

ATTACHMENT A

Technical Comments Table

SAN DIEGO REGIONAL
 WATER QUALITY
 CONTROL BOARD
 2007 APR -11 A

Tentative Order Issue	Comment
<p>Page 21. Section D.1.c(5) Long-term maintenance of structural post-construction BMPs</p>	<p>The requirement to submit proof of a mechanism under which long-term maintenance of all structural post-construction BMPs during the planning process is problematic for the following reasons:</p> <ul style="list-style-type: none"> a. During the planning process, the level of detail for structural BMPs is conceptual only and subject to change as the project is further defined through the administrative approval process, therefore Project Applicants will not know the full extent of maintenance requirements prior to the approval of precise grading permits. b. Submittal of a mechanism at the planning stage does not provide sufficient flexibility for the Project Applicant to develop the most appropriate mechanism, be that an HOA-based structure and fee, a CFD or other similar arrangement, or even an agreement with another public entity. <p>Suggested Language:</p> <p>Replace existing D.1.c(5) with the following:</p> <p><u>(5)Submittal of proof of a mechanism under which ongoing long-term maintenance of all structural post-construction BMPS will be conducted shall be required prior to final permit approval, either the precise grading permit or building permit, which ever occurs first.</u></p>
<p>Page 22. Section D.1.c(6)(e) Infiltration and Groundwater Protection 10 feet vertical distance</p>	<p>Most BMP design documents recommend or require a minimum depth to groundwater of 3 feet or more. This criterion is a based on the hydraulic consideration of groundwater mounding, as well as the treatment consideration of soil filtration. If the native soil has low organic matter or CEC or if there is fractured bedrock, a minimum depth to groundwater of 10 feet is appropriate and additional pretreatment should be required as is stated in the Tentative Order. However, if the soils have a high adsorptive capacity,</p>

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	<p>as required by subsection (f) of this provision, a minimum depth of 3 feet should be adequate to be protective of groundwater quality. Also, infiltration of fully treated runoff for hydromodification control purposes of fully treated runoff should be allowed with a minimum of 3 feet of separation to groundwater. In this case, infiltration relies on the use of highly draining soils and the concern is strictly related to the hydraulic considerations of mounding versus relying on the soil properties to provide runoff treatment.</p> <p>Suggested Language:</p> <p>Add the following language to subsection (e):</p> <p>(e) The vertical distance from the base of any infiltration treatment control BMP to the seasonal high groundwater mark must be at least 10 feet, <u>except as provided in this subsection</u>. Where groundwater basins do not support beneficial uses, this vertical distance criteria may be reduced, provided groundwater quality is maintained. <u>If infiltration soils have a high adsorptive capacity, as required by subsection (f) of this provision, a minimum depth of at least three feet is allowed. Additionally infiltration of runoff that is treated, prior to infiltration, in a treatment control BMP that addresses the pollutants of concern in groundwater and is implemented in accordance with Section D.1.d(6) of this permit is allowed with a minimum of 3 feet of separation to groundwater.</u></p>
<p>Page 22. Section D.1.c(6)(h) Infiltration and Groundwater Protection 100 feet horizontal distance from water supply wells</p>	<p>The Board should clarify the role of water use relative to this requirement – e.g., water supply wells used for domestic consumption versus those used for agricultural consumption.</p> <p>Suggested Language:</p> <p>Add the following language at the end of subsection (h):</p> <p>(h) Infiltration treatment control BMPs must be located a minimum of 100 feet horizontally from any water supply wells <u>used for domestic consumption</u>.</p>
<p>Page 22. Section D.1.c(6)(f) Infiltration and Groundwater Protection soil type</p>	<p>The soil specifications in this subsection are applicable to the use of infiltration for runoff treatment. These soils specifications will limit infiltration rates, and therefore are not amenable to infiltration used for hydromodification control. Coarse soils that allow for rapid infiltration should be allowed</p>

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	<p>for infiltration of fully treated runoff as indicated in the comment for subsection (e) above.</p> <p>Suggested Language:</p> <p>Add the following language at the end of subsection (f):</p> <p><u>Infiltration of treated urban runoff is allowed for hydromodification purposes in other soils as set forth in subsection (e) above.</u></p>
<p>Page 23, Section D.1.c(6)(g) Infiltration and Groundwater Protection land use provisions</p>	<p>Areas of mixed land uses that include the land uses listed in this subsection should be allowed to use infiltration for treatment control and/or hydromodification control.</p> <p>Suggested language:</p> <p>Add the following language at the end of subsection (g):</p> <p><u>Areas of mixed land uses that include a low percentage of high threat to water quality land uses and activities may use infiltration treatment control BMPs. Also, runoff from these areas that is treated, prior to infiltration, in a treatment control BMP that addresses the pollutants of concern in groundwater and is implemented in accordance with Section D.1.d(6) of this permit may be infiltrated for hydromodification control purposes.</u></p>
<p>Page 27, Section D.1.d(6)(a) Treatment control BMP sizing footnote # 6</p>	<p>Suggested Language:</p> <p>Revise footnote 6 to read as follows:</p> <p><u>LID and other design BMPs that are correctly designed in accordance with Section 6.a.i or 6.a.ii can be considered treatment control BMPs.</u></p>
<p>Page 28, Section D.1.d(6)(a)(i) Treatment control volume-based BMP sizing</p>	<ol style="list-style-type: none"> The Tentative Order requires a single volume-based sizing method (volume of runoff produced by the 85th percentile 24-hr event, as determined from the County of Orange's Isopluvial Map). Equivalent, alternative sizing methods, such as using a continuous simulation model to size BMPs, should also be allowed. Continuous simulation provides more detailed information on how BMPs will perform by accounting for site-specific parameters such as slope, soils, and vegetation.

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	<p>2. To be consistent with other guidance documents, change “24-hour 85th percentile storm event” to “85th percentile, 24-hour runoff event”.</p> <p>3. Provide the reference for the 85th Percentile Precipitation Isopluvial Map.</p> <p>Suggested Language:</p> <p>Add the following language at the end of subsection (i):</p> <p>(i) Volume-based treatment control BMPs must be designed to mitigate (infiltrate, filter, or treat) the volume of runoff produced from a 85th percentile, 24-hour storm event, as determined from the County of Orange’s 85th percentile Precipitation Isopluvial Map (DAMP Exhibit 7.II, page 7.II-49) <u>or an equivalent, alternative sizing methods, such as use of a continuous simulation model to size BMPs to achieve 90 percent capture of average annual runoff volume; or</u></p>
<p>Page 28, Section D.1.d(6)(a)(ii) Treatment control flow-based BMP sizing</p>	<p><u>Suggested edit to improve clarity:</u></p> <p>(ii) <u>Flow-based treatment control BMPs must be designed to treat either:</u></p> <p>a. <u>The maximum flow rate of runoff produced from a rainfall intensity of 0.2 inches per hour; or</u></p> <p>b. <u>The maximum flow rate of runoff produced by 2 times the 85th percentile hourly rainfall intensity as determined from the local historical rainfall record.</u></p>

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Page 28, Section D.1.d(6)(b) Treatment control BMPs	<p>The terms “infiltration” and “filtration” refer to types of treatment unit process. Unit processes are the underlying hydrologic, hydraulic, physical, chemical, and biological treatment mechanisms in a treatment BMP. Suggest changing this condition to “...mitigate (treat through infiltration, settling, filtration, or other unit processes)...”</p> <p>Suggested Language:</p> <p>Revised subsection (b) to read as follows:</p> <p>(b) Treatment control BMPs for all Priority Development Projects must mitigate (<u>treat through infiltration, settling, filtration, or other unit processes</u>) the required volume or flow of runoff from all developed portions of the project, including landscaped areas.</p>
Page 30, Section D.1.d(8) LID Site Design BMP Substitution Program	<p>The LID Substitution Program does not provide for sufficient flexibility for a project proponent to be innovative regarding LID strategies, particularly when site design BMPs are mandatory (see subsection (d) requiring implementation of specific site design BMPs). The Substitution Program should seek to achieve the same results as the traditional approach, but use alternative methods/ practices to do so.</p>
Page 31. Section D.1.e BMP Construction Verification	<p>Verification of BMPs at the construction stage should be limited to structural source control and treatment control BMPs and should occur during the regular grading/construction inspections. Such verifications should assure that proper facilities are in place during construction rather than occurring when a home is sold and ready for occupancy.</p> <p>Suggested Language:</p> <p>Revise subsection e. to read as follows:</p> <p>e. BMP CONSTRUCTION VERIFICATION <u>During regular grading/construction inspections for each Priority Development Project subject to SUSMP requirements, each Copermittee must inspect</u></p>
Page 35 Section D.1.h(1) Hydromodification criteria	<p><i>Suggested re-ordering of sub-sections</i></p> <p>The on-site hydromodification control waiver included in</p>

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	<p>D.1.h(3)(c) should excuse a project from the requirements in D.1.h(2) and (3)(a) and (3)(b). Therefore, D.1.h(3)(c) would be better located as D.1.h(1)(b), with the existing first paragraph as D.1.h(1)(a).</p>
<p>Page 35 Section D.1.h (3)(i) Hydromodification Criteria waiver thresholds</p>	<p>The proposed waiver thresholds (an increase of less than 5% total impervious cover on a new development site and at least a 30% decrease in total impervious cover in a redevelopment project) seem arbitrary and not based on the current knowledge of hydromodification impacts.</p> <p>There is much discussion about the reliability of imperviousness as a “predictor” of potential impacts from new development. In fact, the effects of imperviousness on hydromodification impacts is much more complicated than a simple correlation with imperviousness. The limited hydromodification impact research to date has focused on empirical evidence of channel failures in relationship to directly connected impervious area (DCIA) or total impervious area. However, more recent research has established the importance of size of watershed, channel slope and materials, vegetation types, and climatic and precipitation patterns (SCCWRP 2005a). Impervious area that drains directly to a storm drain system and then to the receiving water is considered “directly connected,” whereas impervious area that drains through vegetation prior to surface waters or to infiltration facilities is considered “disconnected.”</p> <p>Although physical degradation of stream channels in semi-arid climates of California may be detectable when watershed imperviousness is between three and five percent, not all streams will respond in the same manner (SCCWRP, 2005b). Management strategies need to account for differences in stream type, stage of channel adjustment, current and expected amount of basin imperviousness, and existing or planned hydromodification control strategies.</p> <p>The absolute measure of watershed imperviousness that could cause stream instability depends on many factors, including watershed area, topography, land cover, and soil type; development impervious area and connectedness; longitudinal slope of the river; channel geometry; and local boundary materials, such as bed and bank material properties and vegetation characteristics.</p>

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	<p>The first part of the waiver, as written, also does not account for the existing imperviousness in the project's watershed, nor the potential cumulative imperviousness of non-priority projects that could occur within the subject watershed.</p> <p>In summary, it is important to not prejudge these thresholds without proper consideration of local watershed and channel stability factors. Instead, the Tentative Order should allow the SMC study and Copermittee hydromodification control planning process to occur, so as to develop appropriate thresholds based on best available science and localized watershed conditions.</p> <p>Suggested Language:</p> <p>Revise subsection (c)(i) to read as follows:</p> <p>(i) <u>Watershed-specific waivers: Waivers may be implemented for new development and redevelopment projects where a watershed management plan has been adopted that establishes thresholds for project waiver based on watershed-specific factors.</u></p> <p>Insert a new subsection (c)(ii) as follows:</p> <p>(ii) <u>Redevelopment project waivers: Waivers may be implemented where redevelopment projects do not increase the potential for hydromodification impacts over the existing site conditions, by both no increase in impervious area and no decrease in the infiltration capacity of pervious areas.</u></p>
Page 35 Section D.1.h (3)(ii)(b) Hydromodification Criteria modified channel conditions	Note that it might not be possible for a project to implement in-stream measures in channels that are significantly hardened (e.g., concrete-lined).
Page 36 Section D.1.h (5)(a)(ii) Hydromodification Criteria Interim Requirements for Large Projects	<p>Subsection (ii) requires disconnecting impervious areas from the drainage network and adjacent impervious area. This should not be required if the impervious area is being directly connected to a downstream regional hydromodification control facility prior to discharge to a sensitive receiving water.</p> <p>Suggested Language:</p>

