Final Project Development and Feasibility Report for the

San Dieguito Reservoir

MAY 2012

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SAN DIEGUITO RESERVOIR
FINAL PROJECT DEVELOPMENT AND FEASIBILITY REPORT

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EXECUTIVE SUMMARY

The San Dieguito Reservoir (SDR) is jointly owned by the Santa Fe Irrigation District (SFID) and the San Dieguito Water District (SDWD). SDR serves both as a raw water storage reservoir and a pre-treatment facility for the R.E. Badger Water Filtration Plant (Badger Plant). In addition, SDR serves as a flood control facility.

The majority of the water in SDR is derived from Lake Hodges. Water from Lake Hodges is conveyed to SDR where it is stored and pre-treated. The pre-treated raw water from SDR is pumped to the Badger Plant where it is treated and distributed for potable water use. In addition to water from Lake Hodges, a portion of water in SDR is from storm water and urban water run-off discharges that are primarily conveyed to SDR through the County of San Diego's (County) stormwater management system.

As summarized below, several key issues/conditions impact the current and/or future operation and maintenance of SDR:

- Urban water runoff discharges convey nutrients and other constituents that promote plant growth/decay and algae growth. This in turn increases total organic carbon (TOCs) loadings, reduces dissolved oxygen, and creates treatment and taste/odor challenges at the Badger Plant. In addition sediment deposits and plant growth fed by nutrients in urban water runoff build up downstream of the existing stormwater culvert and impedes the flow of stormwater into SDR.
- Stormwater primarily enters SDR through a culvert located in the northeastern corner of the SDR. Stormwater discharges bring large quantities of suspended solids resulting in high SDR turbidity and increased treatment challenges.
- Solid materials removed during treatment at the R.E. Badger Water Filtration Plant are discharged to the SDR approximately 1,000 feet downstream of the existing stormwater culvert. Over the years, these solids materials have formed a sediment mound. Each year from Oct 1st to April 30th, the reservoir water surface elevation must be lowered for flood control purposes. During these periods, the top of the sediment mound is exposed. Depending upon atmospheric conditions, periodic odor problems have occurred when the sediment mound is exposed to air.
- When it was originally constructed, the SDR provided a storage capacity of approximately 1,130 acre feet. Over the years, the build-up of decayed of plant materials surrounding SDR, solids conveyed from the R.E. Badger Water Filtration Plant, and sediments from urban water and storm water, have reduced the available storage capacity to approximately 750 to 800 acre feet; approximately a 29%–34% capacity loss. The March 2012 Joint Facilities Master Plan determined that the existing available volume is sufficient to reliably treat approximately 5,700 acre feet of local water annually. If higher

volumes of local water are regularly available, or additional storage is required for other purposes, dredging would be required to recover lost SDR capacity.

- Plant growth and decay around the perimeter of the SDR contributes to the build-up of solids (biomass) and organic loading within the SDR. Removal of this biomass would reduce organic loading.

Multiple projects and/or maintenance programs may be required in the future to improve or enhance current reservoir issues/conditions. SDR supports a wide variety of plant and animal life. Therefore, depending upon the nature of the project and/or maintenance activity, project footprint, and location within the reservoir boundary, permit requirements under the Clean Water Act, Endangered Species Act, and California Fish and Game Code will vary greatly. A significant challenge to the establishment of SDR project scopes of work and costs is the ability to delineate the limits where the project scope triggers more stringent permit constraints.

The SDR Project Development and Feasibility Report (Report) defines the environmental permitting requirements associated with each project, and defines planning level project descriptions that minimize potential environmental impacts. In addition to defining project descriptions and environmental permitting requirements, the Report also identifies project implementation schedules and planning level capital, permitting, mitigation, and maintenance costs.

Six potential projects where identified to address the various issues/conditions impacting operation and maintenance of SDR:

- Urban water pipeline and nutrient management/sedimentation basin
- Stormwater inlet channel modifications
- Urban water natural treatment wetlands
- SDR sediment mound reduction
- SDR dredging to reclaim storage volume
- SDR perimeter vegetation removal.

The first three potential projects listed above are driven by urban water and storm water discharges to SDR by the County. Though the Districts believe the dischargers of urban water and storm water flows are responsible for the cost to implement these improvements, this report provides planning level project descriptions and costs in order to facilitate future discussions with the County.

The following provides a brief summary of each potential project:

Urban water pipeline and nutrient management/sedimentation basin: Currently, urban runoff is discharged by the County through the County's existing stormwater culvert located in the northeast portion of the SDR. Urban water runoff is currently conveyed by the same system that conveys stormwater flows. The County is in the process of replacing their stormwater conveyance pipeline upstream of the existing culvert. As part of that replacement project, the County is planning to build a separate low flow urban water runoff pipeline to SDR. The County's project currently includes an 18-inch urban water "low flow" pipeline terminating at the District's property line. In order to mitigate issues associated with nutrient and sediment discharges from ongoing urban water discharge activities, this Report defines a project including a pipeline extending from the Districts' property line to a sedimentation basin designed to manage urban water discharges containing sediments and nutrients that impact SDR operation and maintenance. The project would re-route urban water discharges to a location that would have less impact on the SDR from a standpoint of nutrient discharge and remove sediments that accumulate downstream of the existing stormwater culvert. The project would also provide a better means to monitor the quality of urban water discharges and identify appropriate nutrient (or other constituent) reduction improvements if necessary.

Stormwater inlet channel modifications: High volume stormwater discharges contain substantial amounts of suspended solids and other constituents that impact the treatability of water from SDR. This Report identifies improvements to the area downstream of the County's existing stormwater culvert that will allow stormwater to mix more evenly with water within SDR and reduce the impacts of suspended solids and turbidity at the Badger Plant. Improvements include localized dredging and the construction of broad engineered 150 foot wide approach floodway.

Urban water natural treatment wetlands: In the event additional urban water nutrient removal is necessary, this Report has identified a project that includes construction of natural treatment wetlands downstream of the proposed nutrient management/sedimentation basin. The area required for the natural treatment wetlands is approximately 2.2 acres. If the Districts determine this area within the SDR boundaries needs to be used for mitigation for other projects, the dischargers of urban water runoff would be required to reduce nutrient loads using other methods prior to discharge to the SDR.

SDR sediment mound reduction: This project includes localized dredging to lower the existing sediment mound an average of approximately 4 feet. This would enable the mound to stay submerged during the periods when the water surface elevation in SDR is lowered to accommodate flood control requirements.

SDR dredging to reclaim storage volume: This project includes the dredging of approximately 250 to 350 acre feet of sediments in order to recover lost storage volume. Greater areas of sensitive biological resources would need to be impacted in order to recover the higher volumes of storage. This would in turn significantly increase project costs and duration.

SDR perimeter vegetation removal: Vegetation surrounding SDR's perimeter is in a continuous state of growth and decay. Over time, this cycle of growth and decay enables the vegetation to fill in the outer perimeter of SDR and reduce available storage volume. The Report includes one potential vegetation removal approach to address this issue. Due to the impact on sensitive habitat, there are several permitting issues that will need to be addressed to define and accommodate a preferred vegetation removal program. In addition, there are alternative removal methods that may significantly reduce potential mitigation costs.

The Report provides detailed descriptions of each potential project. Planning level cost estimates were provided for each project. Table ES-1 summarizes the estimated design and construction cost, permitting cost (including consulting cost required to prepare applicable California Environmental Quality Act (CEQA) documents), and potential mitigation costs. Ranges of costs are provided where permitting and/or mitigation costs could vary significantly dependent upon actual requirements. Also included in Table ES-1 are estimated project implementation durations, including time required to obtain permits.

Table ES-1
Planning Level Cost and Implementation Duration Estimates

Project	Design and Construction Cost	Permitting Cost	Mitigation Cost	Total Cost	Implementation Duration
Urban water pipeline and nutrient management /sedimentation basin	$330,000	$58,500	$0.00	$388,500	12–18 months
Stormwater inlet channel modifications	$1,000,000	$215,000	$264,000	$1,479,000	36 months
Urban water natural treatment wetlands	$770,000	$155,000	$55,000	$980,000	36 months
SDR sediment mound reduction	$1,800,000	$135,000	$0.00	$1,935,000	36 months
SDR dredging to reclaim storage volume	$8,000,000	$450,000	$800,000	$9,250,000	84 months
SDR perimeter vegetation removal	$780,000	$150,000–$350,000	$1,112,000–$3,140,000	$2,042,000–$4,270,000	18 months

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1.0 PURPOSE AND INTRODUCTION

1.1 Purpose

The San Dieguito Reservoir (SDR) is jointly owned by the Santa Fe Irrigation District (SFID) and San Dieguito Water District (SDWD). SFID and SDWD are jointly referred to herein at the "Districts." The Districts provide potable water to over 58,000 North San Diego County residents. SDR is a vital component of the Districts' water supply, storage, and treatment system providing local raw water storage and pre-treatment capabilities. The majority of the water in SDR is from Lake Hodges. Water from Lake Hodges is conveyed to SDR where it is stored and pre-conditioned prior to treatment. The pre-conditioned raw water from SDR is pumped to the R.E. Badger Water Filtration Plant where it is treated and distributed for potable water use. In addition to water from Lake Hodges, a portion of water in SDR is from storm water and urban water run-off that is primarily conveyed to SDR through the County of San Diego's storm water management system.

Due to the limited supply and relatively high cost of imported raw and treated water, it is critical to preserve and enhance the quality of local water supplies stored in SDR. In addition, certain improvements may enhance SDR aesthetics or increase storage capacity. Nutrient loadings on SDR present significant treatment challenges at the R.E. Badger Filtration Plant. Increased concentration of organic matter creates challenges in meeting current and future disinfection byproduct requirements. In addition, nutrients promote the growth of algae that cause taste and odor problems in potable water. These impacts can limit the ability to treat SDR water or require increases in treatment costs to address the issue. The following issues must be addressed to preserve and enhance the quality of local water and maximize the value of SDR.

- Urban water runoff conveys nutrients and other constituents that promote plant growth /decay and algae growth. This in turn increases total organic carbon (TOCs) and reduces dissolved oxygen in SDR creating treatment challenges. Urban water runoff also continuously feeds plant growth and decay occurring immediately downstream of the stormwater culvert that conveys urban runoff to SDR. Over time, this build-up of live and decaying plant material partially blocks the culvert and impedes the flow of storm water into SDR.
- Stormwater primarily enters SDR through a culvert located in the northeastern corner of the SDR. In addition to nutrients, stormwater flows bring significant quantities of sediments resulting in high SDR turbidity.
- Solid materials removed during treatment at the R.E. Badger Water Filtration Plant are discharged to the SDR approximately 1,000 feet downstream of the stormwater culvert. Over the years, these solids materials have formed a sediment mound. Each year from Oct 1st to April 30th, the reservoir water surface elevation is required to be maintained below 244 feet above mean sea level (AMSL) for flood control purposes. During these

periods, the top of the sediment mound is exposed. Depending upon atmospheric conditions, periodic odor problems have occurred when the sediment mound is exposed to air.

