingii),* sycamore *(Platanus occidentalis),* tamarisk (*Tamarix* sp) and arundo (*Arundo donax*).

Various isolated pockets of pooled water occur between Winchester Road and Rancho California Road. Mosquitofish were observed swimming in the pools. Crayfish and bullfrogs (*Rana catesbeiana*) were observed in transects 1-4. Pacific chorus frog (*Pseudacris regilla*) vocalizations were heard along transects 3. Aside from a pre-release, predated bullfrog carcass, no dead or dying fauna was observed in the study area. A small 20 ft or 6 m wide low-flow channel exists between Via Montezuma Road and Rancho California Road. Downstream of Rancho California Road, no surface flow is present.

The entire study area is disturbed by human influence. The surrounding land use is industrial and commercial. The center-flow channel is affected by flood control vegetation management, and additional human intrusion in the channel include Via Montezuma Road and the Rancho California Road bridge crossing and abutments. Buildings occur adjacent to both banks. The banks consist of sand, gravel, cobble and rock substrates that support riparian and grassland vegetation. From Winchester Road to Rancho California Road, the banks have an approximate 3:1 slope and are in stable condition. Downstream of Rancho California Road, the banks are steeper (2:1) and are somewhat vulnerable, with evidence of erosion. Several small drainage pipe inlets were noted on both banks along the study area.

5. Findings

5.1. Vegetation

From the TVRWRF spill inlet into Murrieta Creek, the affected area spans 1.6 miles to Rancho California Road, where the spill was considered contained by the EMWD. The locations of the relevant USGS gaging stations near the study area, and gage flow data for a period before and after the spill for these stations is provided below (Figures 4-6). This data correlates with the assertion that the spill was contained and did not flow beyond Rancho California Road.

The study area encompassed a 2-mile stretch of Murrieta Creek including additional areas up and downstream of the affected area. Approximately 300 m upstream of the spill inlet into

Murrieta Creek, visible signs of the spill were present in the form of an oily film slicking over the pooled areas and floating organic material. These visual signs were mostly concentrated in pooled areas along the west side of the channel. These signs are indicative of a backflow process during the spill event, however, another potential contributing factor to these signs may be the storm drain channel that inlets into the east side of Murrieta Creek (Figure 7). There was no visual indication of the spill downstream of Ranch California Road. The lack of visual signs of contamination in this area supports EMWD assumption that the spill was contained at the surface at Rancho California Road.

Approximately 20 acres of marsh/wetland habitat dominated by *Typha* and *Salix* absorbed the initial impact of the spill.

5.2. Special-Status Plants

According to the California Natural Diversity Data Base (CNDDB) two (2) State-listed, federally-listed or CNPS listed plant species have a low to moderate potential to occur within the study area. These species are the thread-leaved brodiaea *(Brodiaea filifolia)* and California screw moss (*Tortula californica*). They are associated with grassland habitat and are documented in the local vicinity of the study area. These species have not been observed within the affected area however, and they are not expected to occur. Under this expectation, the spill did not result in direct impacts to sensitive plant species. No special-status plant species were observed within the study area during the site inspection. Determining the presence or absence of potentially-occurring special-status plant species would require the completion of a spring/summer focused survey timed to coincide with the respective blooming periods to maximize detectability. All of the other sensitive plant species documented in the Murrieta and Temecula USGS quadrangles are associated with habitat types not found in the study area and are therefore considered absent.

5.3. Special-Status Wildlife

According to the CNDDB ten (10) wildlife species designated as CDFG species of Special Concern are documented within the study area. These species are Southwestern pond turtle (*Actinemys marmorata pallida*), southern rufous-crowned sparrow (*Aimophila ruficeps canescens*), tricolored blackbird *(Agelaius tricolor)* orange-throated whiptail *(Aspidoscelis hyperythra),* coastal western whiptail (*Aspidoscelis tigris stejnegeri*), coranado skink (*Eumeces skiltonianus interparietalis*), arroyo chub (*Gila orcuttii*), black-crowned night heron (*Nycticorax nycticorax*), San Diego coast horned lizard *(Phrynosoma coronatum),* and two-striped garter snake *(Thamnophis hammmondii).* One listed species has been documented in the study area which is the State and federally endangered least Bell's vireo (*Vireo bellii pusillus*).

At the time of the spill no least Bell's vireo habitat was present. The least Bell's vireo (LBVI) is a small, olive-gray migratory songbird that nests and forages almost exclusively in riparian woodland habitats. LBVI nesting habitat typically consists of well developed overstory, understory, and low densities of aquatic and herbaceous cover. The understory frequently contains dense sub-shrub or shrub thickets. Although LBVI use a variety of riparian plant

species for nesting, it appears that the structure of the vegetation is more important than other factors, such as species composition or the age of the stand. As stated before, there is a 45 m wide mow-zone in the affected area and as such, vireo habitat is not currently found in the study area. Additionally, the spill occurred outside of the migratory bird nesting season and did not directly affect breeding bird nest sites.