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	<p>Revise subsection (ii) to read as follows:</p> <p>(ii) <u>Disconnect impervious areas from the receiving waters through on-site or off-site water reuse, evapotranspiration, and/or infiltration.</u></p>
<p>Page 36 Section D.1.h (5)(a)(iii) Hydromodification Criteria Interim Requirements for Large Projects</p>	<p>Subsection (iii) provides for a hydrograph matching interim hydromodification control criterion. As the criterion is stated in the Tentative Order, it is unclear as to exactly which hydrographs are to be used, so the condition should specify exactly which hydrographs are to be used. Also, it may be difficult to determine the 1-year event. Current manuals focus on 2-year events and above, so additional guidance will be necessary to implement this criterion.</p> <p>Palhegyi et al (2005) compared the three flow control criteria in terms of effectiveness at controlling potential channel erosion: peak flow controls, hydrograph matching, and flow duration matching. While hydrograph matching was found to be far more effective than peak flow control, the analysis indicated an unacceptably high risk of future instability.</p>
<p>Page 36 Section D.1.h (5)(a)(iv) Hydromodification Criteria Interim Requirements for Large Projects</p>	<p>Suggested Language:</p> <p>Revise subsection (iv) to read as follows:</p> <p>(iv) Establish buffer zones and setbacks for channel movement. <u>Where in-stream controls are necessary, use geomorphically-referenced channel design techniques.</u></p>
<p>Page 37, Section D.1.i(2)(a)(i) and (ii) New Development/ Redevelopment Education Program</p>	<p>What does “measurably increase” and “measurably change” mean? What are the metrics by which the Permittee is to measure changes/successes?</p>
<p>Page 40, Section D.2.d(1)(a)(xii) and (xiii) Construction BMP Implementation</p>	<p>The preservation of natural hydrologic features [subsection (xii)] and riparian buffers [subsection (xiii)] are not construction BMPs. These are site design BMPs and are inappropriately included in this section.</p>
<p>Page 41, Section D.2.d(1)(c) Designate enhanced BMPS for 303(d) impairments and ESAs</p>	<p>The Board should define what constitutes an “enhanced measures”. It should be clarified that “enhanced measures” are not exclusively “Advanced Sediment Treatment”.</p>
<p>Page 66 Section E Watershed Urban</p>	<p>As reviewed in the Rancho Mission Viejo comment letter, in</p>

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Runoff Management Program	<p>drafting the section of the Tentative Order requiring a Watershed Urban Runoff Management Program, the Board should recognize the efforts of the County of Orange and major landowners, such as Rancho Mission Viejo to put in place a comprehensive watershed land use/open space strategy for the San Juan Creek Watershed/Western San Mateo Watershed through the approved Southern Subregion Habitat Conservation Plan (HCP) and Special Area Management Plan (SAMP) both of which include water quality/quantity management as an integral component.</p> <p>Given its ongoing role in the management of the San Juan Watershed through the Southern Subregion HCP and the size of its park landholdings and overall jurisdictional area, the County of Orange would appear to be the appropriate lead watershed permittee for development of the Watershed Urban Runoff Management Plan rather than the City of San Juan Capistrano.</p>

ATTACHMENT B

SAMP Tenets

- Tenet 1. No net loss of acreage and functions of waters of the United States
- Tenet 2. Maintain/restore hydrologic, water quality, and habitat integrity of waters of the United States
- Tenet 3. Protect headwater areas
- Tenet 4. Maintain/protect/restore diverse and contiguous riparian corridors
- Tenet 5. Maintain or restore floodplain connection
- Tenet 6. Maintain and/or restore sediment sources and transport equilibrium
- Tenet 7. Maintain adequate buffer for the protected riparian corridors
- Tenet 8. Protect riparian areas and associated habitats supporting state and federally listed and sensitive species and their critical habitat

Baseline Conditions Watershed Planning Principles

- Principle 1. Recognize and account for the hydrologic response of different terrains at the sub-basin and watershed scale.
- Principle 2. Emulate, to the extent feasible, the existing runoff and infiltration patterns in consideration of specific terrains, soil types and ground cover.
- Principle 3. Address potential effects of future land use changes on hydrology.
- Principle 4. Minimize alterations of the timing of peak flows of each sub-basin relative to the mainstem creeks.
- Principle 5. Maintain and/or restore the inherent geomorphic structure of major tributaries and their floodplains.
- Principle 6. Maintain coarse sediment yields, storage and transport processes.
- Principle 7. Utilize infiltration properties of sandy terrains for groundwater recharge and to offset potential increases in surface runoff and adverse effects to water quality.

- Principle 8 Protect existing groundwater recharge areas supporting slope wetlands and riparian zones; and maximize groundwater recharge of alluvial aquifers to the extent consistent with aquifer capacity and habitat management goals .
- Principle 9 Protect water quality using a variety of strategies, with particular emphasis on natural treatment systems such as water quality wetlands, swales and infiltration areas.

References: Southern Subregion HCP (USFWS, January 2007)
San Juan Creek Watershed/western San Mateo Watershed SAMP (USACE, March 2007)

ATTACHMENT C

Tech Memo on Soils Characteristics Influencing Contaminant Fate and Transport

SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD

2607 APR - 4 A 11:50

Memorandum

Date: 2 April 2007
To: Laura Eisenberg, Rancho Mission Viejo
From: Lisa Austin, Geosyntec Consultants
Subject: South Orange County Draft MS4 Permit, Tentative Order No. R9-2007-0002

Potential Impacts of Infiltration on Groundwater

INTRODUCTION

Infiltration is the downward movement of water through the pore spaces of the subsurface soil matrix. In a natural system without impervious surfaces such as a meadow, this movement is usually unrestricted, such that water can infiltrate down and recharge the groundwater table; although downward movement can be restricted by low permeability strata such as clays or rock. Many stormwater treatment facilities (BMPs) utilize infiltration and groundwater recharge to reduce the volume and pollutant loadings of surface runoff. Infiltration basins, infiltration trenches, and stormwater injection wells utilize infiltration as a primary treatment mechanism by infiltrating the entire design storm volume. Infiltration is a secondary process in stormwater treatment facilities such as extended detention basins, vegetated swales, filter strips, and bioretention areas, where only a fraction of the design storm will typically infiltrate and is incidental to the primary treatment processes that include sedimentation, filtration, sorption, and plant uptake.

The purpose of this technical memorandum is to evaluate the potential for groundwater impacts caused by intentional and incidental infiltration of urban runoff in treatment control BMPs.

SOILS CHARACTERISTICS INFLUENCING CONTAMINANT FATE AND TRANSPORT

Several different physical, chemical, and biological processes occur while stormwater flows through a soil matrix. However, these processes are not independent. Physical processes

including simple filtration and absorption directly influence the mass transfer, transformation, or degradation of stormwater contaminants that occurs during more complex chemical and biological processes. The subsections below briefly discuss these processes followed by a summary of soil suitability and potential design enhancements to minimize impacts to groundwater resources.

Physical Processes

The ability of surface soil layers to infiltrate and their capacity to absorb stormwater are important modeling and design parameters that are usually represented by the two respective soil properties: the hydraulic conductivity and the storage capacity. The hydraulic conductivity is the rate at which water flows through the soil pore structure, given as a velocity (e.g., in./hr, mm/day, gal/ft²-day). It is a function of the porosity (volume of voids to total volume of soil), the connectivity of the pore spaces, the degree of saturation, and the chemistry and temperature of the pore fluids. One measure of water storage capacity is the field capacity, the maximum fraction of soil water (volume of water to volume of soil) that can be held in the pore spaces under the action of gravity. It is primarily a function of the pore size distribution (i.e. grain sizes) and packing density, and less of a function of the temperature, and organic content of the soil. The hydraulic conductivity, porosity, and field capacity, as well as the antecedent moisture condition (degree of saturation), are critical factors in evaluating the transport rate of contaminants through the subsurface soil matrix to the groundwater table.

Soils vary in their ability to filter and adsorb contaminants. Coarse textured soils tend to be more inert than fine textured soils and allow water to quickly percolate without adsorbing contaminants. Open bedrock fractures and faults can also reduce the water-soil contact area and reduce the ability for soils to filter and adsorb pollutants. Surface crusting may impede initial infiltration, but surface cracks formed during prolonged drying periods may provide a direct route to coarser underlying soils and the groundwater table. Plant roots and burrowing insects and rodents can also increase the infiltration rate of soils. An understanding of the possible subsurface conduits in addition to the properties of the soils that exist beneath an infiltration facility is needed to adequately assess the impacts to groundwater.

Chemical Processes

In addition to the physical processes that dictate primarily the contact time of contaminants to soil particles, the chemical processes responsible for the mass transfer of contaminants to soil particles include surface complexation, ion exchange, differential precipitation, diffusion into

solid and hydrolysis (WERF, 2005). The former three processes are considered to be the most significant (Barbosa, 1999).

Mass transfer for different constituents occurs through different mechanisms and rates. For example, phosphorus mass transfer to particles is generally through a combination of sorption and precipitation depending on pH, and the rate of reaction can be very rapid; on the order of minutes to several hours (WERF, 2005). In contrast, mass transfer for different metals occurs differently and also has differing kinetics. For example, mechanisms of lead mass transfer to particles (depending on the solid phase and pH) generally range from precipitation to surface complexation with relatively rapid kinetics, while zinc mass transfer generally range from surface complexation to hydrolysis with relatively slow kinetics (WERF, 2005).

Cation exchange capacity (CEC) and anion exchange capacity (AEC) are determined mostly by the clay and organic content of soils (Ferguson, 1994). A study conducted by Hathhorn and Yonge (1995) found that the attenuation of copper and zinc was more a function of the organic content rather than the CEC, but for the attenuation of cadmium and lead the CEC was more important. The AEC has not been as widely researched as the CEC due to the complex reactions during the exchange, but the material in soils most reactive with anions have been reported to be amorphous (Al) and (Fe) hydrous oxides or hydroxides (Fang, 1997). Therefore, soils having high concentrations of these complexes may have a greater potential for adsorbing anions such as chloride, but more research in this area is needed.

Biological Processes

Plants and microbes in the soil (e.g., bacteria, fungi) can transform and uptake stormwater pollutants. Microbially mediated transformations occur as a result of respiration, which is a redox process. Redox reactions are chemical transformations involving the transfer of electrons or change in oxidation number of a species and the process occurs in both aerobic (e.g., vadose zone soils) and anaerobic (e.g., aquifer zone soils) environments. Oxygen is used as the electron acceptor during aerobic respiration, while other chemicals (e.g., nitrate, sulfate) function as electron acceptors during anaerobic respiration. Certain microbes can enzymatically oxidize or reduce metals during respiration, affecting metal solubility and reactivity (WERF, 2005). Many of these inorganic transformations are the basis of bioremediation of metals.

Some microbes (primarily heterotrophic bacteria) are able to use complex organic compounds as energy sources during metabolism, often resulting in microbial decomposition of those compounds to less toxic forms. Also, under certain conditions, some microbes can transform

organic compounds even when the compound cannot serve as the primary energy source (cometabolism). Cometabolism is important for the breakdown of chlorinated solvents, polychlorinated biphenyls (PCBs), and many polycyclic aromatic hydrocarbons (PAHs) (WERF, 2005). Such principles are the basis of bioremediation of organic contaminants.

The activity of specific soil microorganisms and their ability to transform stormwater pollutants depends primarily upon their habitat requirements. Basic habitat requirements for all microbes include a substrate to colonize (e.g., soil, plant roots), appropriate nutrients including carbon sources, low concentration of toxics, and sufficient soil moisture. The pH and electron donor availability also affects which microbes flourish. Most bacteria are very sensitive to acidic conditions, while fungi may thrive under both acidic and basic conditions (WERF, 2005). Some microbes require oxygen (aerobic) as an electron donor or other substances (facultative and anaerobic) for metabolism. Various factors determine available oxygen, including soil characteristics and inundation patterns. Water level management in stormwater ponds and infiltration basins may increase microbial activity by allowing surface soils to become aerated between storms. However, complete desiccation would be detrimental to these aerobic bacteria.