- When it was originally constructed, the SDR provided a storage capacity of approximately 1,130 acre feet. Over the years, decaying plant materials, solids conveyed from the R.E. Badger Water Filtration Plant, and sediments from urban water and storm water, have built up in the SDR reducing the available storage capacity to approximately 750 to 800 acre feet; approximately a 29%–34% capacity loss. The March 2012 Joint Facilities Master Plan determined that the existing available volume is sufficient to reliably treat approximately 5,700 acre feet of local water annually. If higher volumes of local water are regularly available, or additional storage is required for other purposes, dredging would be required to restore the SDR's original capacity.
- Plant growth and decay around the perimeter of the SDR contributes to the build-up of solids (biomass) and organic loading within the SDR. Removal of this biomass would reduce organic loading.

The purpose of the SDR Project Development and Feasibility Report (Report) is to develop planning level descriptions for the following projects that will address the above described SDR issues:

- Urban water pipeline and siltation basin;
- Stormwater Flow Management Improvements;
- Artificial Treatment Wetlands to provide addition treatment of urban runoff, if necessary;
- Lowering the existing sediment mound to avoid periodic odor problems;
- General dredging of the SDR to recover approximately 250 to 300 acre feet of storage capacity;
- General vegetation management around the perimeter of the SDR.

A key to the successful implementation of projects in the vicinity of the SDR is the ability to obtain environmental permits. A primary objective of this report is to define the environmental permitting requirements associated with each project, and to configure each project to minimize potential environmental impacts. In addition to defining environmental permitting requirements, this report also identifies project implementation schedules and planning level capital, operating, and maintenance costs.

The first three potential projects listed above are directly driven by urban water and stormwater discharges into the SDR. Though the Districts believe the dischargers of urban water and storm water flows are responsible for the cost to implement these improvements, this report provides

planning level project descriptions and costs in order to facilitate future discussions with the dischargers. The findings of this report will also assist in the determination of joint facility capital improvement and/or maintenance projects for the Districts.

1.2 Introduction

The SDR is located in the community of Rancho Santa Fe, unincorporated San Diego County, California, east of the City of Solana Beach, (Figure 1). The site lies within the U.S. Geological Survey (USGS) 7.5-minute map, Rancho Santa Fe Quadrangle: unsectioned lands of Township 13 South, Range 3 West. Specifically, the project site is bordered by Del Dios Highway on the east and El Camino Del Norte on the north (Figure 2).

The San Dieguito Dam was construction in 1918, and major improvements were added in 1948. In 2004, the Lake Hodges/SDR flume replacement project replaced the original open channel flume feeding the reservoir with a new closed conduit pipeline. Authority to operate SDR was granted by the State of California Department of Safety of Dams (DSOD) in 1966 and renewed in 1982. The spillway elevation defines the maximum pool elevation and reservoir operations area. The Certificate of Authorization provided by DSOD grants the Districts to operate the reservoir to the 250-foot pond elevation.

The SDR has a watershed of approximately 715 acres. The SDR receives water from the Lake Hodges, and acts as a pre-treatment process for water that is ultimately pumped to the R.E. Badger Water Filtration Plant. Water is treated and subsequently distributed to the Districts' customers. The dam has a top elevation of 251 feet and a spillway elevation of 250 feet. During winter months, the SDR is lowered to an approximate elevation of 244 feet to accommodate local runoff from storms without overtopping the dam.

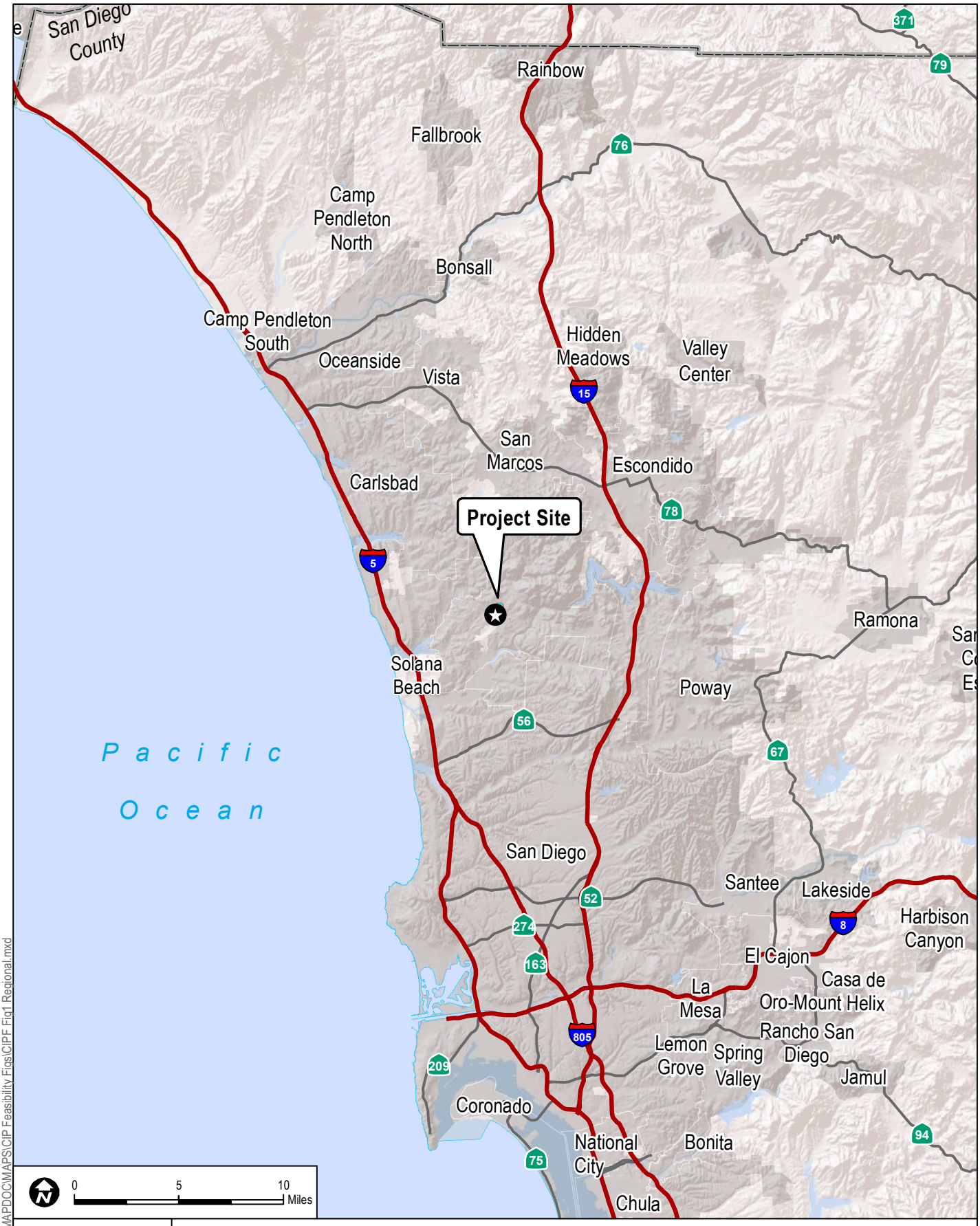

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FIGURE 1

Regional Map

SAN DIEGUITO RESERVOIR PROJECT DEVELOPMENT AND FEASIBILITY REPORT

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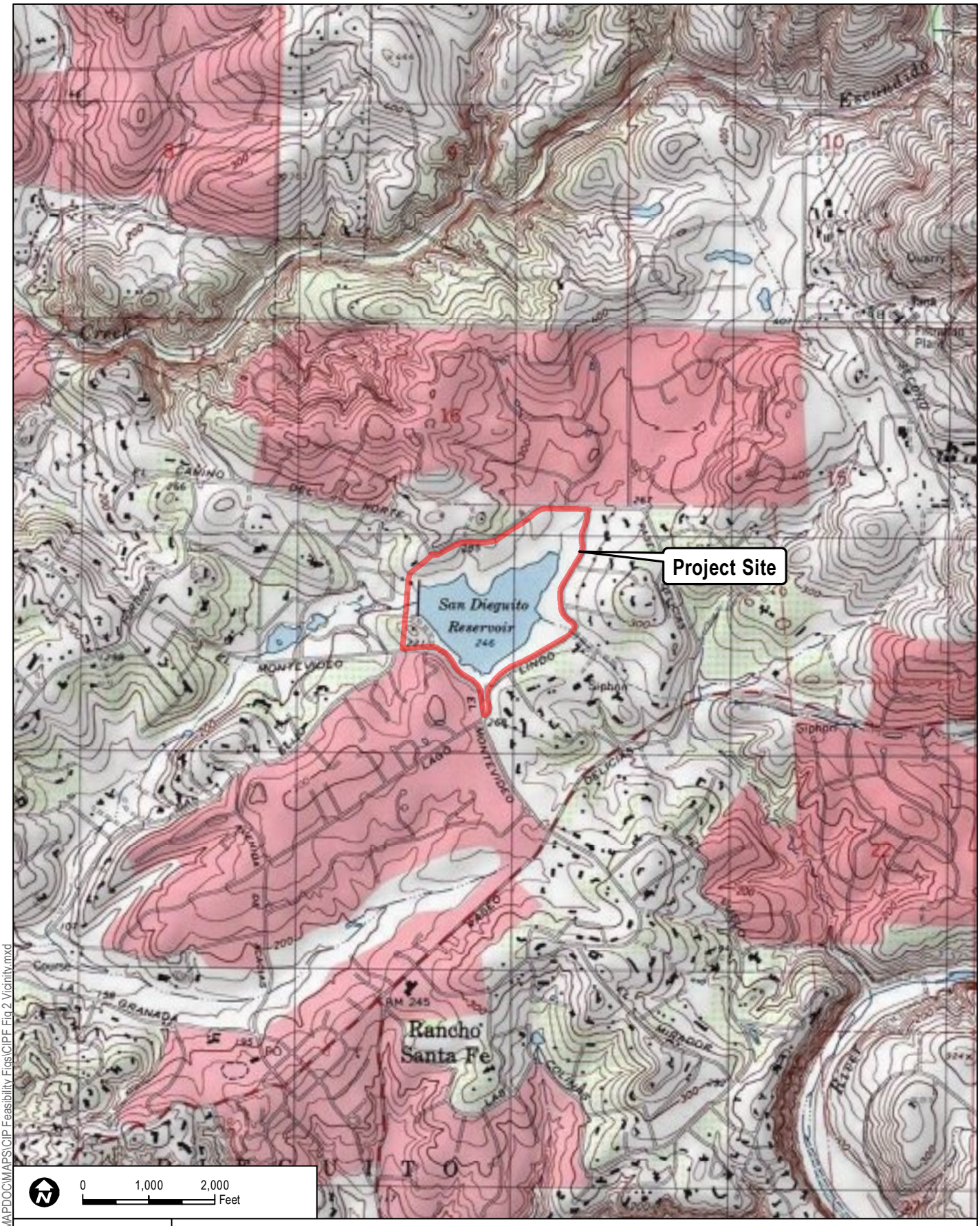

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SOURCE: USGS 7.5-Minute Series Quadrangle.