There is marginally suitable habitat for the two-striped garter snake where permanent and semi-permanent water is present. However, it is unlikely that the garter snake would tolerate the recent mowing. Under this assumption, two-striped garter snake is not currently likely to occur within the spill vicinity.

Murrieta Creek is an intermittent creek most of the year with average flows of 2.4 cubic feet per second (cfs). Although it is an intermittent creek is supports pockets of aquatic habitat. Native fish have been found in lowermost reach of Murrieta Creek near the gorge and in a few isolated localities upstream of Temecula, near Rancho California Road. In its present state Murrieta Creek supports only one of the four freshwater fish species native to the system, namely the arroyo chub, *Gila orcutti*, a small cyprinid minnow. The other three species, the partially armored threespine stickleback (*Gasterosteus aculeatus microcephalus)*, Pacific lamprey (*Lampetra tridentate),* and steelhead trout (*Oncorhynchus mykiss)* have not been recorded in Murrieta Creek in over 30 years. Given this information it is assumed that arroyo chub are present and absorbed direct impacts from the spill. The CDFG did not recommend conducting a fish survey (personal communication with Anna Milloy from CDFG on January 5, 2010).

As noted above, native and non-native frogs and crayfish were observed in the study area. In addition to fish, frogs and crayfish, it is likely that the southwestern pond turtle occurs in the affected area, as the marsh and aquatic habitat is suitable for this species. Southwestern pond turtle is found in ponds, lakes, rivers, streams, creeks, marshes, and irrigation ditches, with abundant vegetation, and either rocky or muddy bottoms, in woodland, forest, and grassland. In streams, it prefers pools to shallower areas. Logs, rocks, cattail mats, and exposed banks are required for basking. It is assumed that native and non-native amphibians and southwestern pond turtle are present in the affected area and that they absorbed direct impacts from the spill. *

6. Discussion of Impacts

Clearly, there are concerns over the possibility of harmful effects resulting from additional nutrients, toxins and pathogens that may be present in the affected area. Although no State- or federally-listed wildlife species occur in the impact area, there are species of special concern and native wildlife species potentially impacted. Potential impacts associated with the sewage spill on avifauna, mammals, reptiles, amphibians and fish are not easily determined or mitigated. Impacts may include bacterial infection and exposure to toxins and pathogens. Raw human sewage contains a mixture of contaminants including a variety of bacteria, protozoans, viruses, and numerous toxic chemicals, as well as high concentrations of nitrogen and phosphorus (Mallin et al. 2007). Sewage-contaminated water contains viruses and bacteria that

are a potential vehicle for disease transmission to ecological receptors (Hamilton 2007). Elevated fecal coliform counts can persist for several weeks after sewage spills in the environment. Wildlife concerns from exposure and/or infection from untreated sewage also include suppression of the immune response system, alterations in the defense mechanisms, and depression of essential biological activity that can lead to susceptibility to disease and latent infections (Friend 1985). Remaining residue from the sewage spill could cause injury to wildlife, particularly amphibians and fish. Amphibians are particularly sensitive to a number of bacteria, including those found in human sewage (Taylor et al. 2001).

The sewage spill impacts on the marsh/wetland habitat may be ameliorated naturally, to some extent, in that the existing natural biological system may in fact help purify the water. Dissolved biodegradable material can be removed from the sewage spill area by decomposing microorganisms living on the exposed surfaces of the aquatic plants and soils. Decomposers such as bacteria, fungi, and actinomycetes are active in any wetland by breaking down dissolved and particulate organic material to carbon dioxide and water. Furthermore, the plants can also play an active role in taking up nitrogen, phosphorus, and other compounds from the sewage spill. This active incorporation of nitrogen and phosphorus can be one mechanism for nutrient removal.

The habitat can provide nitrogen uptake and natural filtration during the natural passive regeneration within the spill impact area in the mow-zone. It is expected that the habitat in the impact area will recover to a pre-spill condition naturally. The reason for this assumption is marsh/wetland habitat develops very fast in situations where there are appropriate levels of water, and when there is an established hydrologic regime and a static physical environment. It is well documented that marsh/wetland vegetation grows very rapidly and abundantly in moist soils. Many wetland plant associations, such as cattails, are plant pioneers that are able to live on raw new soil wherever there is water. Therefore, due to a basically unchanging flow regime, unchanging physical processes, rapid growth rate of marsh/wetland vegetation and adequate availability of water, the spill impact area has the capability to recover quickly as the vegetation regenerates following the fall 2009 mowing.