Many microbes form symbiotic relationships with certain plants; therefore, increasing the vegetation density may increase microbial populations. Also, some plants will assimilate stormwater contaminants through metabolic nutrient uptake or by translocating to roots, stems, and leaves (WERF, 2005).

Soil Suitability and Enhancement Considerations

Due to the presence of at least some clay and/or organic matter, most natural soils would be expected to remove many stormwater constituents during infiltration by filtering, adsorption/ion exchange, and microbial processes. Design manuals and criteria for stormwater treatment infiltration facilities often include requirements or recommendations for soils characteristics, such as the organic and clay content and the CEC. The following are a few of the soils characteristics recommendations for infiltration facilities:

- The Wisconsin Department of Natural Resources recommends soils have an organic content greater than one percent by weight.
- Hathorn and Yonge (1995) recommend that the fraction of soil organic carbon should exceed 0.3% to improve metals attenuation, but should not exceed 1.5% (by weight) for hydraulic effectiveness to a depth of (at least) 1 meter. They also recommend that the

silt/clay content upper limits should be 20% silt and 10% clay to improve/maintain hydraulic performance.

- The Washington Department of Ecology (2001) requires the CEC of the treatment soil (top 18" of soil in the infiltration facility; may be engineered soils) must be ≥ 5 milliequivalents CEC/100 g dry soil (USEPA Method 9081).
- The California BMP Handbooks recommend that soil should not have more than 30% clay or more than 40% of clay and silt combined (CASQA, 2003).

If natural soils do not contain sufficient organic matter, have a low CEC, or have too much clay/silt content for adequate infiltration rates, soil amendments such as mulch, peat, compost, zeolite, or sand may be tilled into the top 2-3 feet of soil. Engineered media may also be used. For instance, sand otherwise incapable of removing dissolved pollutants can be modified, either by the addition of a sorptive media like activated carbon or by amending the surface of the sand. Examples of such media include manganese oxide, iron, aluminum and silicious oxide media, ion exchange media, media coatings, and media substrates (Sansalone and Teng, 2004; Liu et al., 2005).

CONCLUSIONS AND RECOMMENDATIONS

Based on research conducted to date, the potential for contaminating groundwater due to infiltration of most urban stormwater appears to minimal. However, the type of BMP and the quantity of stormwater infiltrated should also be considered. Bioretention facilities are designed to infiltrate, but the organically rich soils used in these facilities will provide significant adsorptive and retentive capacity. Also, the percolation rates in extended detention basins, swales, filter strips, and bioretention facilities are generally much lower than infiltration basins and trenches, giving more time for contaminants to adsorb to soil particles, degraded by microbes, or assimilated by biota. Due to these differences, the siting criteria used for infiltration facilities do not need to be the same as for other BMPs that utilize infiltration as a secondary treatment process.

Most of stormwater treatment BMP design documents recommend or require a minimum depth to groundwater of 3 feet or more. This criterion is based on the hydraulic consideration of groundwater mounding, as well as the treatment consideration of soil filtration. If the native soil has low organic matter or CEC or if there is fractured bedrock, a larger minimum depth to groundwater (>10 feet) is appropriate and pretreatment should be required. However, if the soils have a high adsorptive capacity, a minimum depth of 3 feet should be adequate.

The physical and chemical characteristics of the native soils should be evaluated when considering infiltration as a stormwater treatment option. As discussed above, the texture, organic matter, clay content and the CEC can be used to assess the tendency for soils to retain pollutants in infiltrating stormwater. Coarse grained soils have a high hydraulic conductivity, but they tend to contain less organic matter and have a lower CEC than fine grained soils. Soil amendments, such as compost, peat, mulch, zeolite, or engineered media such as oxide-coated sand can be used to increase some of these beneficial characteristics for treatment infiltration facilities.

Infiltration facilities located in areas with coarse grained soils are preferable for hydromodification control purposes. In this situation, runoff directed to these facilities should be treated in a separate treatment control BMP that addresses the pollutants of concern in groundwater prior to infiltration.

REFERENCES

- Barbosa, A.E. (1999). Highway Runoff Pollution and Design of Infiltration Ponds for Pollutant Retention in Semi-Arid Climates. Submitted in partial fulfillment of the requirements for obtaining the Doctor of Philosophy (Ph.D) at the Department of Civil Engineering, Aalborg University
- CASQA (2003). California BMP Handbooks - Stormwater BMP New Development and Redevelopment. [Online] <http://www.cabmphandbooks.com/>
- Fang, H.Y. (1997). *Introduction to Environmental Geotechnology*. CRC Press, Inc., Boca Raton, FL.
- Ferguson, B.K. (1994). *Stormwater Infiltration*. CRC Press, Inc., Boca Raton, FL.
- Hathhorn, W.E. and Yonge, D.R. (1995). The Assessment of Groundwater Pollution Potential Resulting From Stormwater Infiltration BMPs. Washington State Transportation Center (TRAC) Washington State University, Research Project T9902, Task 3
- Liu, D., Sansalone, J.J., and Cartledge, F.C. (2005). "Overall Rate Kinetics for Adsorption of Rainfall-Runoff Heavy Metals by Composite Oxide-Coated Polymeric Media", *J. of Environmental Engineering*, (July).

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Sansalone, J.J. and Teng, Z. (2004), "In-Situ Storm Water Treatment and Recharge Through Infiltration: Quality and Quantity Attenuation", *J. of Environmental Engineering, ASCE*, 130(9), September.

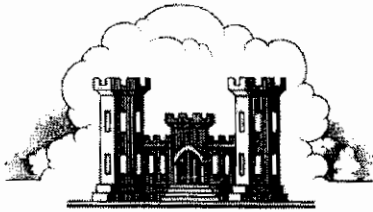
WERF, Water Environment Research Foundation (2005). *Critical Assessment of Stormwater Treatment and Control Selection Issues*. 02-SW-1.

WSDoE, Washington State Department of Ecology (2001). *Stormwater Management Manual for Western Washington*.

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ATTACHMENT D

Excerpts from USACE Long Term Individual Permit



LOS ANGELES DISTRICT
U.S. ARMY CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY PERMIT

Permittee: Rancho Mission Viejo, LLC
28811 Ortega Highway, P.O. Box 9
San Juan Capistrano, California 92693

Permit Number: SPL-1999-16236

Issuing Office: Los Angeles District

Note: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: To discharge dredged and/or fill materials associated with the construction and maintenance of facilities within the Rancho Mission Viejo (RMV) Planning Area as shown in Figures 8-1 through 8-5 from the San Juan Creek Watershed/Western San Mateo Creek Watershed Special Area Management Plan (SJ/SM SAMP) Environmental Impact Statement (EIS). Within potential development areas as described in Figures 8-1 through 8-5, permitted activities include permanent and temporary discharge of dredged and/or fill materials for:

1. Public and private utilities, including utility lines and maintenance of utility lines;
2. Public and private drainage and flood control facilities, including construction of outfall and intake structures, construction of bank stabilization structures, and maintenance of all flood control facilities;
3. Public and private roads and bridges, including lengthening, widening, and maintenance;
4. Public and private land development, including residential, commercial, institutional, and recreational uses;
5. Habitat restoration and water quality improvement projects, including wetland restoration and creation and construction of stormwater management facilities; and
6. Public and private water storage facilities and impoundments.

Outside of those potential development areas, permitted activities include temporary discharge of dredged and/or fill materials for:

1. Maintenance and repair of public and private utilities, including utility lines;
2. Maintenance and repair of public and private drainage and flood control facilities, including outfall and intake structures, bank stabilization structures, flood control channels (consistent with an established maintenance baseline), and flood control basins (consistent with an established maintenance baseline);
3. Maintenance and repair of public and private roads and bridges;
4. Habitat restoration improvement projects, including wetland restoration and creation; and
5. Permanent impacts associated with reviewed infrastructure projects including:
 - a. Construction of public and private utilities and
 - b. Crossings of any mainstem stream using complete spans or partial spans with in-channel piers/piles.

Overall, the activities within the Rancho Mission Viejo Planning Area consists of construction and maintenance of about 14,000 homes across six planning areas, urban activity uses, business park uses, neighborhood center uses, and other development facilities and associated infrastructure facilities including trails, drainage facilities, water and sewer lines, and roads/bridges and the maintenance of existing and new facilities. The activities would result in a maximum permanent impacts of 55.46 acres of waters of the U.S., including 17.91 acres of wetlands, and maximum temporary impacts to 36.89 acres of waters of the U.S., including 15.82 acres of wetlands. Details of the activities are provided in the SJ/SM SAMP EIS.

This long-term Department of the Army permit authorizes the activities described above with specific activities authorized individually in the future with Letters of Permission (LOP). The review associated with issuance of future authorizations under an LOP ensures compliance with the Special Conditions of the long-term Department of the Army permit as project details become known. The procedures for reviewing and issuing a Letter of Permission are shown in Figure 3 and summarized in Attachment "A."

Project Location: In San Juan Creek, Chiquita Creek, Gobernadora Creek, Verdugo Creek, Cristianitos Creek, Gabino Creek, or Talega Creek and their tributaries within the Rancho Mission Viejo Planning Area in Orange County, California (Figures 1 and 2).

Permit Conditions:

General Conditions:

1. The time limit for completing the authorized activity ends on **March 21, 2082**. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.
2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification from this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.
4. If you transfer the permit in conjunction with the sale of the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.
5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit.
6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished with the terms and conditions of your permit, provided 24-hour notice is given to the permittee.

Special Conditions:

I. Project Review

1. The permittee shall contact the Corps every 25 years for the life of the permit to undertake a review of the decision document to determine consistency with the National Environmental Policy Act. Consistency review would determine if any supplemental documentation and analysis would be needed.
2. Future authorizations for specific project elements shall be authorized through Letters of Permissions after the Corps undertakes review procedures as shown in Figure 3 and summarized in Attachment "A."

II. Project Design

A. Project Footprint

1. The permittee shall confine development and supporting infrastructure to the footprint (including infrastructure alignments and facilities within designated open space) shown on Figures 8-1, 8-2, 8-3a, 8-3b, 8-3c, 8-4, and 8-5 in the EIS.
2. For the impact analysis areas, the permittee shall limit the size of the projects to 550 acres of development for Planning Area 4, 175 acres of reservoir for Planning Area 4, 500 acres of development for Planning Area 8, and 50 total acres of orchards in Planning Areas 6 and/or 7.
3. The permittee shall avoid all impacts to the thread-leaved brodiaea (a threatened facultative wetland plant) in a major population in a key location (as described in Southern NCCP Planning Guidelines) on Chiquadora Ridge as part of construction for Planning Area 2.

B. Hydrology

1. Outside the development footprint shown in Figure 2, the permittee shall insure post-project surface water hydrology for any stream of Strahler 3rd order or greater shall not be substantially different from pre-project hydrology. Strahler order may be determined from the Glenn Lukos Associates jurisdictional determination dated November 17, 2003 and amended April 18, 2004.

a. For 24-hour precipitation events, flows in response to 100-year events shall not be substantially different between pre-project conditions and post-project conditions. The permittee shall use best management practices including and not limited to detention basins, retention basins, low-water irrigation, and increase in pervious surfaces to manage excessive storm runoff from developed areas. The runoff management plan required by Ranch Plan EIR Mitigation Measure 4.5-1(g) as amended by the Ranch Plan Development Agreement shall be submitted with each project application for review by the Corps.

b. For 24-hour precipitation events, flows in response to 10-year events shall not differ by more than 1% between pre-project conditions and post-project conditions. The permittee shall use best management practices including and not limited to detention basins, retention basins, low-water irrigation, and increase in pervious surfaces to manage excessive storm runoff from developed areas. The runoff management plan required by Ranch Plan EIR Mitigation Measure 4.5-1(g) as amended by the Ranch Plan Development Agreement shall be submitted with each project application for review by the Corps.