FIGURE 2
Vicinity Map

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SAN DIEGUITO RESERVOIR PROJECT DEVELOPMENT AND FEASIBILITY REPORT

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The SDR is a major component of the water treatment process for the Districts. As such, the Districts continually monitor the water quality of the reservoir, and identify improvements to keep the water quality at its highest level. Recent examples of such improvements include the introduction of Solar Bees, AquaMats and Floating Islands to the reservoir. In 2006, the Districts installed two Solar Bees at the SDR. Solar Bees are floating solar-powered, in-water circulation devices that improve water quality by aeration. Aeration prevents blue-green algae blooms, reduces taste and odor issues, and de-stratifies the water column to prevent reservoir turn-over. AquaMats are strips of porous fibers in the water column that provide a surface for beneficial bacteria to grow and consume organic and ammonia compounds for the water, thereby reducing chlorine requirements in the finished water. Floating Islands remove harmful pollutants using natural microbial processes, supporting plant life that flourishes by uptake of phosphorus and nitrates.

As an ongoing process of improving the quality of SDR water, the Districts are targeting challenges associated with the influent water quality at the reservoir. The majority of water in SDR is conveyed from Lake Hodges. However, a portion of the water is also derived from storm water and urban run-off conveyed primarily through the County of San Diego's storm water management system. The majority of stormwater and urban run-off tributary to the SDR enters through a multi-barrel culvert at the northeastern extent of the reservoir, near the intersection of Camino Del Norte and Lago Lindo. The northeastern portion of the reservoir supports a diverse community of environmentally significant and protected vegetation types and species, as does the majority of the reservoir perimeter.

Downstream from the multi-barrel culvert, a drain line from the R.E. Badger Water Filtration Plant discharges return flows containing solids that over the years have formed a sediment mound. The top elevation of this mound is submerged most of the year. However, the top of the mound is exposed during winter months when the water elevation is lowered for flood control. Depending upon atmospheric conditions, the exposed material has resulted in periodic odor issues.

The following discussions identify a series of potential solutions to the identified challenges, as well as the anticipated environmental challenges associated with implementation of these proposed improvements.

To address the identified challenges facing the SDR, a variety of proposed improvement projects have been developed that target specific reservoir operational issues that currently impact the surrounding community and/or the Districts' water treatment needs. It is noted that the requirements for some of the proposed projects will be based upon data collected after installation and operation of the initial projects. Therefore, the range of projects is intended to be

implemented over a potentially prolonged duration, during which data collection will either validate or eliminate the need for future projects. The CIP projects examined include:

- An urban water runoff pipe and sediment basin that would remove sediment from "first flush" water and urban runoff, and allow for testing of nutrient content of this isolated flow.
- An improved floodway from the Camino Del Norte box culvert that would reduce reservoir water turbidity caused by flood water entering SDR.
- A treatment wetland that would improve the water quality by removing nutrient loading from incoming first flush water and urban runoff before it enters SDR.
- Removal of a sediment accumulation within the open water area of the reservoir that causes odor issues in winter months when reservoir water level is lowered for flood control.
- Reservoir capacity recovery through dredge operations that would remove accumulated sediments and detritus to recover 250–300 acre feet of capacity.
- Vegetation management around the reservoir shoreline to reduce biomass accumulation and slow the eutrophication process that is reducing reservoir capacity.

Biological baseline data was updated from the Final Impact Report for the San Dieguito Reservoir Rehabilitation and Flume Replacement Projects, Appendix B, Biological Analysis to the San Dieguito Reservoir Rehabilitation and Flume Replacement Projects (Project Design Consultants 2001). Other documents reviewed for this study include:

- *Technical Appendices for the San Dieguito Reservoir Rehabilitation and Flume Replacement Projects* (Project Design Consultants 2001)
- *Final Supplemental Environmental Impact Report to the Final Environmental Impact Report for the San Dieguito Reservoir Rehabilitation and Flume Replacement Project* (Merkel & Associates 2002)
- *Addendum to the San Dieguito Reservoir Rehabilitation and Flume Rehabilitation Project Biological Report* (Merkel & Associates 2002)
- *San Dieguito Reservoir Rehabilitation Study, Biological Constraints Report* (Merkel & Associates 1998)
- *Wetlands Delineation Report, San Dieguito Reservoir, Rancho Santa Fe, CA* (Merkel & Associates 2000).

This report provides definition of each project, the anticipated construction and facility footprint, and explores design alternatives that each meet the purpose and need of the project. Projects are defined by the purpose and need, project components, and alternative methods and locations to achieve project goals. An impact analysis for biological resources was conducted to quantify impacts that are likely to occur for each project.

Biological impacts were analyzed in the regulatory context for the Federal Clean Water Act (U.S. Army Corps of Engineers, ACOE), State Fish & Game Code (California Department of Fish & Game, CDFG), State Porter-Cologne Act (San Diego Regional Water Quality Control Board, RWQCB), and Endangered Species Act (U.S. Fish & Wildlife Service, FWS). This analysis resulted in alternatives that fit the various permit programs of these agencies and identified the "path of least resistance" to permit each project. The impact analysis provides data from which expected mitigation requirements can be developed. Anticipated mitigation requirements under various permitting strategies and site specific opportunities are presented for each project.

Engineer planning level cost estimates were developed for each project to place the projects in the proper budgeting context for the Districts. Additional cost information is provided with regard to permitting and mitigation implementation. Finally, an analysis of anticipated permitting schedule is presented to identify which projects can move forward relatively quickly and those projects that will require a more extended permitting process.

2.0 ENVIRONMENTAL REGULATORY BACKDROP

The 1918 dam structure consists of a series of concrete arches with a spillway elevation of 250 feet AMSL. The spillway elevation establishes the operations area behind the dam where raw water is stored prior to treatment and distribution to customers. Source water for SDR is primarily derived from Lake Hodges. The majority of water in Lake Hodges is from natural runoff within the watershed.

During the period May 1 to September 30th, the reservoir may be operated to the top of the 250-foot spillway elevation. From October 1st to April 30th, the reservoir water surface (pond) elevation must be maintained below 244 feet AMSL for flood control purposes. During all times of the year, operations to maintain a minimum of 6 inches of freeboard below the target pond elevation is an operational goal.

There are a number of state and federal laws with respect to waters of the U.S., including wetlands that apply to work at the SDR. Compensatory mitigation is required by the resource agencies to mitigate wetland impacts resulting from projects. The nature of impacts in terms of permanent impacts (i.e., replaced with infrastructure or maintained in a permanent non-vegetated state) vs. temporary impacts (i.e., a one-time vegetation removal/disturbance associated with construction activities and in situ replacement of like-kind vegetation) can affect the type and quantity of required mitigation acreage. Permanent impacts (i.e., permanent loss of wetlands) require a combination of wetlands creation and enhancement as compensatory mitigation. Temporary impacts require mitigation that re-establishes contours and like-kind vegetation on the impact site and enhancement of existing wetlands normally through weed eradication. Similarly, extended "temporal loss" of wetlands (e.g., >3yrs.) may be viewed by resource agencies as a permanent loss due to frequent vegetation disturbance that does not allow full interim recovery of habitat before subsequent disturbance occurs.

2.1 Federal Regulations

Federal Clean Water Act

Sections 404 and 401 of the Federal Clean Water Act provide for regulation of the discharge of fill material to areas waters of the U.S. The extent of waters of the U.S. is determined through completion of a jurisdictional delineation and verification from the ACOE. The discharge of fill material may include excavations (which result in discharge due to incidental fallback of materials) as well as construction of facilities including drainage structures, pipelines, access roads, pump stations, and reservoirs, to the extent that construction of these facilities occurs within a jurisdictional water of the U.S.

The ACOE has three permit programs under which discharges may be authorized: Nationwide, Individual and Regional General. **Nationwide permits** allow for a streamlined permit review and approval process by addressing public review and National Environmental Policy Act (NEPA) requirements up-front, in a programmatic fashion for all authorizations under the permit and therefore these are not required for each individual project authorization. These pre-determined permits have specific thresholds of allowable impacts (in terms of acreage, linear feet, and types of waters, depending on the permit), specific types of discharges which are allowed, and specific notification and mitigation requirements. Nationwide Permits authorize work to occur on a one-time basis and do not allow for routine, frequent maintenance. **Individual permits** are issued for those projects that do not meet the nationwide or regional general permit requirements. Individual permits require full evaluation including public review and NEPA compliance. **Regional general permits** are issued for specific regions and address regional issues such as channel maintenance, response to emergencies, invasive removal, etc. Similar to nationwide permits, these permits offer a streamlined authorization process for specific qualifying activities based on the type of activity and the types of impacts.

Programmatic permit actions are ideal for activities resulting in repeat impacts to aquatic resources at dozens, hundreds, or even thousands of locations throughout a jurisdiction. More frequent and familiar processes include seeking existing general permits (i.e., the ACOE Nationwide Permit Program) or standard individual permits (e.g., case-by-case Section 404 individual permits) for a project(s) via submittal of site-specific permit applications and case-by-case review, public noticing when needed, and processing.

For routine maintenance work it is assumed that, by adhering to avoidance and minimization measures and established operational protocols, impacts to aquatic resources and listed species or their habitat can be minimized. In light of this expectation, and because maintenance needs are in perpetuity, a programmatic permit from the resource agencies would offer substantial, long term cost and time saving by having one programmatic agency review and permit process versus multiple case-by-case costs.