7. Recommendations

It is recommended that EMWD implement a short-term habitat monitoring program in order to identify and mitigate any residual habitat damage potentially resulting from the spill. The monitoring program should consists of two monitoring events that begin in the spring of 2010 and end in the spring of 2011. The purpose of the monitoring program is to compare and document the habitat growth response in the affected area, as well as up and downstream of the affected area. The monitoring data can be used for future reference and will help identify any short-term changes in the habitat conditions that may result from the spill.

Qualitative habitat monitoring should focus on habitat type, habitat conditions, growth rates, botanical species diversity, structure, recruitment rates, and any significant disease or pest problems. The two (2) monitoring events should be performed in the spring, between April and

July 2010 and 2011, to help record an accurate representation of perennial and annual herbaceous plants within the affected area. Specific, sampling grids and transects should be set for the monitoring. Permanent photo stations should be set within the grids and transects to provide a visual photo log to track of the changes in habitat over time. All wildlife species detected by sight, track, or sign within the monitoring areas should also be recorded. These data can also show how the habitat is functioning for the benefit of wildlife.

An effective monitoring program can provide valuable information on the effects of an action or event. Monitoring would involve the collection and interpretation of biological resource data for two growing seasons, and documentation of the effects of the spill on the biological resources of concern. Based on the monitoring results, remedial actions (vegetation removal, revegetation, translocation of faunal species, etc.) may be identified and coordinated/approved with/by CDFG. At the end of the monitoring period, a report of findings shall be submitted to the pertinent regulatory agencies (CDFG, U.S. Fish and Wildlife Service, and RWQCB) and it shall include recommendations for further actions, if any are required. If at any time during the monitoring period, that evidence of harm to flora or fauna is obvious, then a shift towards immediate remediation will be made in coordination with the appropriate agencies.

8. References

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Figure 1. Regional Location Map