2. For any stream located outside the development footprint of Strahler 3rd order or greater receiving project discharges, the permittee shall undertake adaptive management measures to insure no change in channel geomorphology. Strahler order may be determined from the Glenn Lukos Associates jurisdictional determination. The permittee shall provide a monitoring plan to the Corps explaining the protocol, standards constituting adverse impacts, and remedial measures should thresholds for adverse impacts be reached. The stream stabilization program required by Ranch Plan EIR Mitigation Measure 4.5-7 and the stream monitoring program required by Ranch Plan EIR Mitigation Measure 4.5-8 shall be submitted as part of the monitoring plan for review and approval.

3. The permittee shall not place water quality and/or water retention basins within the active channel of San Juan Creek, Chiquita Creek, Gobernadora Creek, Verdugo Creek, Cristianitos Creek, Gabino Creek, or Talega Creek.

4. For any Corps jurisdictional feature vegetated with coast live oaks located outside of the development footprint that receive discharges, the permittee shall monitor the health of the oaks for five years after the start of the discharges. Any oaks greater than 6 feet in height that die of excessive inundation, shall be mitigated at a ratio of one 10-gallon coast live oak for loss of one-inch diameter at breast height. The permittee shall provide a monitoring plan to the Corps explaining the monitoring protocol and the standards constituting adverse impacts.

C. Water Quality

1. The permittee shall abide by all the terms and conditions of the applicable Section 401 certification.

2. The permittee shall develop and implement master area and sub-area water quality management plans for each Planning Area (Ranch Plan EIR Mitigation Measures 4.5-3 and 4.5-4). A copy of the plan shall be submitted to the Corps for review and approval for consistency with the Conceptual Water Quality Management Plan (WQMP) approved as part of the SAMP EIS. The Corps shall have 30-days to review and approve any submitted plan. If the Corps does not provide comments within 30 days, the submitted plan shall be deemed approved. In the event of a disagreement between the Corps requirements and those of the County of Orange, the permittee, Corps and County shall agree on a resolution of said disagreement within 15 days. Copies of the WQMP annual reports shall be provided to the Corps within 30 days of completion.

D. Habitat

1. The permittee shall design new arterial roads or existing arterials upgraded to serve Rancho Mission Viejo projects along San Juan Creek, Chiquita Creek, and Gobernadora Creek, as follows in order to protect wildlife:

a. The bridge crossings shall provide a minimum of 20 feet of clearance from the stream bottom; and

b. Chain link fencing or functionally similar barrier of 10 feet in height (or as revised/determined through adaptive management) shall be installed on both sides of the approaches to the bridge for a distance of 100 feet away (or as revised/determined through adaptive management) from the stream to deter wildlife from entering the roadway.

2. The permittee shall provide wildlife movement corridors along San Juan Creek, Canada Chiquita, Canada Gobernadora, Cristianitos, Gabino, and Talega Creeks. Uses within these corridors shall be as follows:

a. The corridor along San Juan Creek upstream of Trampas Canyon to the edge of the RMV property shall provide a 400-meter wide corridor (200-meter setback off the centerline) except for the narrowing due to infrastructure facilities.

b. Residential or commercial structures shall not be constructed within the 400-meter corridor.

c. Limited fuel modification zones, trails, and related recreational facilities (i.e., interpretative signage) are allowed within the 400-meter corridor.

d. Infrastructure facilities are allowed including:

i) natural treatment systems for water quality treatment and related drainage facilities;

ii) outfalls that are located outside of the ordinary high water mark;

iii) approved bridge crossings;

iv) water, sewer, and power facilities as set forth in Figures 8-3a, 8-3b, and 8-3c.

3. The permittee shall retrofit the existing Cow Camp culvert crossing across San Juan Creek upon receiving authorization to discharge fill materials associated with Planning Area 3 to allow for fish passage. Alternatively, the crossing may be relocated to accomplish the same functional objectives as above and the current crossing may be removed and the disturbed area restored to provide a smooth, continuous longitudinal channel profile. The culverts shall comply with these following guidelines:

a. The culvert shall be a minimum of 6 feet in width.

b. The bottoms of the culverted crossings shall not be less than 25% of the culvert height.

c. Retrofitted culverts shall be at grade.

4. The permittee shall use best management practices, including and not limited to detention basins, retention basins, low-water irrigation, increase in pervious surfaces, and/or diversion of runoff to a collection system for re-use for irrigation purposes to prevent dry season runoff from entering San Juan Creek (upstream of Trampas Canyon), Gabino Creek, and Talega Creek from September to mid-October.

5. The permittee shall eradicate bullfrogs from any water quality treatment basin within 0.5 km of streams known to have arroyo toads. The eradication shall occur at the very least from September to mid-October to interrupt the annual breeding cycle. Permittee may use a variety of approaches to ensure compliance with this condition. Eradication efforts shall be monitored annually as part of the Aquatic Resources Adaptive Management Plan. If eradication efforts are not successful, the permittee shall cause the water quality treatment basin to be dry from September to mid-October by diverting dry season runoff to a collection system for re-use for irrigation purposes.

6. The permittee shall minimize light-spillover associated with the development to minimize indirect impacts to wildlife. Lighting shall be directed away from habitat areas through the use of low-sodium or similar intensity lights, light shields, native shrubs, berms, placement low near the ground, or other shielding methods.

7. The permittee shall refrain from using invasive exotic vegetation within fuel modification zones. Invasive exotic vegetation are those rated as medium or high by the California Invasive Plant Council in terms of their invasiveness.

8. The permittee shall undertake telemetry monitoring studies for arroyo toad near Planning Area 8 for five years and submit the results to the Corps before submittal of an application for Planning Area 8. The results shall be used in designing appropriate measures to minimize impacts to the arroyo toad in Planning Area 8.

III. Project Construction

1. The permittee shall implement a contractor education program to provide an overview and understanding of the project construction special conditions. A copy of the Special Conditions must be included in all bid packages for the project and be available at the work site at all times during periods of work and must be presented upon request by any Corps or other agency personnel with a reasonable reason for making such a request.

2. The permittee shall perform initial vegetation clearing in waters of the U.S. between September 15 and February 15. Work in waters may occur between February 15 and September 15 if breeding bird surveys indicate the absence of any nesting birds within a 50-foot radius.
3. With each project LOP application, the permittee shall submit to the Corps a complete set of detailed grading/construction plans showing all work and structures in waters of the U.S. The plans shall be submitted on paper that is no larger than 11x 17 inches. The permittee shall ensure that the project is built in accordance with the grading/construction plans.
4. The permittee shall place, heavy equipment working in or crossing wetlands on temporary construction mats (timber, steel, geotextile, rubber, etc.), or other measures must be taken to minimize soil disturbance such as using low pressure equipment, when practicable and if personnel would not be put into any additional potential hazard. Temporary construction mats shall be removed promptly after construction.
5. The permittee shall only discharge dredged or fill materials into waters of the U.S. that is free from pollutants in toxic amounts (see Section 307 of the Clean Water Act). The permittee not place within waters of the U.S. unsuitable materials (e.g., trash, debris, car bodies, asphalt, etc.).
 - a. This condition is satisfied through the use of using on-site materials from balanced cut-and-fill grading operations for every Planning Area except for Planning Area 8.
 - b. For Planning Area 8, the permittee shall prepare an updated Phase I Environmental Site Assessment (GPA EIR Mitigation Measure 4.14-13), prepare a comprehensive closure plan (GPA EIS Mitigation Measure 4.14-15), prepare a Health and Safety Contingency Plan (GPA EIR Mitigation Measure 4.14.1), remove all underground storage tanks (GPA EIR Mitigation Measure 4.14-6), and in the event that toxic materials are discovered during construction, an in the field assessment (GPA EIR Mitigation Measure 4.14-2). Such assessments shall be provided to the Corps. The permittee shall not discharge fill materials associated with Planning Area 8 containing toxic amounts of pollutants.
6. The permittee shall clearly mark the limits of the workspace with flagging or similar means to ensure mechanized equipment does not enter preserved waters of the U.S. and riparian wetland/habitat areas. Adverse impacts to waters of the U.S. beyond the Corps-approved construction footprint are not authorized. Such impacts could result in permit suspension and revocation, administrative, civil or criminal penalties, and/or substantial, additional, compensatory mitigation requirements
7. The permittee shall install toad exclusion fencing for any work within 300 feet of a known population of the arroyo toad adjacent to San Juan Creek, Verdugo Creek, Gabino Creek, Cristianitos Creek, and Talega Creek for activities occurring outside of the estivation period.
8. The permittee shall implement best management practices to prevent the movement of sediment into waters of U.S. Compliance with Ranch Plan EIR Standard Condition 4.5-11 (Erosion and Sediment Control Plan (ESCP)) would satisfy this condition. The ESCP must be designed to minimize the mobilization of fine sediments into downstream waters occupied by steelhead and

arroyo toad. A copy of the current ESCP shall be provided to the Corps for each project application.

9. For each planning area within the San Juan Creek Watershed, the permittee shall survey streams 1000 feet downstream of each planning area for arroyo chub and three-spined stickleback prior to construction. If either species are found, downstream turbidity up to 300 feet from the planning area during construction shall not exceed more than 10 NTU over background when the background is less than 50 NTU or a 20 percent increase in turbidity when the background turbidity is more than 50 NTU. Background turbidity values can be obtained by measuring turbidity just upstream of the discharge point during construction. If the turbidity threshold is exceeded, the permittee shall implement additional turbidity control measures within 48 hours to reduce the turbidity to below threshold values.

10. The permittee shall restore all temporarily impacted areas to pre-construction elevations within one month following completion of work. If wetlands or non-wetland waters of the U.S. vegetated with native wetland species were impacted, re-vegetation should commence within three months after restoration of pre-construction elevations and be completed within one growing season. If re-vegetation cannot start due to seasonal conflicts (e.g., impacts occurring in late fall/early winter should not be re-vegetated until seasonal conditions are conducive to re-vegetation), exposed earth surfaces should be stabilized immediately with jute-netting, straw matting, or other applicable best management practice to minimize any erosion from wind or water.

11. The permittee shall comply with all the conditions of the historic properties treatment plan once the Corps in consultation with the State Historic Preservation Office approves the plan.

12. Pursuant to 36 C.F.R. section 800.13, in the event of any discoveries during construction of either previously unrecorded human remains, archeological deposits, or any other type of previously unrecorded historic property, the permittee shall notify the Corps' Archeology Staff within 24 hours (Steve Dibble at 213-452-3849, Pam Maxwell at 213-452-3877, or John Killeen at 213-452-3861). The permittee shall immediately suspend all work in any area(s) where potential cultural resources are discovered. The permittee shall not resume construction in the area surrounding the potential cultural resources until the Corps re-authorizes project construction, per 36 C.F.R. section 800.13.

13. During construction of each Planning Area or associated infrastructure, the permittee shall provide weekly construction reports via e-mail, fax, and/or mail demonstrating status of compliance with all project construction special conditions. Appropriate photos shall be submitted to show establishment of project construction minimization features.

14. This Corps permit does not authorize you to take any threatened or endangered species, in particular coastal California gnatcatcher (*Polioptila californica californica*), least Bell's vireo (*Vireo bellii pusillus*), southwestern willow flycatcher (*Empidonax traillii extimus*), arroyo toad (*Bufo microscaphus californicus*), San Diego fairy shrimp (*Branchinecta sandiegonensis*), Riverside fairy shrimp (*Streptocephalus woottoni*), and thread-leaved brodiaea (*Brodiaea filifolia*) or adversely modify its designated critical habitat. In order to legally take a listed species, you must have separate authorization under the Endangered Species Act (ESA) (e.g. ESA Section 10 permit, or a Biological Opinion (BO) under ESA Section 7, with "incidental take" provisions with which you

must comply). The FWS BO 1-6-07-F-812.8 and Incidental Take Permit TE 144140-0 provides such authorization and contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is also specified in the BO. Your authorization under this Corps permit is conditional upon your compliance with all of the mandatory terms and conditions associated with incidental take of the BO, which terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the BO, where a take of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with your Corps permit. The FWS is the appropriate authority to determine compliance with the terms and conditions of its BO and with the ESA.