A Regional General Permit (RGP) is typically used to authorize repeat activities with minimal impacts to waters of the U.S. while projects resulting in more extensive repeat wetland impacts would likely require a Programmatic Individual Permit (PIP). This approach is optimal to address necessary maintenance and has, in general, received buy-in by local resource agencies.

The RGP and PIP processes both involve public noticing and the preparation of a NEPA document (i.e., Environmental Assessment or Environmental Impact Statement). The main differences between an RGP and a PIP are that RGPs do not require sequencing or the preparation of an alternatives analysis. The term “sequencing” refers to a review to assess the efforts made by an applicant to follow, in descending order, the following principles: avoidance,

minimization, reduction or elimination of impacts over time, and lastly mitigation. The alternatives analysis must determine that the proposed impacts are unavoidable and there are no other practicable alternatives to meet the project objectives. This requires the applicant to demonstrate that the proposed project is the least environmentally damaging practicable alternative pursuant to the Section 404(b)(1) guidelines.

Authorization under Section 404 by the ACOE is reliant upon certification of water quality (i.e., the project will not adversely affect water quality or the designated beneficial uses of the receiving waters) by the RWQCB. The RWQCB certification falls under Section 401 and may be pre-issued in cases of nationwide or regional general permits or may be reserved for project-specific review in the case of some nationwide and regional general permits and all individual permits.

In addition to reviewing permit applications for protection of beneficial uses, the RWQCB is responsible for developing and implementing plans for improvement of water quality within those receiving bodies listed as "impaired" under Section 303(d) of the federal Clean Water Act. As of this date, the SDR has not been listed as impaired under Section 303(d).

2.2 State Regulations

State Fish and Game Code

Section 1600 of the California Fish and Game Code provides for regulation of activities affecting a lake or streambed, or associated riparian habitats. The extent of habitats regulated by CDFG is determined through completion of a jurisdictional wetlands delineation and subsequent verification by CDFG staff. CDFG may regulate a variety of activities including construction of facilities or vegetation management.

State Porter-Cologne Act

The California Porter-Cologne Act provides for the regulation of discharges to waters of the State through issuance of Waste Discharge Requirements (WDR) by the RWQCB. In the case of most permit applications for construction or maintenance project, the RWQCB already regulates the activity under Section 401 of the federal Clean Water Act and usually waives the WDR. However, in cases where the impact is large or controversial or where federal regulation does not apply, the RWQCB may choose to request an application for an individual WDR.

2.3 Potential Project Grouping Advantage

Depending on funding and project priorities it may be in the Districts' best interest to group certain projects, specifically those with a routine maintenance component, for time and cost savings. An RGP, for example, is designed to authorize categories of activities that will be

conducted frequently but with minimal individual and cumulative impacts. RGPs apply to those projects that, at each location, permanently impact 0.5 acre or less of waters of the U.S., including wetlands, each time maintenance is performed. RGPs are processed similar to an IP in that public noticing is required along with preparation of a NEPA document (i.e., Environmental Assessment or Environmental Impact Statement). A Programmatic IP is similar in application to an RGP but it best applies to those projects that, at each location, permanently impact more than 0.5 acre of waters of the U.S., including wetlands.

By grouping certain projects with maintenance needs the Districts would recognize the following benefits:

- Increased efficiency in performing reservoir maintenance
- Reduced cost by having one programmatic review process versus variable and numerous case-by-case costs
- Extended authorization period of five (5) or more years
- A comprehensive approach for mitigation is provided.

2.4 Resource Agency Outreach

A briefing to the resource agencies that have jurisdictional over the biological resources at SDR was conducted on April 17, 2012. In attendance were Peggy Bartels, U.S. Army Corps of Engineers; Kelly Fisher, California Department of Fish and Game; and Alan Monji, San Diego Regional Water Quality Control Board. The briefing covered the purpose and goals of the meeting, issues of concern at SDR and an overview of each project in terms of a facility description, anticipated resource impacts, and proposed permitting strategy. All six projects were discussed. The resource agency response to each project is provided in each project discussion of this report in Section 5.0.

The resource agency comments should be approached with caution. The briefing provided the regulators a conceptual level of understanding of these projects without any accompanying technical studies or detailed documents. Therefore, this somewhat cursory treatment of the projects did not provide enough detailed information for the resource agencies to make definitive comments; nor are their comments binding until a fully designed project is presented through an official permit application. In addition, once a complete application is submitted, other resource agency staff could be assigned that may have a different perspective of the project. However, the meeting established a high level of confidence in the Districts' ability to permit certain projects easily, while others will require greater study, refinement, and negotiation with resource agency staff.

The resource agency representatives generally supported the smaller projects and expressed willingness and regulatory ability to permit these projects. The two larger projects (Reservoir Capacity Recovery and Vegetation Management Program) were viewed has having potentially significant impacts to wetlands resources and there was general agreement among the representatives present that a more detailed design and discussion of these two projects would be required to arrive at an acceptable project that can be permitted.

In addition to the project-specific comments that are provided in Section 5.0, there were some comments that apply to all of the projects:

- The CDFG representative recommended that any maintenance activities associated with a project, even if no jurisdictional impacts are involved, be permitted through a Routine Maintenance Agreement with CDFG to avoid future misunderstandings.
- CDFG recommended processing a separate Streambed Alteration Agreement (SAA) for each project rather than an umbrella Master SAA that would cover all of the proposed projects. The comment was based on the perception that the larger, more complicated projects would hold back the smaller, more easily permitted projects due to the longer amount of time anticipated to permit the larger projects.

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3.0 COUNTY OF SAN DIEGO MS4 OVERVIEW

The quality of water in SDR is influenced by urban water runoff and stormwater that is primarily conveyed by the County of San Diego's stormwater collection system and discharged to the SDR through an existing culvert located at the northeastern end of SDR. Since the County's discharge of stormwater and urban runoff water influences the quality of water in SDR, as well as the growth of vegetation within and around SDR (through the contribution of nutrients), this section provides a general overview of the County of San Diego's discharge permit requirements.

Municipal Separate Storm Sewer Systems (MS4s) are regulated throughout the County of San Diego by the Regional Water Quality Control Board. The basis for the regulation of MS4s is the Federal Clean Water Act (CWA), the Porter-Cologne Water Quality Control Act, and applicable provisions and policies adopted by the State Water Resources Control Board.

Urban runoff can contain waste and pollutants that adversely affect the quality and beneficial uses of receiving bodies of water. The most common pollutants associated with urban runoff and stormwater flow include total suspended solids, sediment, pathogens, hydrocarbons, organics, metals, oxygen-demanding substances, nutrients, and trash.

The objective of the RWQCB Order is to provide protective measures to prevent the degradation of beneficial uses of surface and ground water resources. Per the regional Basin Plan and the California Water Code (Section 13050(h)) water quality objectives are defined as follows:

"The limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water of the prevention of nuisance within a specific area."

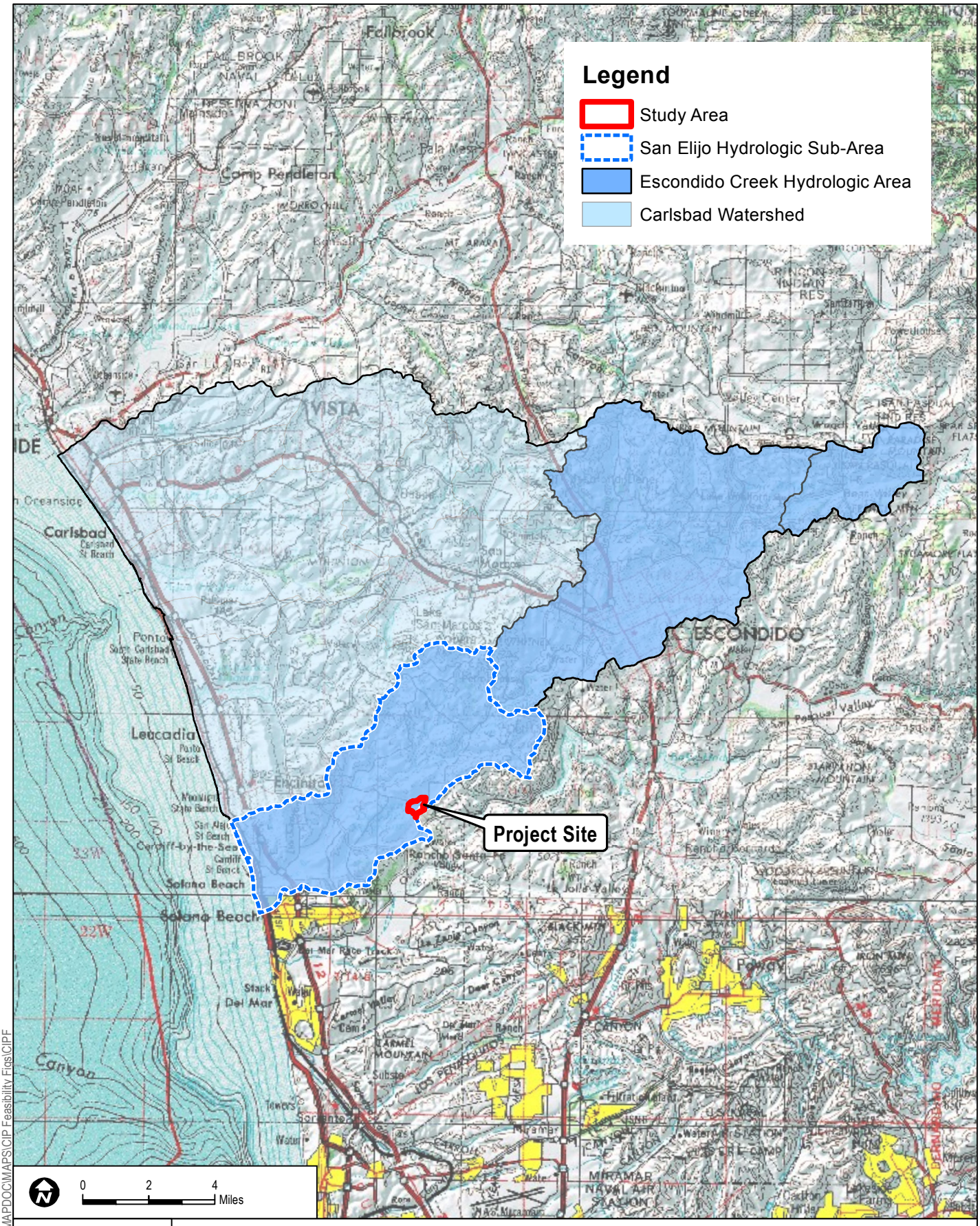
Per the San Diego RWQCB Order No. R9-2007-0001 and the Basin Plan for SD County, the SDR is located within the San Elijo Sub Area (HSA) of the Escondido Creek Hydraulic Area (HA) of the Carlsbad Hydraulic Unit (HU) designated at area 904.61 (Figure 3).