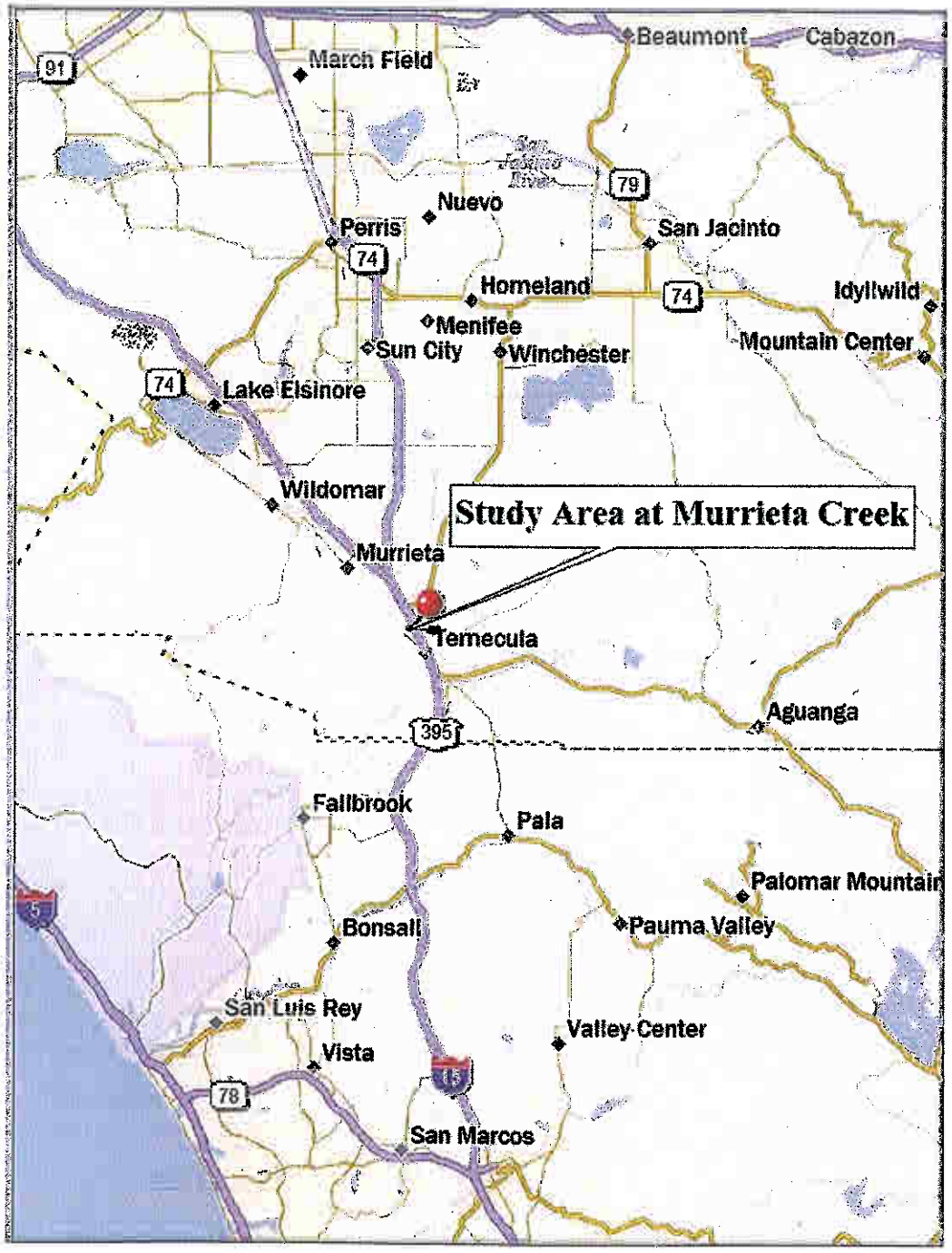


Figure 2. Site Location Map

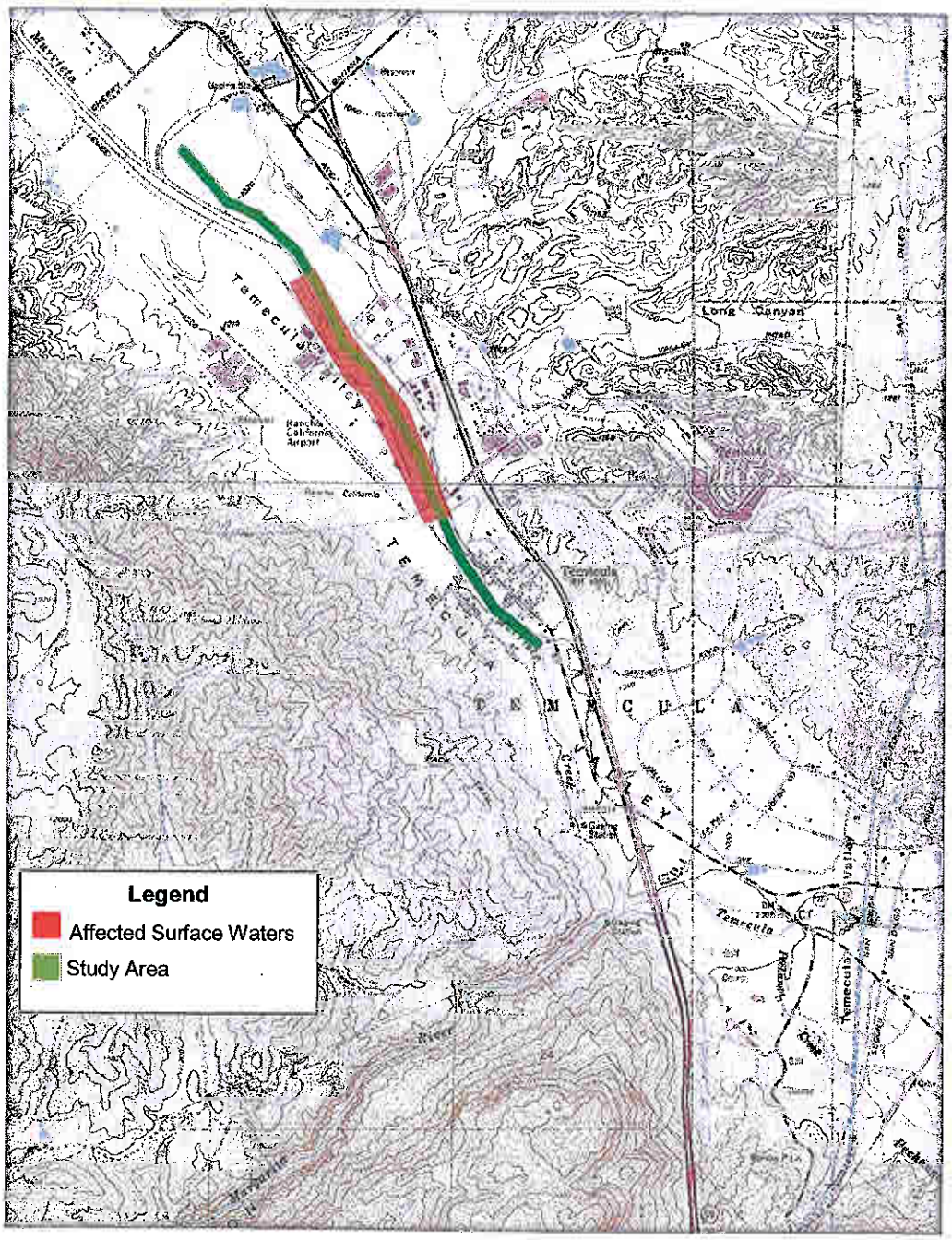


Figure 3. Aerial Map

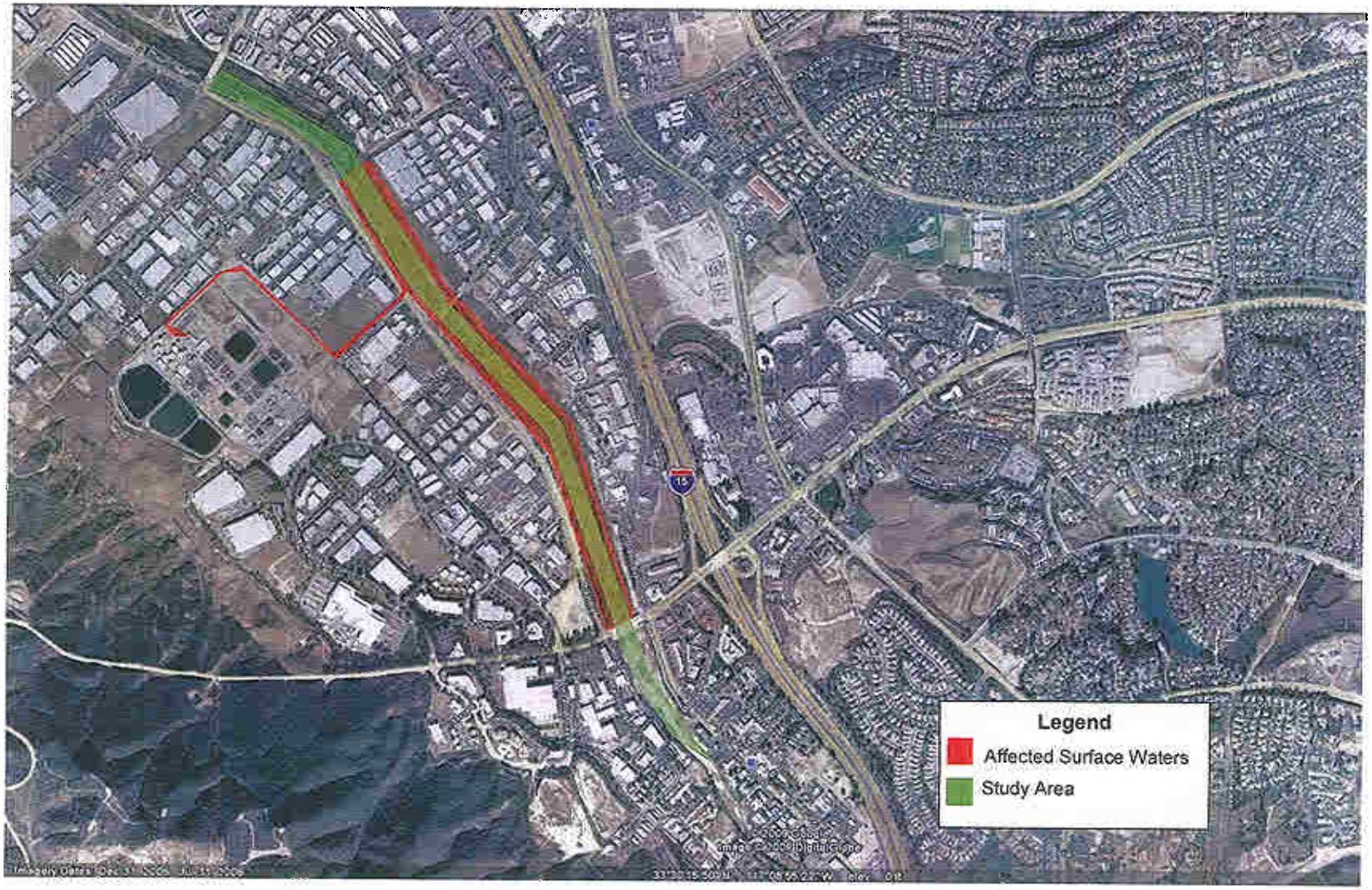


Figure 4. Locations of USGS Gaging Stations Near the Study Area

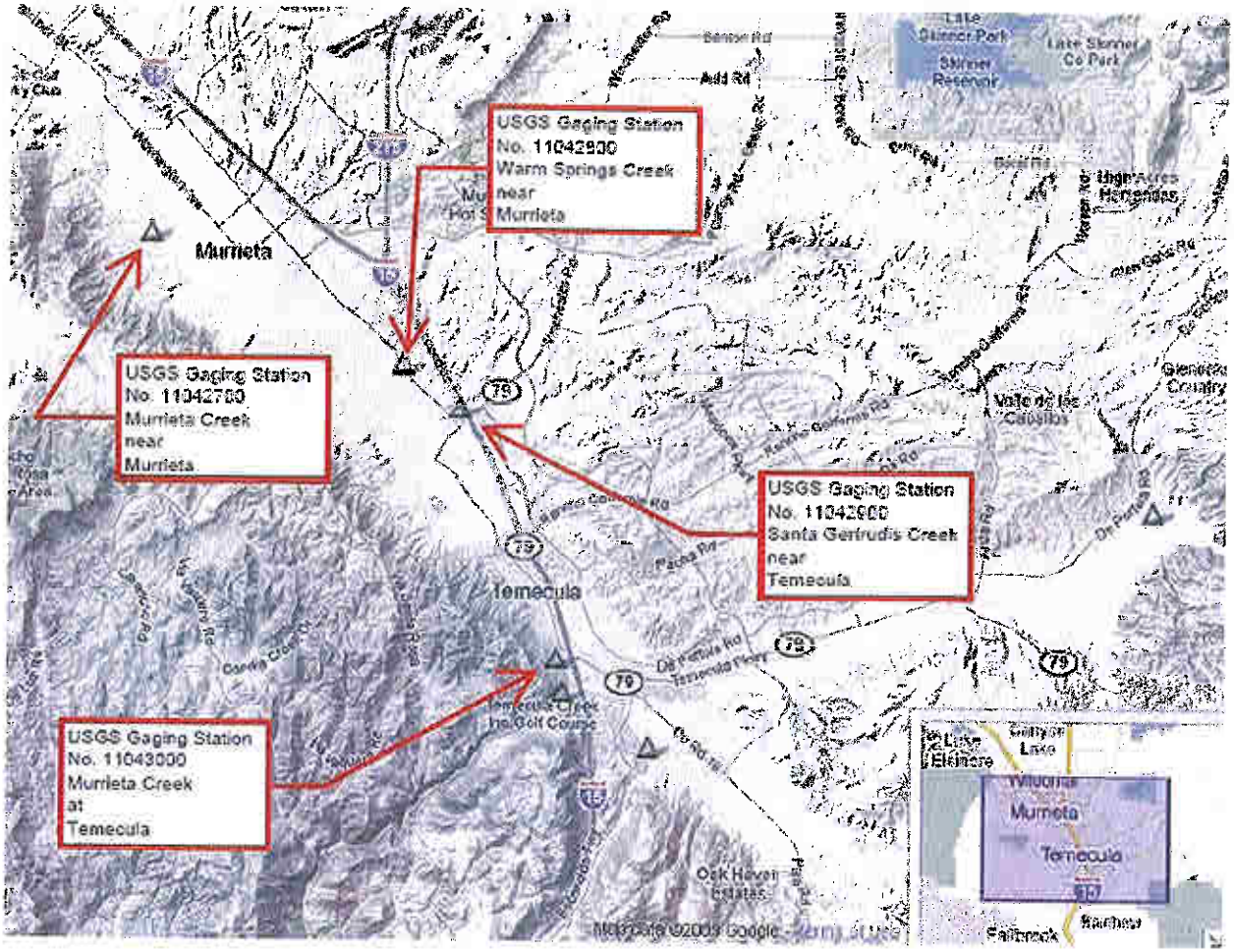


Figure 5. Gage Flow Data Between December 20, and January 31, 2009

Eastern Municipal Water District
Temecula Valley Regional Water Reclamation Facility
Influent Release on December 25 & 26, 2009

USGS Gaging Station No.	Location	Title	Unit	Statistics	12/20/09	12/21/09	12/22/09	12/23/09	12/24/09	12/25/09
11042510	Vail Lake near Temecula	Precipitation	inch	total	0.00	0.00	0.07	0.00	0.00	0.00
11042700	Murrieta Creek near Murrieta	Gage Height	foot	minimum	2.38	2.38	2.38	2.38	2.38	2.38
				maximum	2.38	2.38	2.39	2.38	2.40	2.38
11042800	Warm Spring Creek near Murrieta	Gage Height	foot	minimum	3.75	3.75	3.86	3.92	3.86	3.86
				maximum	3.76	3.86	4.05	3.99	3.94	3.92
11042900	Santa Gertrudis Creek near Temecula	Gage Height	foot	minimum	1.73	1.73	1.73	1.73	1.73	1.73
				maximum	1.74	1.75	1.76	1.75	1.75	1.75
11043000	Murrieta Creek at Temecula	Gage Height	foot	minimum	1.24	1.14	1.16	1.16	1.20	1.22
				maximum	1.43	1.46	1.35	1.30	1.33	1.37