IV. Compensatory Mitigation

1. The permittee shall protect avoided aquatic resources that are appropriately buffered (where feasible) by recording conservation easements. The conservation easements shall be recorded in phases in substantial conformance with the RMV Open Space and Phasing Plan shown as Exhibit B in the RMV Open Space Agreement, entered into by the permittee and County of Orange pursuant to the Ranch Plan Program EIR No. 589. The Corps acknowledges that the conservation easements will allow for passive recreation, agricultural uses by the O'Neill family and its successors in interest, if any, and for certain specified infrastructure facilities as illustrated in Exhibits 8-1 through 8-5. The Southern Subregion Habitat Conservation Plan conservation easement shall be approved by the Corps before recordation. Following the recordation of each conservation easement, the permittee shall provide to the Corps a copy of the conservation easement.
2. The permittee shall compensate for all impacts to aquatic resources ensuring no net loss of functions and acres of naturally-vegetated waters of the U.S., including wetlands.
 - a. The permittee shall compensate for all impacts to wetlands and non-wetland waters of the U.S. vegetated with native wetland plant species at a 1:1 ratio on an area basis.
 - i. The permittee may use the 18 acres of credit already established at the Gobernadora Ecological Restoration Area to compensate for future impacts to any waters of the U.S.
 - ii. Compensatory mitigation for impacts to specified wetlands and non-wetland waters of the U.S. vegetated with native wetland plant species shall be initiated prior to impacts to the specified waters of the U.S. and achieve the success criteria prior to impacts to the specified waters of the U.S.
 - iii. The permittee shall provide the Corps, Department of Fish and Game, and the U.S. Fish and Wildlife Service with a habitat mitigation and monitoring plan consistent with the LAD Mitigation and Monitoring Guidelines for review and approval prior to implementation of the compensatory mitigation. The compensatory mitigation sites should be prioritized in consideration of the "San Juan Creek Watershed Riparian Ecosystem Restoration Plan: Site Selection and General Design Criteria" by Engineering Research and Development Center (ERDC) dated August 2004 and the Aquatic Resources Restoration Plan. Additional considerations include the proximity of impact site and mitigation site, impacts to other sensitive habits due to the potential mitigation site, site

ownership, and other factors. Restoration design shall follow the principles of the ERDC restoration plan (Appendix F4 of the SAMP EIS).

b. The permittee shall compensate for all impacts to non-wetland waters that are vegetated by upland species or unvegetated through the eradication of all arundo on the RMV Planning Area (about 90 acres) consistent with the Invasive Species Control Plan.

c. Temporary impacts to wetlands or naturally vegetated non-wetland waters of the U.S. will be compensated through the existing habitat values and functions provided by 18 acres of already existing created/restored wetlands within GERA that is already providing temporal gain and the habitat value and functional enhancement provided through implementation of the ARAMP, including invasive species control such as the eradication of about 90 acres of giant reed on the RMV Planning Area. Temporary impacts to waters of the U.S. unvegetated or vegetated by upland species does not require compensatory mitigation.

3. The permittee shall compensate for the loss of mud nama, southern tarplant, and salt spring checkerbloom at a 2:1 ratio based on acreage.

a. The permittee shall provide the Corps, Department of Fish and Game, and the U.S. Fish and Wildlife Service with a habitat mitigation and monitoring plan consistent with the LAD Mitigation and Monitoring Guidelines and the Plant Species Translocation, Propagation, and Management Plan (Appendix J-1 to the GPA/ZC EIR) for all anticipated impacts to these sensitive wetland plants.

b. The permittee may elect to initiate replacement of sensitive plant acreage before impacts occur. If final performance criteria are achieved prior to impacts occurring, the Corps shall reduce the mitigation ratio to 1:1. Applicant may apply excess mitigation credits towards future impacts.

4. The permittee shall finalize the Adaptive Resources Management Plan, including funding sources, for in perpetuity preservation of aquatic resource functions and values within one year of issuance of the long-term individual permit.

5. The permittee shall conduct an exotic aquatic animal removal program to remove cowbirds, bullfrogs, non-native fishes, etc., as set forth in the Invasive Species Control Plan (Appendix F4 to the SAMP EIS).

V. Post-Project

1. The permittee shall submit to the Corps and Department as-built drawings of the boundaries of each planning area within 12 months of their completion.

2. The permittee shall submit to the Corps and Department as-built drawings of each compensatory mitigation area within 12 months of their completion.

3. The permittee shall submit to the Corps and the Department of a final report demonstrating compliance with each of the special conditions.

Further Information:

ATTACHMENT E

HCP Appendix U

SAN DIEGO REGIONAL
WATER QUALITY
CONTROL BOARD

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Appendix U Avoidance and Minimization Measures

Rancho Mission Viejo

(1) Avoidance/minimization through Project Modifications

Brodiaea

- The permittee shall avoid all impacts to the largest thread-leaved brodiaea population (a threatened facultative wetland plant) of the major population in a key location (as described in Southern NCCP Planning Guidelines) on Chiquadora Ridge as part of construction for Planning Area 2 (ACOE Special Condition I.A.3).

Arroyo Toad

- The permittee shall provide wildlife movement corridors along San Juan Creek, Canada Chiquita, Canada Gobernadora, Cristianitos, Gabino, and Talega Creeks. Uses within these corridors shall be as follows:
 - a. The corridor along San Juan Creek upstream of Trampas Canyon to the edge of the RMV property shall provide a 400-meter wide corridor (200-meter setback off the centerline) except for the narrowing due to infrastructure facilities.
 - b. Residential or commercial structures shall not be constructed within the 400-meter corridor.
 - c. Limited fuel modification zones, trails, and related recreational facilities (i.e., interpretative signage, staging areas, picnic areas) are allowed within the 400-meter corridor.
 - d. Infrastructure facilities are allowed including:
 - i) natural treatment systems for water quality treatment and related drainage facilities;
 - ii) outfalls that are located outside of the ordinary high water mark;
 - iii) approved bridge crossings; and
 - iv) water, sewer, and power facilities as set forth in Figure 1 (ACOE Special Condition I.D.2)
- The permittee shall undertake telemetry monitoring studies for arroyo toad near Planning Area 8 for five years and submit the results to the Corps before submittal of an application for Planning Area 8. The results shall be used in designing appropriate measures to minimize impacts to the arroyo toad in Planning Area 8 (ACOE Special Condition I.D.8.)

Vernal Pools/Fairy Shrimp/Western Spadefoot Toad

- Prior to issuance of a grading permit for Planning Area 5, the Project Applicant shall demonstrate to the satisfaction of the County's Director of Planning Services Department or his/her designee that all vernal pools in the Trampas Sub-basin have been avoided (*GPA EIR Mitigation Measure 4.9-35*).

Dudleya/Western Spadefoot Toad & Southwestern Pond Turtle

- The permittee shall locate any potential orchards to be located in Planning Area 6, within the areas identified in *Figure 205-M (NCCP Minimization Measure 8-2)*.

(2) Avoidance/Minimization through Construction-Related Measures

Wildlife Movement Corridors

- The permittee shall design new arterial roads or existing arterials upgraded to serve Rancho Mission Viejo projects along San Juan Creek, Chiquita Creek, and Gobernadora Creek, as follows in order to protect wildlife:
 - a. The bridge crossings shall provide a minimum of 20 feet of clearance from the stream bottom;
 - b. Chain link fencing or functionally similar barrier of 10 feet in height (or as revised/determined through adaptive management) shall be installed on both sides of the approaches to the bridge for a distance of 100 feet away (or as revised/determined through adaptive management) from the stream to deter wildlife from entering the roadway (*ACOE Special Condition I.C.1*).
- The permittee shall include a wildlife culvert at Chiquita Narrows within the design of Cristianitos Road with the following dimensions: The culvert shall have a minimum dimension of 15 by 15 feet, the bottom of the culvert shall be of a natural substrate, light shall be visible from one end of the culvert to the other, vegetation installed at either end shall be native low growing to prevent predator-prey stalking, and if required for public health and safety, all lighting on the road above the culvert shall be shielded to prevent spill-over effects (*NCCP Minimization Measure 8-1*).

Multiple Species

- Biological resources outside of the Proposed Project impact area shall be protected during construction. To ensure this protection, the Project Applicant shall prepare and implement a

Biological Resources Construction Plan (BRCP) that provides for the protection of the resource and established the monitoring requirements. The BRCP shall contain at a minimum the following:

- a. Specific measures for the protection of sensitive amphibian, mammal, bird, and plant species during construction.
- b. Identification and quantification of habitats to be removed.
- c. Design of protective fencing around conserved habitat areas and the construction staging areas.
- d. Specific construction monitoring programs for sensitive species required by Wildlife Agencies including, but not limited to, programs for the arroyo toad, western spadefoot toad, southwestern pond turtle, cactus wren, and coastal California gnatcatcher. Such measures shall be consistent with prior Section 7 consultations and 1600 agreements; e.g., Arroyo Trabuco Golf Course.
- e. Specific measures required by Wildlife Agencies (e.g., Arroyo Trabuco Golf Course) for the protection of sensitive habitats including, but are not limited to, erosion and siltation control measures, protective fencing guidelines, dust control measures, grading techniques, construction area limits, and biological monitoring requirements (*GPA EIR Mitigation Measure 4.9-30*).

Raptors

- During construction, a construction monitoring program shall be implemented to mitigate for short-term noise impacts to nesting raptors, to the satisfaction of the County of Orange, Manager, Subdivision and Grading. Indirect impacts shall be mitigated by limiting heavy construction (i.e., mass grading) within 300 feet of occupied raptor nests. Occupied raptors nests shall be marked as "Environmentally Sensitive Areas" on grading/construction plans and shall be protected with fencing consisting of T-bar posts and yellow rope. Signs noting the area as an "Environmentally Sensitive Area" will be attached to the rope at regular intervals (*GPA EIR Mitigation Measure 4.9-26*).

Tricolored Blackbird

- Prior to issuance of grading permits for Planning Area 4, the County's Director of Planning Services/designee shall verify that wetland/riparian habitat for tricolored blackbird at the mouth of Verdugo Canyon has been avoided (*GPA EIR Mitigation Measure 4.9-31*).

Arroyo Toad

- The permittee shall install toad exclusion fencing for any work within 300 feet of a known population of the arroyo toad adjacent to San Juan Creek, Verdugo Creek, Gabino Creek, Cristianitos Creek, and Talega Creek for activities occurring outside of the estivation period (*ACOE Special Condition II.7*).

Fish

- The permittee shall retrofit the existing Cow Camp culvert crossing across San Juan Creek upon receiving authorization to discharge fill materials associated with Planning Area 3 to allow for fish passage. Alternatively, the crossing may be relocated to accomplish the same functional objectives as above and the current crossing may be removed and the disturbed area restored to provide a smooth, continuous longitudinal channel profile. The culverts shall comply with these following guidelines:
 - a. The culvert shall be a minimum of 6 feet in width.
 - b. The bottoms of the culverted crossings shall not be less than 25% of the culvert height.
 - c. Retrofitted culverts shall be at grade (*ACOE Special Condition I.D.3*).
- The permittee shall implement best management practices to prevent the movement of sediment into waters of U.S. Compliance with Ranch Plan EIR Standard Condition 4.5-11 (Erosion and Sediment Control Plan (ESCP)) would satisfy this condition. The ESCP must be designed to minimize the mobilization of fine sediments into downstream waters occupied by steelhead, tidewater goby, and arroyo toad. A copy of the current ESCP shall be provided to the Corps for each project application (*ACOE Special Condition II.8*).
- For each planning area within the San Juan Creek Watershed, the permittee shall survey streams 1,000 feet downstream of each planning area for arroyo chub and partially-armored threespine stickleback prior to construction. If either species are found, downstream turbidity up to 300 feet from the planning area during construction shall not exceed more than 10 NTU over background when the background is less than 50 NTU or a 20 percent increase in turbidity when the background turbidity is more than 50 NTU. Background turbidity values can be obtained by measuring turbidity just upstream of the discharge point during construction. If the turbidity threshold is exceeded, the permittee shall implement additional turbidity control measures within 48 hours to reduce the turbidity to below threshold values (*ACOE Special Condition II.9*).