Water quality objectives identified in the Basin Plan for the Escondido Creek HA are outlined in Table 1.

Table 1
Water Quality Objectives for the Escondido Creek HA

	Constituent Concentration (mg/L or as noted)												
Escondido Creek HA	*TDS*	*Cl*	*SO_4*	*%Na*	*N&P*	*Fe*	*Mn*	*MBAS*	*B*	*ODOR*	*Turb NTU*	*Color Units*	*F*
	500	250	250	60	*	0.3	0.05	0.5	0.75	None	20	20	1.0

* Concentrations of nitrogen and phosphorus, by themselves or in combination with other nutrients, shall be maintained at levels below those which stimulate algae and emergent plant growth. Threshold total Phosphorus (P) concentrations shall not exceed 0.05 mg/l in any stream at the point where it enters any standing body of water, nor 0.025 mg/l in any standing body of water. A desired goal in order to prevent plant nuisances in streams and other flowing waters appears to be 0.1 mg/l total P. These values are not to be exceeded more than 10% of the time unless studies of the specific body in question clearly show that water quality objective changes are permissible and changes are approved by the Regional Board. Analogous threshold values have not been set for nitrogen compounds; however, natural ratios of nitrogen to phosphorus are to be determined by surveillance and monitoring and upheld. If data are lacking, a ratio of N: P=10:1 shall be used.



DUDEK

SOURCE: USGS 7.5-Minute Series Quadrangle.

FIGURE 3
Base Plan Map

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Though not specifically identified with a numeric objective level in the Basin Plan, it does identify a water quality objective for sediment load:

The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

Copermittees under the plan are required to implement a monitoring and reporting program. The program requirements include the establishment of monitoring stations for sampling and testing to assist in characterizing urban runoff discharges. The goals of the program include assessing compliance with the RWQCB Order, improvement of the effectiveness of implemented water quality management programs, assess impacts from runoff, to prioritize areas that need management actions, and to assess the overall health of receiving waters. The complete monitoring program for the County can be found in the RWQCB Order, but includes provisions of receiving waters monitoring for Mass Loading Stations (MLS), Temporary Watershed Assessment Stations (TWAS), Bioassessment (BA); and urban runoff monitoring for MS4 outfall. Dudek has identified and utilized the annual reporting for these various stations (as deemed applicable to the San Dieguito Reservoir) as part of this report.

Based on our understanding of the issues faced by the District and the project objectives associated with the proposed improvements, Dudek has reviewed beneficial uses, pollutants of concern (POC), water quality objectives, and recent monitoring data as it relates to pollutant constituents that may be included in incoming flows to the reservoir.

3.1 Basin Plan Analysis

Per R9-2007-0001, the primary POC in the Carlsbad Hydraulic Unit include bacterial indicators, eutrophic, sedimentation/siltation, nutrients, and TDS (Table 2). The focus of our research has been on the presence and exceedance levels for sediments and nutrients as we believe these are to two primary pollutants causing maintenance and water quality concerns for the District.

Beneficial Uses for the reservoir include MUN, AGR, REC 1, REC 2, WARM, COLD, and WILD (Table 2). The reservoir is not listed under the 2011 CWA Section 303(d) list for polluted water bodies, but the following water bodies located within the Carlsbad HU are:

- Escondido Creek – 904.62 – DDT, Manganese, Phosphate, Selenium, Sulfates, TDS
- Encinitas Creek – 904.51 – Phosphorus
- Cottonwood Creek – 904.51 – DDT
- Buena Vista Lagoon – 904.21 – Indicator Bacteria
- Buena Vista Creek – 904.21 – Sediment Toxicity

- Buena Creek – 904.32 – DDT, Nitrate and Nitrite, Phosphate
- Agua Hedionda Lagoon – 904.31 – Indicator Bacteria, Sediment
- Agua Hedionda Creek – 904.31 – Manganese, Selenium, Sulfates, TDS.

A review of the 303d listed water bodies indicates that sediment is not generally a primary issue for water bodies located within the hydraulic unit area, but that nutrient levels are a clear issue.

Table 2
Pollutants of Concern

Regional Board Watershed Management Area (WMA)	Hydrologic Unit(s)	Major Surface Water Bodies	303(d) Pollutants of Concern or Water Quality Effect[1]	Co-permittee
Santa Margarita River	Santa Margarita (902.00)	Santa Margarita River and Estuary, Pacific Ocean	1. Eutrophic 2. Nitrogen 3. Phosphorus 4. Total Dissolved Solids	1. County of San Diego
San Luis Rey River	San Luis Rey (903.00)	San Luis Rey River and Estuary, Pacific Ocean	1. Bacterial Indicators 2. Eutrophic 3. Chloride 4. Total Dissolved Solids	1. City of Escondido 2. City of Oceanside 3. City of Vista 4. County of San Diego
Carlsbad	Carlsbad (904.00)	Batiquitos Lagoon San Elijo Lagoon Agua Hedionda Lagoon Buena Vista Lagoon and Tributary Systems Pacific Ocean	1. Bacterial Indicators 2. Eutrophic 3. Sedimentation/ Siltation 4. Nutrients 5. Total Dissolved Solids	1. City of Carlsbad 2. City of Encinitas 3. City of Escondido 4. City of Oceanside 5. City of San Marcos 6. City of Solana Beach 7. City of Vista 8. County of San Diego

Note: 1. The listed 303(d) pollutant(s) of concern do not necessarily reflect impairment of the entire corresponding WMA or all corresponding major surface water bodies. The specific impaired portions of each WMA are listed in the State Water Resources Control Board's 2011 Section 303(d) List of Water Quality Limited Segments.

Table 3
Beneficial Uses

Reservoirs and Lakes	Hydrologic Unit Basin Number	Beneficial Use												
		MUN	*AGR*	*IND*	*PROC*	*GWR*	*FRSH*	*REC1*	*REC2*	*WARM*	*COLD*	*WILD*	*RARE*	*POW*
O'Neill Lake	2.13	X	X	X				X	X	X	X	X	X	
Diamond Valley Lake	2.35; 2.36	X	X	X	X	X		X[1]	X	X	X	X		X
Lake Skinner	2.42	X	X	X	X	O		X[1]	X	X		X		
Vail Lake	2.81	X	X	X	X	X		X[1]	X	X		X		
Turner Lake	3.13	X	X	X				O	X	X				
Lake Henshaw	3.31	X	X	X	X		X	X[1]	X	X		X	X	X
Olivenhain Reservoir	5.21	X		X				X[1]	X	X	X	X		X
San Dieguito Reservoir	5.21	X	X	O				X	X	X	X	X		
Lake Dixon	4.62	X	X	O				X[1]	X	X	X	X		
Lake Wohlford	4.63	X	X	O				X[1]	X	X	X	X		X
Lake Hodges	5.21	X	X	X	X			X[1]	X	X	X	X	X	
Lake Poway	5.52	X	X	X	X			X[1]	X	X	X	X		
Sutherland Lake	5.53	X	X	X	X			X[1]	X	X	X	X	X	
Miramar Reservoir	6.10	X		X				X[1]	X	X		X		X
Lake Murray	7.11	X		X				X[1]	X	X	X	X		X
Lake Jennings	7.12	X		X				X	X	X	X	X		

Notes: 1. Fishing from shore or boat permitted, but other water contact recreational (REC-1) uses are prohibited.
X = Existing beneficial use.
O = Potential beneficial use.

3.2 Monitoring and Reporting

Runoff monitoring must be reported to the RWQCB each year per the approved MS4 permit. As part of our effort, Dudek has accessed and reviewed multiple year reporting data for the Carlsbad HU area. This info was prepared by the County for annual reporting purposes as required by the RWQCB and was accessed through the project Clean Water website, www.projectcleanwater.org. While both dry and wet weather monitoring data is included in the reports (prepared by Weston) the primary focus of our review was on dry weather reporting as these flows are known to carry the highest pollutant loads.

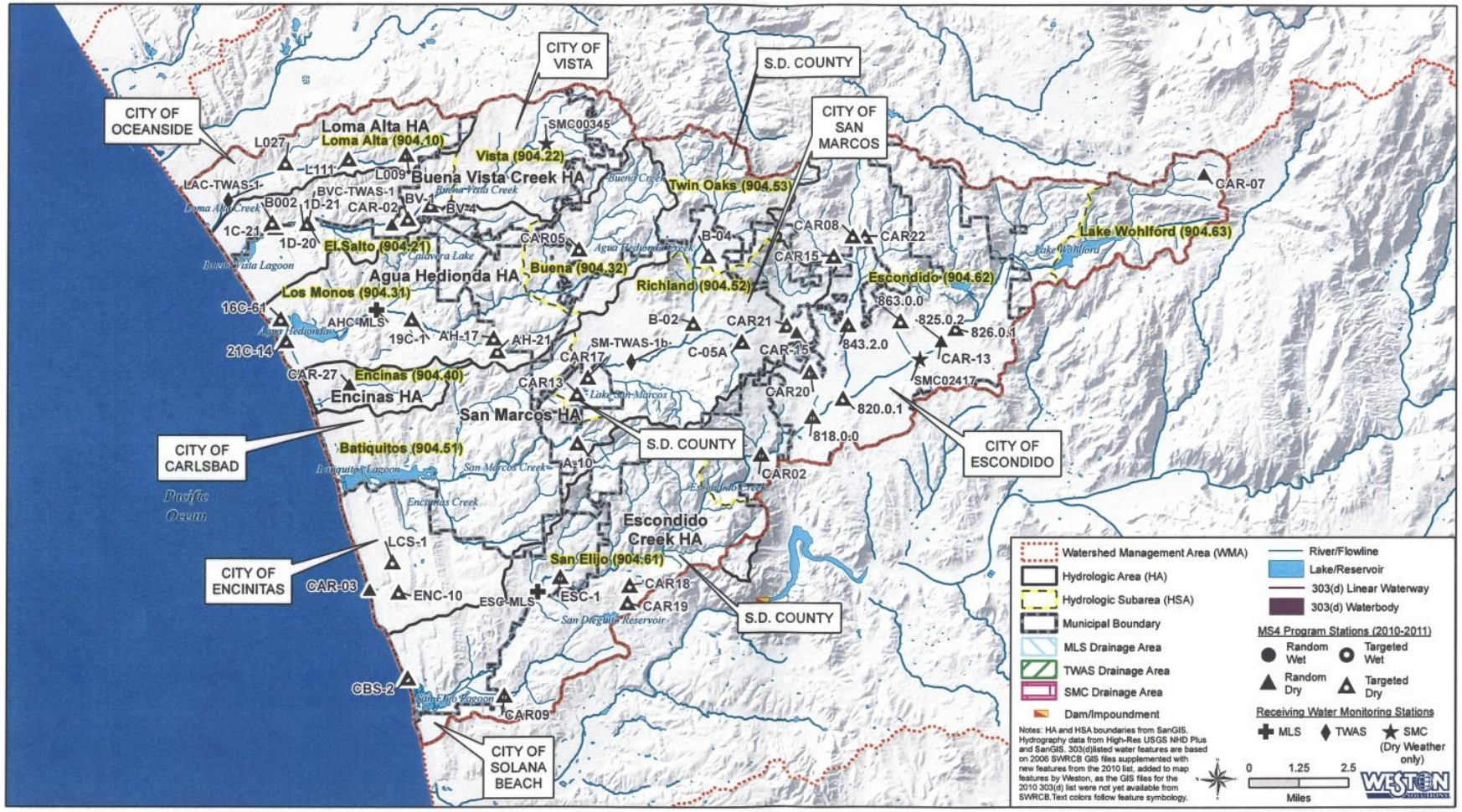
MS4 compliance monitoring stations are located throughout the Carlsbad HU (Figure 4). For the purposes of this report, we have narrowed our review of monitoring data to the data point in close proximity and upstream of the SDR. These data points include CAR18, CAR19, both of which are listed as dry weather monitoring sites in compliance with the MS4; a map of monitoring stations in the Carlsbad HU follows:

Summary tables of dry weather water quality monitoring data for the years 2009–2010 and 2010–2011 is included as Appendix A.

Though a limited data set exists for monitoring low flow influent characteristics for SDR, based on our review of the data for nitrogen and phosphorus content, it appears likely that nutrient loading is a major contributing factor to vegetative growth and maintenance issues in the reservoir. A summary of dry weather monitoring across HSA 904.61 for the year 2010–2011 indicates that exceedance levels for these 2 pollutants above baseline levels established in the Basin plan were 80% for nitrogen and 60% for phosphorus. Monitoring and testing stations CAR 18 and CAR 19 both indicate nutrient loading above baseline limits previously identified, with CAR 19 also indicating an exceedance of total suspended solids.

Ongoing monitoring by the County will continue to offer a limited data set for continued review and analysis of incoming pollutants to SDR. It may be beneficial to the Districts to consider a water quality testing program to supplement that required by the MS4 permit by the County. This testing program would provide a more complete picture of the nutrient loading problem for SDR.

Figure 4 Monitoring Stations for Carlsbad HU



3.2.1 Constituent Analysis

Based on the monitoring and reporting data discussed above, the Districts initiated an influent testing protocol during the storm event of March 16th and 17th, 2012. The testing of the influent consisted of baseline sampling and analysis of urban runoff prior to the storm event and sampling and analysis of first flush flow at the onset of the storm event. Samples were taken from the El Camino Del Norte culvert just upstream of the reservoir.

First Flush Sample & Pre-Storm Urban Runoff Sample

The samples were tested for various constituents, including organic content, nutrients, and turbidity. In addition to sample testing data from the aforementioned storm event, the Districts provided first flush testing data results from a storm event on October 31, 2011. A summary of the analysis results is presented in Table 4.

Table 4
Summary of First Flush Testing Data Results

Constituent	March 16, 2010 (pre-storm urban runoff)	March 17, 2010 (first-flush)	October 31, 2011 (First Large Rain of the Season – First Flush Sample)
UV254 (-1/cm)	0.151	0.652	—
TOC (mg/L)	7.317	15.33	39.85
DOC (mg/L)	6.803	10.46	31.06
pH	7.08	7.77	7.56
Conductivity (uS/cm)	4,390	467	979
Total P (mg/l)	0.164	1.32	2.55
Reactive P (mg/l)	0.133	1.02	1.91
Nitrite (mg/L)	0.018	0.76	—
Nitrate (mg/L)	1.11	2.39	3.32
Ammonia (mg/L)	0.025	0.222	0.862
Total N (mg/L)	1.81	0.765	—
Manganese (mg/L)	0.362	0.292	0.92
Turbidity (NTU)	4	78	161

3.2.2 Baseline and First Flush Testing Results

Reviewing the constituent analysis results (Table 4) as compared to baseline limit levels established in the Basin Plan (Table 1) indicates a significant increase in the concentration of the previously identified primary pollutants (nutrients and sediment) in first flush storm water runoff. With baseline limits for total P established at 0.1 mg/L and total N (at a 10:1 ratio with total P) at 1.0 mg/L, the testing results also show an exceedance of established pollutant thresholds for the MS4 permit. In addition to the nutrient pollutants, the Turbidity baseline threshold of 20 NTU was also exceeded.

3.3 Summary and Recommendations

Monitoring stations directly upstream on receiving water bodies provide the most reliable data set for review of incoming pollutants. Both monitoring stations reviewed by Dudek were installed as part of the County's MS4 compliance program within the last 2 years. Therefore it is impossible to discern the potential increase in sediment and nutrient loading that the Reservoir may have experienced in recent years. Historically, a clear track record of water quality degradation can be attributed to watershed urbanization. While the lack of historic data makes this impossible to statistically verify, it can be surmised that this is a leading contributing factor to the pollutant threshold exceedance levels noted above.

While compliance with MS4 permitting only requires a single dry weather monitoring sample per year, it would be beneficial for the long term monitoring of SDR to sample a minimum of four storm events with samples taken of pre-storm runoff and first flush runoff immediately upstream of SDR.

It is recommended that additional sampling points and monitoring stations be defined and implemented upstream of SDR that provide the data needed to clearly define nutrient loading (and other constituents) to SDR attributable to urban runoff and stormwater discharges. This will help to better define the treatment approach required to reduce nutrient concentrations (and other constituents if applicable) to required levels.

Construction of water quality enhancement structures or Best Management Practices (BMPs) would have a significant impact on the quality of urban runoff and first flush storm water entering the reservoir. Table 5 presents the efficiency of BMP efficiency for various pollutants (excerpted from California Stormwater Quality Association (CASQA) BMP Handbook).

Table 5
Best Management Practices Efficiency

	Bio Swales	Detention Basins	Infiltration BMP's	Treatment Wetlands	Sand/Media Filters	Water Quality Inlets	Hydrodynamic Devices
Pollutant							
Suspended Solids	✓	✓	✓	✓	✓	O	✓
Nutrients	O	✓	✓	✓	✓	O	O
Organics	O	O	O	O	✓	O	O
Trash & Debris	O	✓	O	O	✓	✓	✓
Oxygen Demanding Substances	O	✓	✓	✓	✓	O	O
Pathogens	O	O	✓	O	✓	O	O
Oil and Grease	✓	✓	O	O	✓	✓	✓
Pesticide	O	O	O	O	O	O	O
Heavy Metals	✓	✓	✓	✓	✓	O	O

✓ = High or Medium Removal Efficiency O = Low or Unknown Removal Efficiency

In the event that BMPs associated with efficient removal of sediments and nutrients (sedimentation basins, bio-swales, etc.) are incorporated as part of the any proposed improvement project by the District, a monitoring and sampling station should be established at the outfall of the drainage improvements into the Reservoir as an aid to measuring and verifying the efficacy of the improvements over time.

4.0 BIOLOGICAL RESOURCE BASELINE

4.1 Existing Biological Conditions

Although the projects reviewed for this report deviate substantially from the previously proposed SDR rehabilitation project, the baseline biological resources that were identified for that project in 2001 generally remain intact at the reservoir. Baseline biological data was updated through site visits conducted by Dudek biologists. Site visits involved additional vegetation mapping and general biological and wildlife reconnaissance surveys within the study area to determine changes from conditions that were presented in the above referenced documents.

The following summarizes the results of Dudek's literature review and biological reconnaissance surveys conducted on the SDR property and describes the existing conditions of the biological resources on the site, including vegetation communities, jurisdictional wetlands, flora, wildlife, existing and potential special-status species, wildlife movement, and relation of the site to regional habitat/species conservation planning efforts.

4.2 Project Setting

The slopes surrounding the reservoir range from 5% to 10% and soils are mapped as moderately well drained Huerhuero loam, San Miguel rocky silt loam, Altamont clay, and Olivenhain cobbly loam (Bowman 1973) (*Addendum* 2002). None of these soils types are considered hydric soils, which may indicate the presence of jurisdictional wetlands according to the USDA Soil Conservation Service (1994). Several of these soils, Huerhuero, Altamont, and Olivenhain, are known to support clay endemic plant species several of which are considered special-status.

4.3 Methods

Biological surveys were performed by Merkel & Associates (M&A) at the Reservoir from 1998–2002 and Dudek in 2011–2012. The surveys conducted by M&A in 1998 included both general (avian, fish, turtle, aquatic vegetation and general vegetation); focused surveys were conducted by M&A in 2000 and 2002 for the federally-listed threatened coastal California gnatcatcher *(Polioptila californica californica)* and to delineate the extent of jurisdictional waters, including wetlands. Senior botanist and wetlands regulatory specialist, Vipul Joshi (Dudek), completed a reconnaissance survey focused on botanical issues including identification of vegetation communities and likely jurisdictional wetland on November 22, 2011. Senior wildlife biologist, Brock Ortega (Dudek), completed a reconnaissance survey focused on wildlife issues including identification of suitable habitat conditions for California gnatcatcher and a number of riparian and aquatic species on February 8, 2012.

Vegetation community mapping follow Holland (1988) nomenclature with minor deviations to address some unique conditions observed on the property. A jurisdictional delineation was not

conducted by Dudek; however the likely jurisdiction of the U.S. Army Corps of Engineers (ACOE), California Department of Fish and Game (CDFG), and Regional Water Quality Control Board (RWQCB) was preliminarily evaluated based on literature review and observed site conditions. The methodologies of focused surveys conducted by M&A are not summarized here, but were reviewed to determine the relevance of the survey results to determinations regarding existing conditions of the site.