USGS Gaging Station No.	Location	Title	Unit	Statistics	12/26/09	12/27/09	12/28/09	12/29/09	12/30/09	12/31/09
11042510	Vail Lake near Temecula	Precipitation	inch	total	0.00	0.00	0.00	0.00	0.00	0.01
11042700	Murrieta Creek near Murrieta	Gage Height	foot	minimum	2.38	2.38	2.38	2.38	2.38	2.38
				maximum	2.38	2.38	2.40	2.41	2.39	2.38
11042800	Warm Spring Creek near Murrieta	Gage Height	foot	minimum	3.86	3.86	3.86	3.86	3.86	3.86
				maximum	3.86	3.86	3.86	3.86	3.86	3.86
11042900	Santa Gertrudis Creek near Temecula	Gage Height	foot	minimum	1.74	1.73	1.73	1.73	1.73	1.73
				maximum	1.75	1.75	1.74	1.75	1.74	1.74
11043000	Murrieta Creek at Temecula	Gage Height	foot	minimum	1.25	1.26	1.28	1.30	1.33	1.34
				maximum	1.40	1.42	1.43	1.45	1.47	1.40

Figure 6. Flow Data of USGS Gaging Station 11043000 Between December 12, 2009 and January 09, 2010.

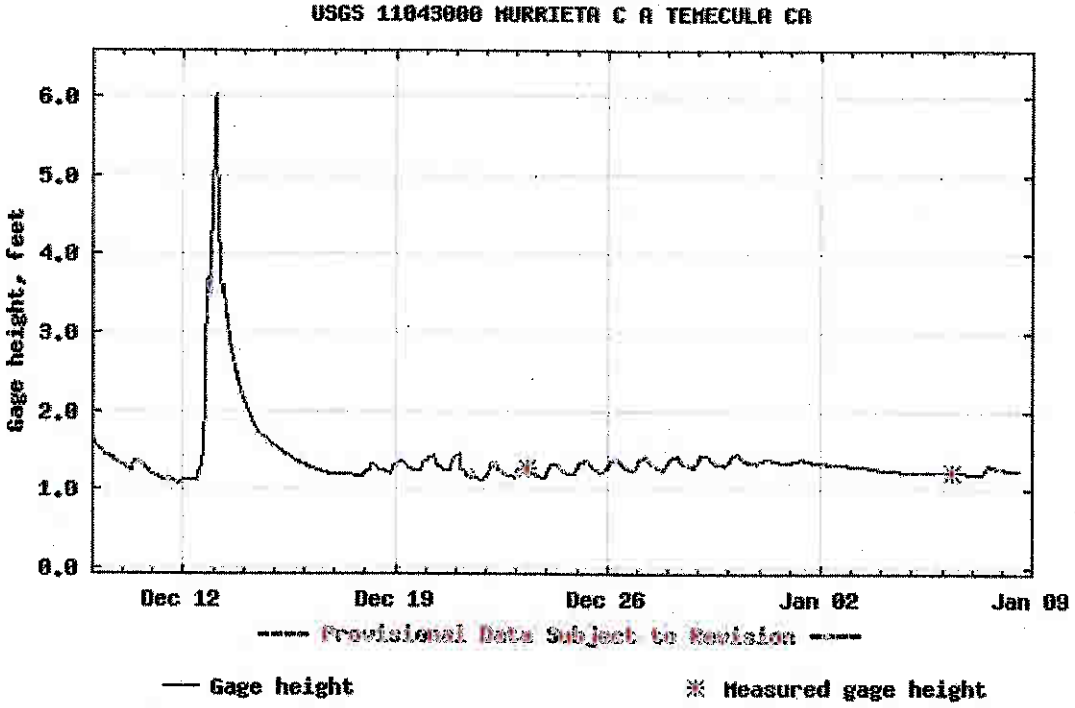
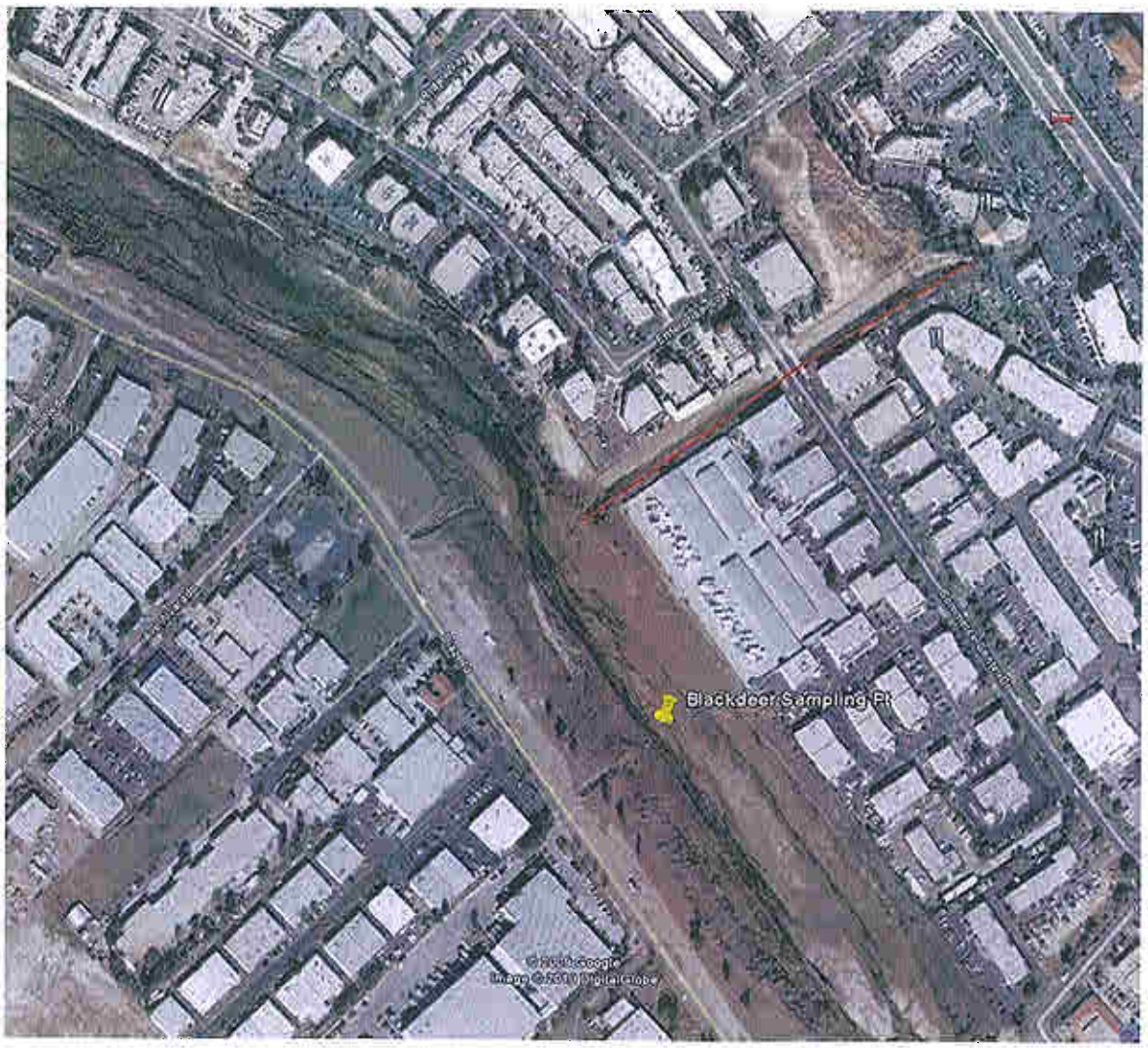