Southern Tarplant

- Prior to issuance of a grading permit for Planning Area 2, the Project Applicant shall demonstrate to the satisfaction of the County's Director of Planning Services Department or his/her designee that impacts to the *key location* and *major population* of southern tarplant in the Chiquita sub-basin have been substantially avoided. Consistency with this mitigation measure for the portion of Planning Area 2 subject to Planning Reserve shall be addressed in accordance with the requirements of the Planning Reserve Designation (*GPA EIR Mitigation Measure 4.9-2*).
- Translocation of southern tarplant shall occur in accordance with Appendix I – Sensitive Plant Translocation, Propagation and Management Plan

Coulter's Saltbush

- Prior to issuance of a grading permit for Planning Area 2, the Project Applicant shall demonstrate to the satisfaction of the County's Director of Planning Services Department or his/her designee that impacts to the *key location* and *major population* of Coulter's saltbush in the Chiquita sub-basin have been substantially avoided. Consistency with this mitigation measure for the portion of Planning Area 2 subject to Planning Reserve shall be addressed in accordance with the requirements of the Planning Reserve Designation (*GPA EIR Mitigation Measure 4.9-3*).
- Translocation of Coulter's saltbush shall occur in accordance with Appendix I – Sensitive Plant Translocation, Propagation and Management Plan

Mud Nama

- Translocation of mud nama shall occur in accordance with Appendix I – Sensitive Plant Translocation, Propagation and Management Plan

Mariposa Lily

- Translocation of Mariposa lily shall occur in accordance with Appendix I – Sensitive Plant Translocation, Propagation and Management Plan

Many-stemmed Dudleya

- Translocation of many-stemmed dudleya shall occur in accordance with Appendix I – Sensitive Plant Translocation, Propagation and Management Plan

Salt Spring Checkerbloom

- Translocation of salt spring checkerbloom shall occur in accordance with Appendix I – Sensitive Plant Translocation, Propagation and Management Plan

Palmer's grapplinghook

- Palmer's grapplinghook seed will be collected prior to project impacts for use in the seed mix for coastal sage scrub/native grassland restoration areas. Receiver sites will support clay soils and other conditions suitable for Palmer's grapplinghook. In addition, where feasible, clay soils will be salvaged from development areas and appropriately transported to restoration areas to provide a seed bank.

Vernal Barley

- Vernal barley seed can be collected prior to project impacts for use in the seed mix for coastal sage scrub/native grassland restoration areas. Receiver sites will support clay soils and other conditions suitable for vernal barley. In addition, where feasible, clay soils will be salvaged from development areas and appropriately transported to restoration areas to provide a seed bank.

Small-flowered Microseris

- Small-flowered microseris seed can be collected prior to project impacts for use in the seed mix for coastal sage scrub/native grassland restoration areas. Receiver sites will support clay soils and other conditions suitable for small-flowered microseris. In addition, where feasible, clay soils will be salvaged from development areas and appropriately transported to restoration areas to provide a seed bank.

(3) Minimization of Indirect Effects

Lighting

- The permittee shall minimize light-spillover associated with the development to minimize indirect impacts to wildlife. Lighting shall be directed away from habitat areas through the use of low-sodium or similar intensity lights, light shields, native shrubs, berms, placement low near the ground, or other shielding methods (*ACOE Special Condition I.D. 7*).
- Lighting shall be shielded or directed away from RMV Open Space habitat areas through the use of low-sodium or similar intensity lights, light shields, native shrubs, berms or other shielding methods.

- Prior to the issuance of building permits for a tract with public street lighting adjacent to RMV Open Space habitat areas, the County of Orange shall verify that measures to shield such lighting have been incorporated in the building plans (*GPA EIR Mitigation Measure 4.9-28*).

Invasive Species

- The permittee shall refrain from using invasive exotic vegetation within fuel modification zones. Invasive exotic vegetation species are those rated as medium or high by the California Invasive Plant Council in terms of their invasiveness (*ACOE Special Condition I.D.8*).
- The permittee shall conduct an exotic aquatic animal removal program to remove cowbirds, bullfrogs, non-native fishes, etc., as set forth in the Invasive Species Control Plan (Appendix F4 to the SAMP EIS) (*ACOE Special Condition III.6*).
- All plants identified by the California Exotic Pest Plant Council as an invasive risk in southern California shall be prohibited from development and fuel management zones adjacent to the RMV Open Space. The plant palette for fuel management zones adjacent to the RMV Open Space shall be limited to those species listed on the Orange County Fire Authority Fuel Modification Plant List. Plants native to Rancho Mission Viejo shall be given preference in the plant palette.
- Prior to issuance of fuel modification plan approvals, the County of Orange shall verify that: 1) plants identified by the California Exotic Pest Plant Council as an invasive risk in Southern California are not included in plans for fuel management zones adjacent to the RMV Open Space and, 2) the plant palette for fuel management zones adjacent to RMV Open Space is limited to those species listed on the Orange County Fire Authority Fuel Modification Plant List.
- Prior to the recordation of a map for a tract adjacent to the RMV Open Space, the County of Orange shall verify that the CC&Rs contain language prohibiting the planting of plants identified by the California Exotic Pest Plant Council as an invasive risk in Southern California in private landscaped areas (*GPA EIR Mitigation Measure 4.9-27*).

Access

- Access to the RMV Open Space shall be managed and directed as specified in the Open Space Agreement between the County of Orange and RMV. Where potential conflicts between development and open space are identified per the agreement the following shall occur:
 - a. Prior to the issuance of building permits for a tract adjacent to the RMV Open Space, the County of Orange shall verify that measures, such as fencing, signs, etc., to direct the public to public access points within the RMV Open Space have been incorporated into the

building plans. To the extent that public access points are not identified, the County of Orange shall verify that measures, such as fencing, signs, etc., to prohibit public access have been incorporated into the building plans (*GPA EIR Mitigation Measure 4.9-29*).

(4) Restoration of Temporary Impact Areas

- All temporarily impacted upland areas shall be restored to pre-construction elevations within one month following completion of work. All temporarily impacted upland areas will be restored to equivalent or better conditions compared to the existing condition at the time of impact. Re-vegetation should commence within three months after restoration of pre-construction elevations and be completed within one growing season. If re-vegetation cannot start due to seasonal conflicts (e.g., impacts occurring in late fall/early winter should not be re-vegetated until seasonal conditions are conducive to re-vegetation), exposed earth surfaces should be stabilized immediately with jute-netting, straw matting, or other applicable best management practice to minimize any erosion from wind or water.

(5) Grazing Management Plan Species Avoidance Measures after Reserve Dedication

Arroyo Toad

- Cattle shall be seasonally excluded from active breeding pools and adjacent sand bars and benches to the maximum extent practical within lower Gabino Creek during arroyo toad breeding season. To the extent feasible and/or necessary, temporary fencing around active breeding pools and adjacent sand bars and benches shall be erected to discourage cattle from entering these areas (*Grazing Management Plan*).
- Cattle shall be seasonally excluded from active breeding pools and adjacent sand bars and benches to the maximum extent practical within San Juan Creek during arroyo toad breeding season. To the extent feasible and/or necessary, temporary fencing around active breeding pools and adjacent sand bars and benches shall be erected to discourage cattle from entering these areas (*Grazing Management Plan*).

Vernal Pools/Fairy Shrimp

- If recommended by the Science Panel, cattle shall be seasonally excluded from the Radio Tower Road vernal pools once sufficient rainfall has occurred to result in the pools ponding (i.e., holding water) to a depth of at least 1 inch lasting for at least 24 hours. To the extent necessary (i.e., if cattle are being grazed in the Radio Tower Road pasture), temporary fencing shall be erected around the pools to discourage cattle from entering the pools. If erected, fencing shall remain in

place until the pools are sufficiently dry that cattle hooves do not result in soil disturbance and compaction.

Southwestern Willow Flycatcher/Least Bell's Vireo

- Grazing within GERA for fuel modification purposes once every three years shall be conducted outside the breeding season for southwestern willow flycatcher and least Bell's vireo (February 15 to July 15).

(6) MSAA Avoidance/Minimization Measures

- The permittee shall implement a contractor education program to provide an overview and understanding of the project construction special conditions. A copy of the Special Conditions must be included in all bid packages for the project and be available at the work site at all times during periods of work and must be presented upon request by any Corps or other agency personnel with a reasonable reason for making such a request (*ACOE Special Condition II.1*).
- The permittee shall perform initial vegetation clearing in waters of the U.S. between September 15 and March 15. Work in waters may occur between March 15 and September 15 if breeding bird surveys indicate the absence of any nesting birds within a 50-foot radius (*ACOE Special Condition II.2*).
- In all areas external to the planning area boundaries, the permittee shall provide plans to the Corps showing the limits of grading, upland haul routes, fueling and storage areas for vehicles outside of waters of the U.S., temporary impact areas, dewatering areas, and temporary access roads within waters of the U.S. Plans shall be provided with each project application for each planning area for review prior to project impacts (*ACOE Special Condition II.3*).
- The permittee shall place, heavy equipment working in or crossing wetlands on temporary construction mats (timber, steel, geotextile, rubber, etc.), or other measures must be taken to minimize soil disturbance such as using low pressure equipment, when practicable and if personnel would not be put into any additional potential hazard. Temporary construction mats shall be removed promptly after construction (*ACOE Special Condition II.4*).
- The permittee shall only discharge dredged or fill material into waters of the U.S. that is free from pollutants in toxic amounts (see Section 307 of the Clean Water Act). The permittee shall not place within waters of the U.S. unsuitable materials (e.g., trash, debris, car bodies, asphalt, etc.).
- This condition is satisfied through the use of on-site materials from balanced cut-and-fill grading operations for every Planning Area except for Planning Area 8.

- For Planning Area 8, the permittee shall prepare an updated Phase I Environmental Site Assessment (GPA EIR Mitigation Measure 4.14-13), prepare a comprehensive closure plan (GPA EIS Mitigation Measure 4.14-15), prepare a Health and Safety Contingency Plan (GPA EIR Mitigation Measure 4.14.1), remove all underground storage tanks (GPA EIR Mitigation Measure 4.14-6), and in the event that toxic materials are discovered during construction, an in the field assessment (GPA EIR Mitigation Measure 4.14-2). Such assessments shall be provided to the Corps. The permittee shall not discharge fill materials associated with Planning Area 8 containing toxic amounts of pollutants (*ACOE Special Condition II.5*).
- The permittee shall identify the limits of impacts in the field with brightly-colored flags, tape, or other marking to prevent unauthorized grading outside approved footprints (*ACOE Special Condition II.6*).
- The permittee shall restore all temporarily impacted areas to pre-construction elevations within one month following completion of work. If wetlands or non-wetland waters of the U.S. vegetated with native wetland species were impacted, re-vegetation should commence within three months after restoration of pre-construction elevations and be completed within 1 growing season. If re-vegetation cannot start due to seasonal conflicts (e.g., impacts occurring in late fall/early winter should not be re-vegetated until seasonal conditions are conducive to re-vegetation), exposed earth surfaces should be stabilized immediately with jute-netting, straw matting, or other applicable best management practice to minimize any erosion from wind or water (*ACOE Special Condition II.10*).
- During construction of each Planning Area or associated infrastructure, the permittee shall provide weekly construction reports via e-mail, fax, and/or mail demonstrating status of compliance with all project construction special conditions. Appropriate photos shall be submitted to show establishment of project construction minimization features (*ACOE Special Condition II.12*).