4.4 Results

4.4.1 Vegetation Communities

Table 6 lists the ten vegetation communities and two land cover types identified on site: disturbed coastal sage scrub, Valley needlegrass (native) grassland, annual (non-native) grassland, cismontane alkali marsh, freshwater, riparian woodland, southern coastal salt marsh, southern willow scrub, disturbed wetland, open water, and disturbed/developed.

Table 6
Vegetation Communities and Land Cover Types
San Dieguito Reservoir Property

General Type	Vegetation Communities and Land Cover Types	Acreage
Native Upland	Disturbed Coastal Sage Scrub	2.3
	Valley Needlegrass (Native) Grassland	4.4
	Subtotal	*6.7*
Non-Native Upland	Annual (Non-Native) Grassland	14.2
	Eucalyptus Woodland	1.5
	Subtotal	*15.7*
Native Wetland	Cismontane Alkali Marsh	2.6
	Freshwater Marsh	20.4
	Mixed Riparian Woodland	0.5
	Southern Coastal Salt Marsh	0.1
	Southern Willow Scrub	0.1
	Subtotal	*23.7*
Non-Native Wetland	Disturbed Wetland	4.5
Land Cover Types	Open Water	47
	Disturbed/Developed	12.8
	Total	**110.4**

The SDR property supports approximately 28 acres of wetland consisting of freshwater marsh, cismontane alkali marsh, disturbed wetlands and southern willow scrub communities (Figure 5). Riparian wetlands were mapped downstream of the dam structure and are not considered in this

feasibility analysis. The majority of the vegetation is supported by the impounded water stored within the reservoir, including approximately 16.8 acres of the 28 acres of wetlands identified on site occurring below the spillway elevation.

Freshwater marsh occupies an approximately 25- to 350-foot width around the fringe of the impounded water on the north and south side of the reservoir. The east side currently supports freshwater marsh of approximately 200 feet to 300 feet in width. Species comprising freshwater marsh on site include bulrush *(Schoenoplectus* sp.*)* and cattails *(Typha* sp.*).* All of the freshwater marsh within the property occurs below the spillway elevation, principally below 250 feet AMSL. Based on review of the reservoir water surface elevation data, this vegetation is nearly always inundated.

Open water habitat serves as a resource to numerous water fowl species. In particular, the interface between open water and FWM has been viewed as a valuable resource for these species for forage, cover and nesting away from potential predators.

Southern willow scrub, disturbed wetlands and cismontane alkali marsh occupy the next strata above the impounded water. A single patch of SWS (0.14 acre) was mapped at the eastern end of the reservoir near Camino Del Norte. SWS vegetation is typified by mature willows *(Salix* sp.*).* Cismontane alkali marsh (2.71 acres) occurs on the north and south shorelines immediately behind the freshwater marsh. Most CAM on site is composed of monotypic stands of saltgrass *(Distichlis spicata).* One patch of CAM near Lago Lindo and Montevideo is composed mainly of pickleweed *(Salicornia* sp.*).*

Although not detected on site, the wetlands vegetation on-site support potential habitat for two California species of special concern: tricolored blackbird *(Agelaius tricolor)* and western pond turtle *(Emys marmorata).* Tricolored blackbird nest in colonies within freshwater marsh, and western pond turtle may occupy the fringes of the reservoir with additional portions of its life cycle occurring in upland areas. The site was not surveyed for either tricolored blackbird or western pond turtle for this feasibility study. Finally, the riparian vegetation in association with upland vegetation (eucalyptus) and the reservoir itself provide high-quality habitat for raptors, which as a group are considered special-status. Therefore, the site may be considered of high value as a resource for raptor foraging and nesting.

Disturbed coastal sage scrub occurs in two polygons on slopes north of the reservoir and is dominated by California sagebrush with other co-dominants including laurel sumac, California buckwheat, and broom baccharis. The vegetation community is relatively open with approximately 30%–50% native shrub cover. Non-native species include bromes and mustard. Overall, the habitat value is poor given the small size, isolated location, and low native cover.

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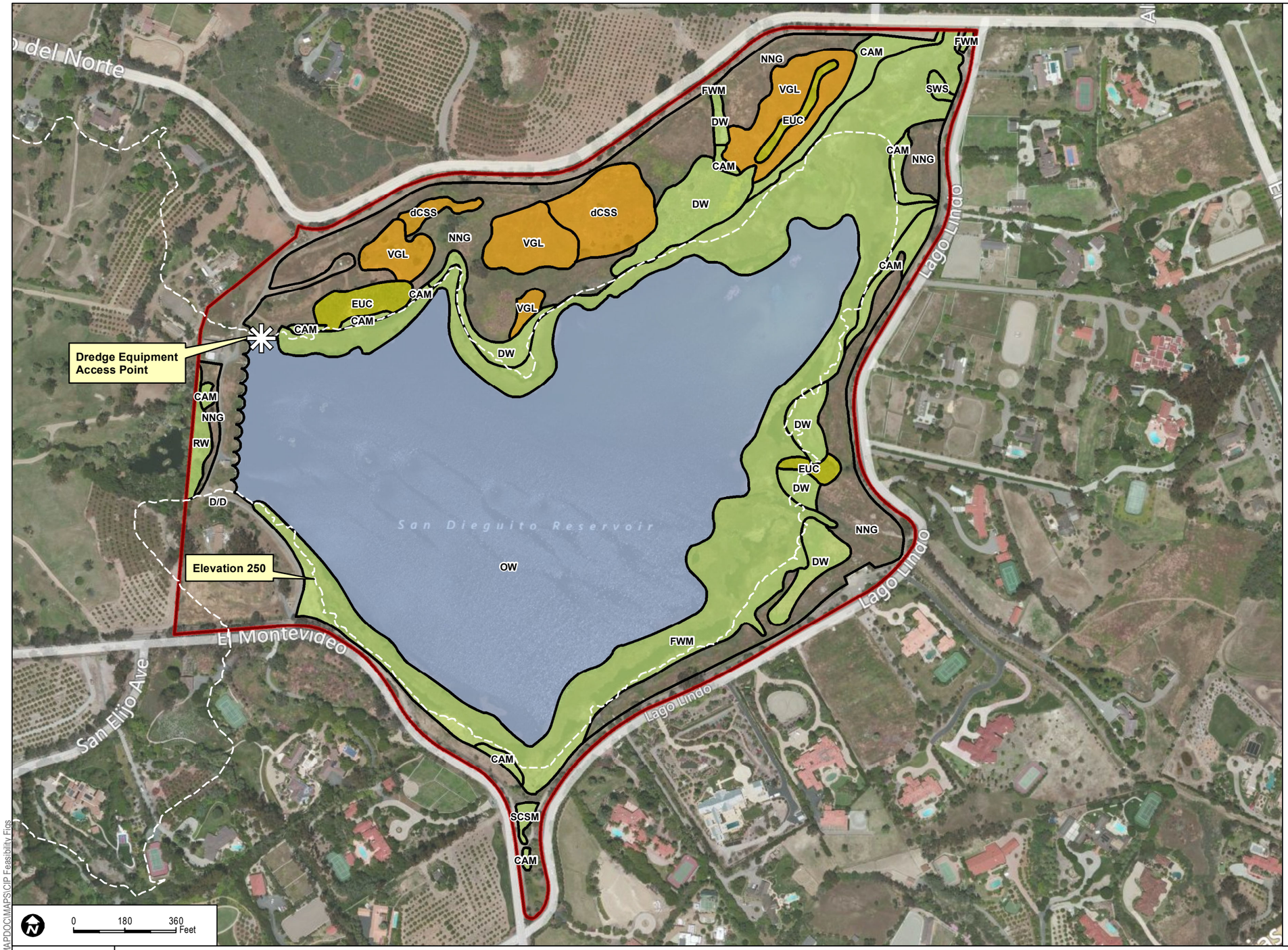

Legend

- Study Area
- Vegetation Mapping

Vegetation Communities

- CAM, Cismontane Alkali Marsh
- D/D, Developed/Disturbed
- DW, Disturbed Wetlands
- EUC, Eucalyptus Woodland
- FWM, Freshwater Marsh
- NNG, Non-Native Grassland
- OW, Open Water
- RW, Riparian Woodland
- SCSM, Southern Coastal Salt Marsh
- SWS, Southern Willow Scrub
- VGL, Valley Needlegrass Grassland
- dCSS, Disturbed Coastal Sage Scrub
- Waters of the U.S. - Moderate Sensitivity
- Wetlands - High Sensitivity
- Upland Habitat - Moderate Sensitivity
- Upland Habitat - Low Sensitivity

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AERIAL SOURCE: BING MAPPING SERVICE

FIGURE 5

Existing Vegetation

SAN DIEGUITO RESERVOIR PROJECT DEVELOPMENT AND FEASIBILITY REPORT

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Valley Needlegrass (native) grassland also occurs in on the slopes north of the reservoir within four polygons and is dominated by purple needlegrass. This species accounts for 20%–50% of the plant cover in these areas with other common species include western ragweed, coast goldenbush, laurel sumac, as well as non-natives including artichoke thistle, wild fennel, bromes, and star thistle. Dudek identified an occurrence of California adolphia *(Adolphia californica)*, a clay endemic special-status plant species, in this area. Although not observed during Dudek's survey, previous reports indicate that the community supports wildflowers including blue-eyed grass (*Sisyrinchium bellum*) and common goldenstar (*Bloomeria crocea)*.

Annual (non-native) grassland occupies the majority of the upland land within the property and occurs in all areas around the reservoir. Several bromes dominate this community and, along with other non-native grasses, occupy 50%–90% of the vegetative cover. Other common species in this community include red-stemmed filaree *(Erodium cicutarium)*, doveweed *(Croton setigerus)*, and fascicled tarplant *(Deinandra fasciculata)*.

Eucalyptus woodland occurs in three areas around the reservoir where stands of eucalyptus trees occur; in the northwest and southeast areas, the stands include large, mature trees. The understory of the trees is dominated by non-native grasses as well as Russian thistle *(Salsola tragus)* and Australian saltbush *(Atriplex semibaccata)*.

Cismontane alkali marsh occurs in many locations around the reservoir at an elevation above freshwater marsh, approximately 2–4 feet above the water surface elevation of the reservoir at the time of the survey. The community is dominated by salt grass and also supports other hydrophytic vegetation including sedge *(Cyperus* sp.), western ragweed *(Ambrosia psilostachya)*, and mugwort *(Artemisia dracunculus)*. In many areas this community occurs in a mixed pattern with annual grassland making the delineation between the two communities difficult. The current mapping is an approximation of the occurrence of this community and would require verification, especially for purposes of determining the extent to which the community meets jurisdictional wetlands criteria. For purposes of this study, it is assumed that all of the areas mapped as cismontane alkali marsh would be jurisdictional wetlands criteria and be subject to regulation by the ACOE, CDFG, and RWQCB; however, this would require verification through completion of a wetlands delineation which may determine the jurisdictional area to be smaller or larger than current mapping.