Figure 7. Eastside Storm Drain



Site photos between Winchester Road and Via Montezuma Road

Photo 1. Standing 100 feet upstream of Via Montezuma looking upstream toward Winchester Road.

Photo 2. Standing in the mid-section of the survey area between of Via Montezuma and Winchester Road. Photo showing existing site conditions, habitat structure and disturbance from recent mowing for flood control.

Photo 3. Photo showing the oily film observed in the study area which was primarily detected on the west side of Murrieta Creek, approximately 1,200 feet up and down stream of Via Montezuma.

Photo 4. Photo showing clear aquatic conditions in the study area. Clear pooled water was mostly observed from Rancho California Road upstream to approximately 300 feet and from Winchester Road downstream to approximately 800 feet.

Site photos between Via Montezuma Road and Rancho California Road

Photo 5. Standing 100 feet downstream of Via Montezuma Road showing conditions of pooled water on the west side of Murrieta Creek.

Photo 6. Standing mid-section of the survey area between Via Montezuma Road and Rancho California Road, looking downstream towards the Rancho California bridge crossing over Murrieta Creek.

Photo 7. Standing upstream of the Rancho California bridge crossing looking upstream at Murrieta Creek.

Photo 8. Standing under the Rancho California bridge crossing looking upstream at Murrieta Creek.

Site photos between Rancho California Road and 1,000 feet downstream

Photo 9. Standing approximately 500 feet downstream of the Rancho California Road bridge crossing looking upstream towards the bridge.

Photo 10. Photo showing dry creek conditions downstream of the Rancho California Road bridge crossing looking upstream towards the bridge.

Photo 11. Standing approximately 100 feet upstream of the Rancho California Road bridge crossing, looking downstream.