Santa Margarita Water District

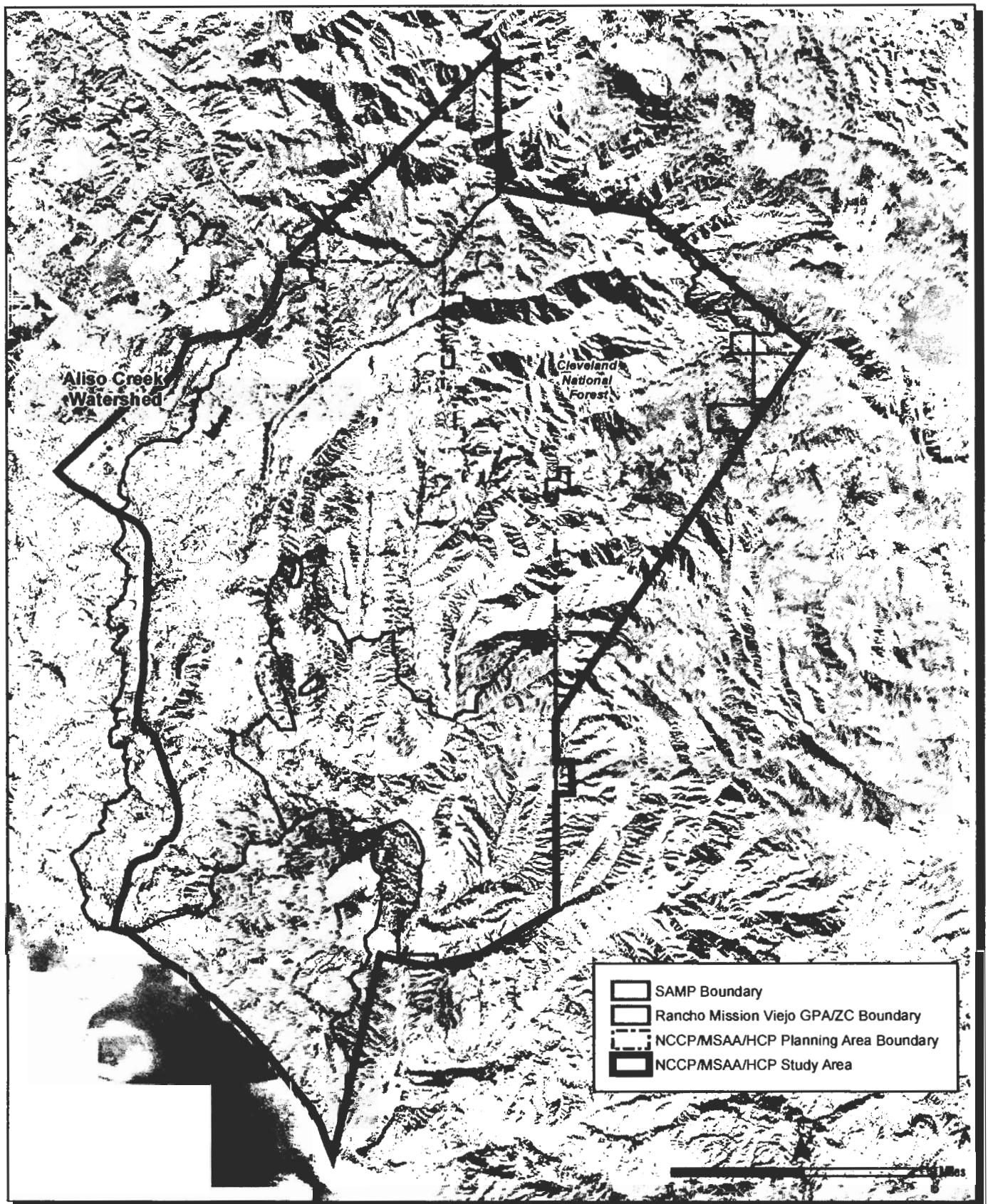
(1) Avoidance/Minimization through Construction-Related Measures

- The permittee shall implement a contractor education program to provide an overview and understanding of the project construction special conditions. A copy of the Special Conditions must be included in all bid packages for the project and be available at the work site at all times during periods of work and must be presented upon request by any Corps or other agency personnel with a reasonable reason for making such a request (*ACOE Special Condition SMWD II.1*).

- The permittee shall perform initial vegetation clearing in waters of the U.S. between September 15 and March 15. Work in waters may occur between March 15 and September 15 if breeding bird surveys indicate the absence of any nesting birds within a 50-foot radius (*ACOE Special Condition SMWD II.2*).
- With each project LOP application, the permittee shall provide plans to the Corps showing the limits of grading, upland haul routes, fueling and storage areas for vehicles outside of waters of the U.S., temporary impact areas, dewatering areas, and temporary access roads within waters of the U.S. The permittee shall conform the grading to pre-identified impacts (*ACOE Special Condition SMWD II.3*).
- The permittee shall place heavy equipment working in or crossing wetlands on temporary construction mats (timber, steel, geotextile, rubber, etc.), or other measures must be taken to minimize soil disturbance such as using low pressure equipment, when practicable and if personnel would not be put into any additional potential hazard. Temporary construction mats shall be removed promptly after construction (*ACOE Special Condition SMWD II.4*).
- The permittee shall only discharge dredged or fill material into waters of the U.S. that is free from pollutants in toxic amounts (see Section 307 of the Clean Water Act). The permittee shall not place within waters of the U.S. unsuitable materials (e.g., trash, debris, car bodies, asphalt, etc.) (*ACOE Special Condition SMWD II.5*).
- The permittee shall identify the limits of impacts in the field with brightly-colored flags, tape, or other marking to prevent unauthorized grading outside approved footprints (*ACOE Special Condition SMWD II.6*).
- The permittee shall install toad exclusion fencing for any work within 300 feet of a known population of the arroyo toad adjacent to San Juan Creek, Verdugo Creek, Gabino Creek, Cristianitos Creek, and Talega Creek for activities occurring outside of the estivation period (*ACOE Special Condition SMWD II.7*).
- The permittee shall implement best management practices to prevent the movement of sediment into waters of U.S. The permittee shall develop a program-level plan to minimize the mobilization of fine sediments into downstream waters. A copy of the plan shall be provided to the Corps before issuance of the final permit (*ACOE Special Condition SMWD II.8*).
- The permittee shall restore all temporarily impacted areas to pre-construction elevations within one month following completion of work. If wetlands or non-wetland waters of the U.S. vegetated with native wetland species were impacted, re-vegetation should commence within three months after restoration of pre-construction elevations and be completed within 1 growing season. If re-

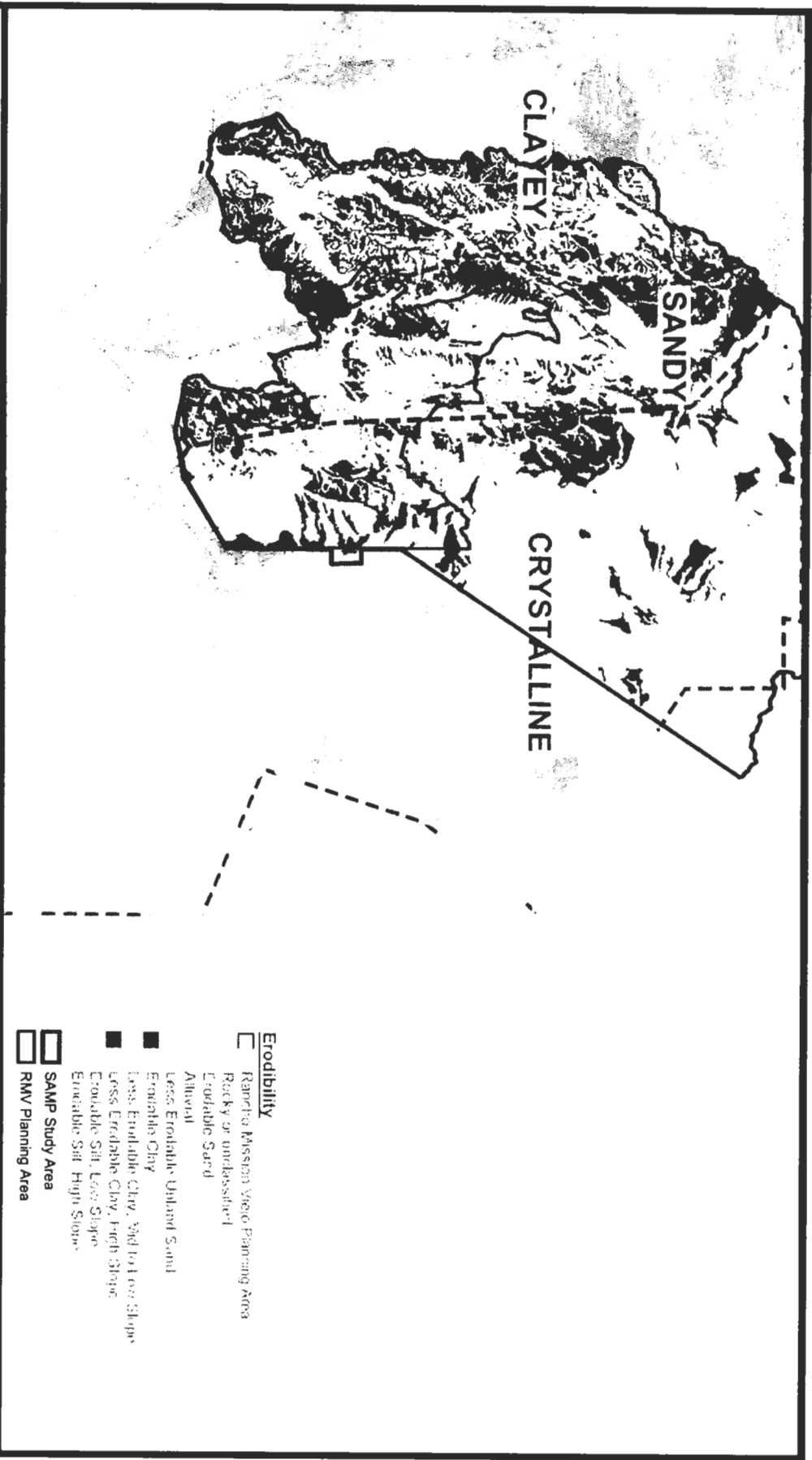
vegetation cannot start due to seasonal conflicts (e.g., impacts occurring in late fall/early winter should not be re-vegetated until seasonal conditions are conducive to re-vegetation), exposed earth surfaces should be stabilized immediately with jute-netting, straw matting, or other applicable best management practice to minimize any erosion from wind or water (*ACOE Special Condition SMWD II.9*).

- During work on each infrastructure project, the permittee shall provide weekly construction reports via e-mail, fax, and/or mail demonstrating status of compliance with all project construction special conditions. Appropriate photos shall be submitted to show establishment of project construction minimization features (*ACOE Special Condition SMWD II.11*).
- The permittee shall allow the Corps to inspect the site at any time during and immediately after project implementation provided a 24-hour advance notice is given to the permittee (*ACOE Special Condition SMWD II.12*).



Southern NCCP/MSAA/HCP, SAMP, and GPA/ZC Boundaries

FIGURE 7-M

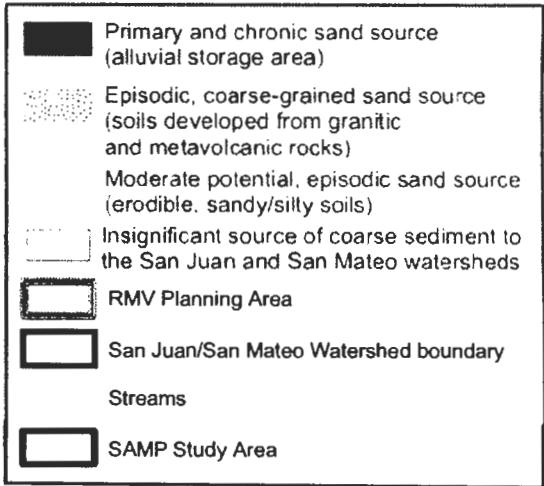
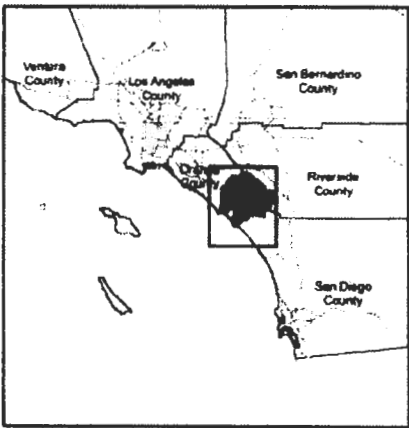
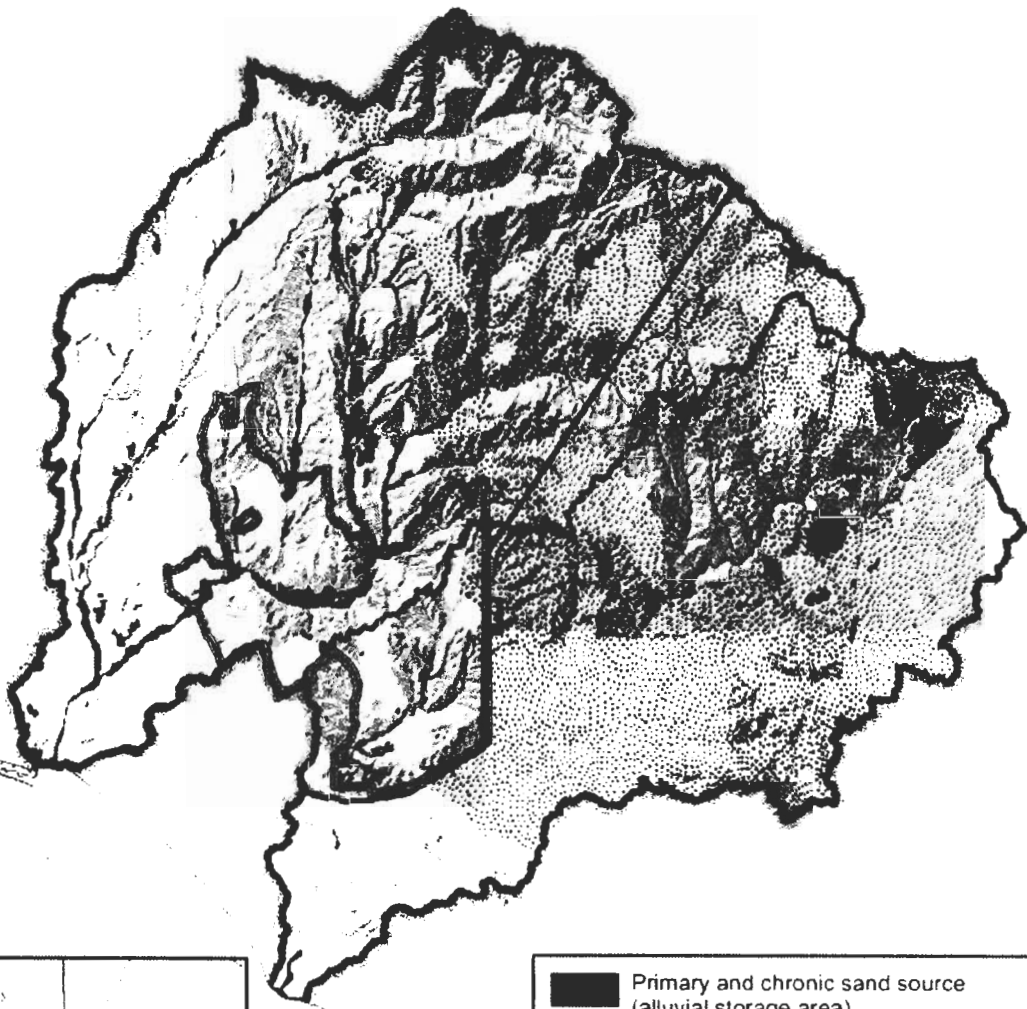


Landscape-scale Terrains and Shallow Substrate Erodibility

San Juan Creek and Western San Mateo Creek Watersheds SAMP ES

Figure 4.11-3
Source: Bureau Hydrologica 2000

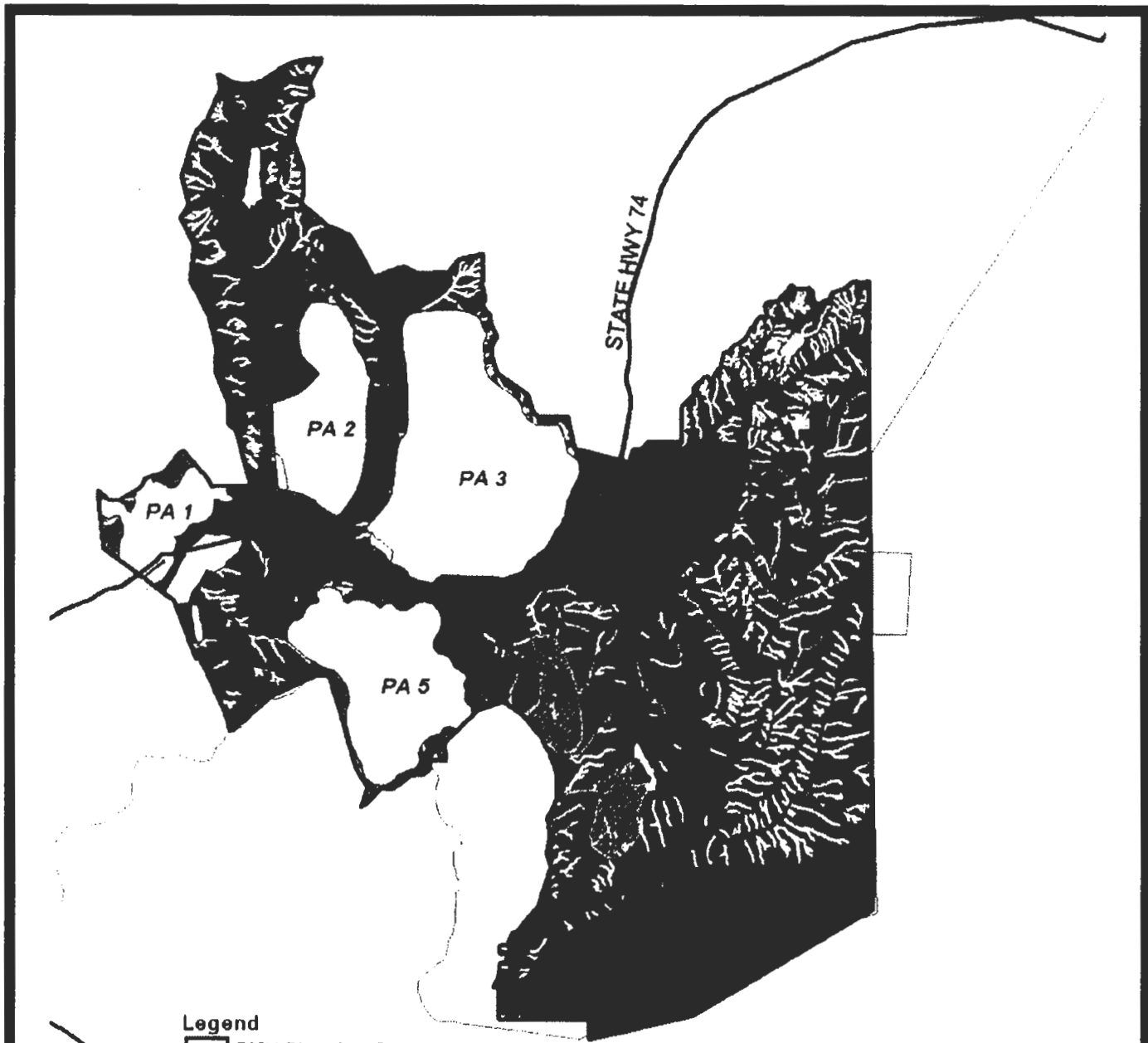




Geomorphology Terrains

Not to Scale





- Legend**
- RMV Planning Area
 - NAP
 - Actively Managed Aquatic Resource Conservation Areas (ARCAs)
 - Conserved Ephemeral Streams
 - Contributing Uplands to be Dedicated as Open Space
 - SAMP Study Area Outside Ranch Plan
 - 200 Meter Setback
- Areas Eligible for Abbreviated Permitting**
- Development
 - Development Impact Analysis Area
 - Orchard Impact Analysis Area

Aquatic Resources Conservation Areas

Not to Scale





Figure 3-6
Combined Flow and Water Quality Control System – Plan

June 2004

Water Quality Management Plan
Rancho Mission Viejo



Geosyntec
Consultants

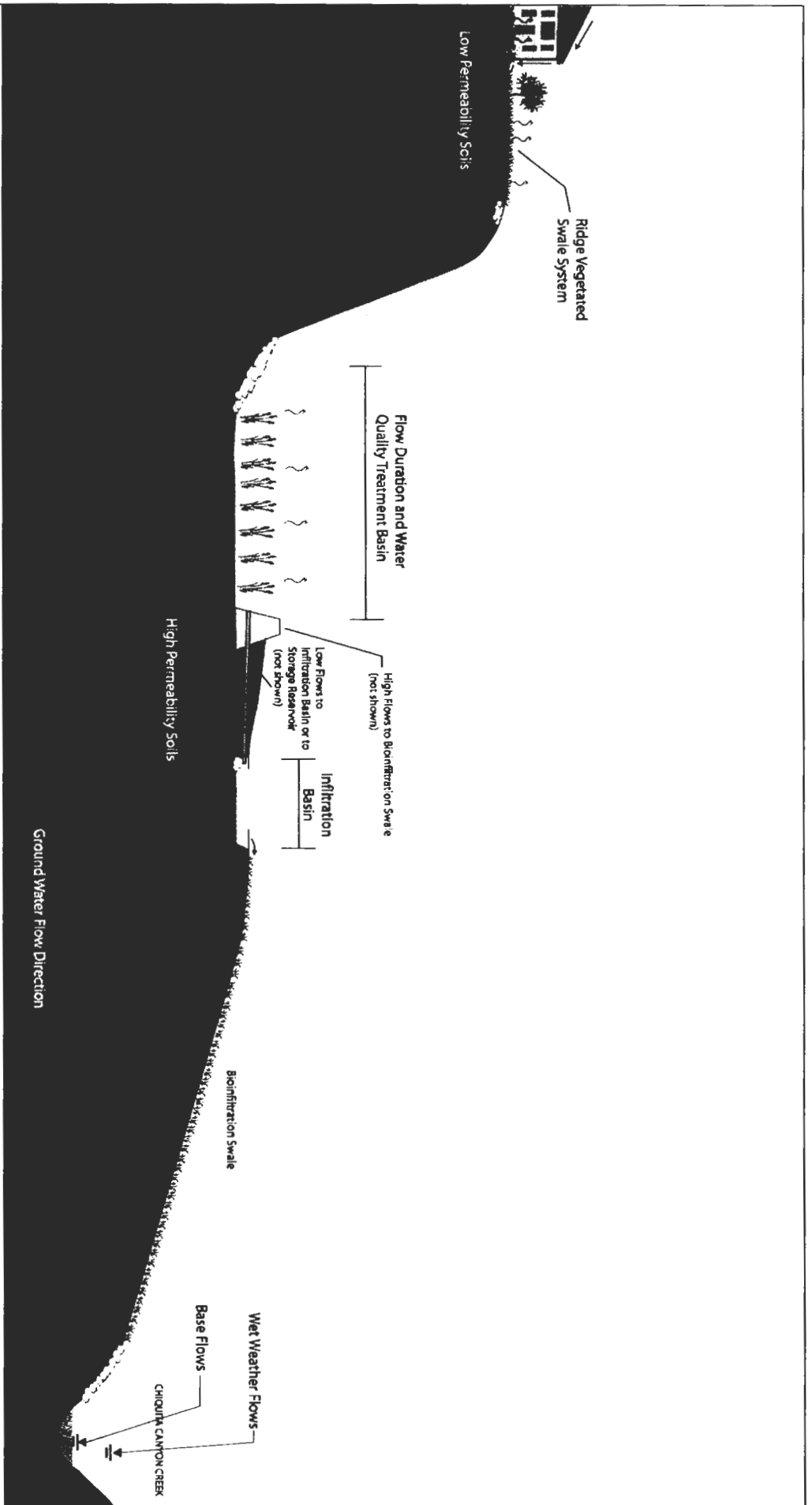


Figure 3-7
Combined Flow and Water Quality Control System - Profile

March 2004

Water Quality Management Plan
 Rancho Mission Viejo