Freshwater marsh occupies the fringe of the reservoir almost across its entire perimeter. The width of marsh varies from a couple feet wide to over 100 feet wide. Vegetative cover is usually near 100% and is dominated by bulrush and cattail although some areas also support a mix of vegetative cover and mudflat. Freshwater marsh is likely to meet jurisdictional wetlands criteria and be considered jurisdictional by the ACOE, CDFG, RWQCB. However, much, if not all, of the community likely occurs below the 250-foot elevation of the dam, meaning that it is within the

operational area of the dam, and therefore may be regulated by the ACOE in a manner similar to the open water portion of the reservoir, as opposed to a wetland.

Mixed Riparian woodland occupies a small area on the western boundary of the property, downstream of the dam face where a mixture of willows and other riparian species occur.

Southern coastal salt marsh occurs in a single area along a tributary drainage south of the reservoir where soils are apparently at least somewhat saline. The area is dominated by pickleweed with salt grass, western ragweed, and alkali mallow (*Malvella leprosa*) also present.

Southern willow scrub occurs in a single area near the intersection of Camino Del Norte and Lago Lindo. The occurrence is a single stand of arroyo willow with near 100%. The trees are approximately 10–12 feet in height.

Disturbed wetland is a general community designation for a variety of areas on the fringe of the reservoir, usually above freshwater marsh. These areas support an understory similar to cismontane alkali marsh or annual grassland, but are dominated by non-native invasive species including tamarisk, Canary Island date palms (*Phoenix canariensis*), Pampas grass *(Cortaderia selloana),* prickly lettuce *(Picris echioides),* and wild fennel *(Foeniculum vulgare).*

Open water is the surface area of the reservoir itself. The water surface elevation of the reservoir is manipulated by the Districts and is generally maintained at 249.5 feet AMSL from May to September and 243.5 feet AMSL from October–April. The open water currently has a mean depth of 11 feet with the deepest area occurring upstream of the dam at 32 feet (Anderson 2011).

Disturbed/Developed is the land cover designation used to identify areas around the reservoir including roads, parking lot, the dam and associated buildings/facilities, trails, a brush management zone along El Camino Del Norte, and landscaping with mulch as a ground cover.

Changes in vegetation can be discerned from a comparison of the vegetation data collected in 1998 and 2012 (Figure 5); however, several factors confound definitive conclusions. The survey area was likely different between these data sets as demonstrated by the difference in developed area that was not mapped in 1998.

- Cismontane alkali marsh appears to have expanded into fringe wetlands areas, immediately behind the freshwater marsh vegetation.

- Open water mapped in 1998 did not include 5.84 acres of mud flat/salt panne vegetation associated within the sediment accumulation in the reservoir. In winter when the reservoir is lowered, exposed sediment likely appears as a mud flat. However, the sediment is entirely artificial and does not represent a resource to benthic life due to its chemical composition. In addition, a lower reservoir pond elevation in winter would

result in a smaller acreage of open water. Therefore, the data does not necessarily mean the open water area has expanded.

- Freshwater marsh vegetation has expanded by approximately 25% over the interim period. This expansion of FWM demonstrates the continued eutrophication of the reservoir and further loss of reservoir capacity.

- Coastal sage scrub has apparently degraded on site and is now mapped disturbed with low suitability for California gnatcatcher habitat.

Table 7 summarizes the mapped vegetation types that were present in 2001 and in 2012 for comparison.

Table 7
Reservoir Baseline Vegetation Comparison

Existing Vegetation/Land Cover Type	Map Code	1998 Map	2012 Map	Change
Cismontane Alkali Marsh	CAM	0.40 ac.	2.71 ac.	+2.31 ac.
Disturbed/Developed	D/D	0.52 ac.	12.77 ac.	+12.25 ac.
Disturbed Wetlands	DW	n/a	4.47 ac.	+4.47 ac.
Eucalyptus Woodlands	EUC	2.51 ac.[1]	1.45 ac.	-1.06 ac.
Freshwater Marsh	FWM	16.34 ac.	20.39 ac.	+4.05 ac.
Non-Native Grasslands	NNG	26.89 ac.	14.16 ac.	-12.73 ac.
Open Water	OW	44.99 ac.[2]	47.04 ac.	+2.05 ac.
Riparian Woodland/Forest	RW	0.46 ac.	0.45 ac.	-0.01 ac.
Southern Willow Scrub	SWS	n/a	0.14 ac.	+ 0.14 ac.
Valley Needlegrass Grasslands	VGL	4.31 ac.	4.40 ac.	+ 0.09 ac.
Coastal Sage Scrub	CSS	1.81 ac.	n/a	-1.81 ac.
Disturbed Coastal Sage Scrub	dCSS	n/a	2.31 ac.	+2.31 ac.

Notes:
[1] 1998 mapping used Non-native woodland vegetation category that included other non-native species such as palms, salt cedar, Brazilian and Peruvian pepper trees. This might explain the apparent decrease in this vegetation type because many of these trees occur as isolated individuals in other vegetation types such as disturbed wetlands.
[2] Acreage includes 5.84 acres of area mapped as mudflat/salt panne

4.4.2 Special-Status/Regulated Resources

4.4.2.1 Special-Status Plant Species

M&A identified only one special-status plant species, southwestern spiny rush *(Juncus acutus* ssp. *leopoldii)*, on the property. The species occurs in several patches within a drainage of freshwater marsh bordering the northwestern portion reservoir. Dudek additionally identified California adolphia within upland north of the reservoir. Appendix B (Table B-1) lists several additional special-status plant species which have either a moderate or high potential to occur on site. Many of these plants are either clay endemic (including four species which are federally-listed) or occur

in alkali and mesic soil conditions which are present on the fringes of the reservoir. Focused spring and summer surveys would be required to determine presence/absence of these species.

4.4.2.2 Special-Status Wildlife Species

One special-status wildlife species, yellow-breasted chat *(Icteria virens)*, was observed on the reservoir site during surveys conducted by M&A in 1998, 2000, and 2002. One special-status species, black-crowned night heron *(Nycticorax nycticorax)*, was detected on site during a general wildlife survey conducted by senior wildlife biologist Brock Ortega on February 8, 2012. No focused surveys were performed therefore; any conclusions of sensitive species absence are conditional upon results of future protocol surveys. Appendix B (Table B-2) lists eight special-status species of wildlife that have a moderate or high potential to occur on site.

Disturbed coastal sage scrub vegetation was assessed for suitability for California gnatcatcher. The vegetation was determined not to be suitable for this species due to low native shrub cover and small patch size. There are likely too few resources to support a gnatcatcher breeding territory on site. Gnatcatcher individuals may pass through the area and utilize the vegetation as foraging habitat on occasion, however this is unlikely, as there is limited proximate habitat to the site. Most of the surrounding areas are developed for one anthropogenic use or another.

Southern willow scrub, disturbed wetland and treed areas were investigated for their potential to support least Bell's vireo and southwestern willow flycatcher. No portion of the site supports enough suitable vegetation to support these species.

Freshwater marsh vegetation was investigated for its potential to support tricolored blackbird. All of the freshwater marsh areas could potentially support this species. However, there are no known colonies to have nested here in the past (Unitt 2004), and there are very few colonies in San Diego County. Where colonies do nest, they do so in a nomadic fashion, rotating between nesting areas between seasons.

While there was a negative survey effort in 1998, pond turtles have been known to recolonize lakes and may be difficult to locate when present in low numbers. The lake does provide suitable habitat as they have been found in similar and smaller lakes and ponds throughout southern California. An extensive trapping or visual survey effort would be necessary to fully determine their presence or absence. However, if present, pond turtles can likely be protected during potential project activities with implementation of standard species protection measures and because there is abundant escape cover available around the reservoir. Therefore focused surveys for pond turtle would not likely be required.

Projects that would result in impacts to freshwater marsh would likely necessitate focused surveys to determine presence/absence of tricolored blackbird and nesting birds, in general. Project impacting any other vegetation types (coastal sage scrub, cismontane alkali marsh,

non-native grassland, southern willow scrub) would likely only require surveys to determine status of nesting birds if impacts were to occur during the breeding season (generally February–August, annually).

4.4.3 Wildlife Corridors and Habitat Linkages

The Santa Fe Irrigation District Subarea Plan (October 2002) identifies a patch of coastal sage scrub on the SDR property that dens a family of coyotes. The County MSCP Subarea Plan does not identify any regional wildlife corridors associated with the SDR site (SFID Addendum 2002). There is very limited habitat in the surrounding area and it is likely that only urbanized wildlife (such as coyotes, raccoons, skunks, etc.) utilize the area for movement.

4.4.4 Regional Resource Planning Context

The SDR and surrounding lands are contained within the Districts Subarea Plan to the San Diego Multiple Species Conservation Plan (MSCP). The Districts Subarea Plan is a draft document that has not been finalized nor have permits been issued pursuant to the Subarea Plan. The Subarea Plan preparation, review, and approval process is currently on hold for an indefinite period. Surrounding areas are subject to the County of San Diego North County Subarea Plan to MSCP. A draft of that document was released for public review in 2009 and specifically excludes the SDR as well as other water district lands. As such, the SDR has no formal designations within any regional resource planning documents. The conservation of resources on the property is also not relied upon for conservation of species within adjacent resource planning areas. The conservation of biological resources would however likely be important if the Districts were to pursue obtaining coverage for any species under MSCP through an individual Subarea Plan.

4.4.5 Findings and Conclusions

Vegetation in the reservoir presents varying degrees of constraint to the proposed project based on the regulatory jurisdiction and sensitivity of vegetation as a biological resource to aquatic life and wildlife. Open water is regulated by the U.S Army Corps of Engineers and California Department of Fish & Game as Waters of the U.S. and Waters of the State, respectively. Open water, although regulated, poses a moderate constraint to the proposed projects and generally does not carry within it any mitigation requirements.

In contrast, wetlands vegetation is regulated by these state and federal agencies and requires mitigation for any impacts. As there is limited area around the SDR that is suitable for mitigation of wetlands impacts, these wetlands vegetation areas present the greatest regulatory constraint to project design and implementation.

Uplands vegetation communities such as coastal sage scrub and native grasslands present moderate constraints to project design and implementation. Impacts to these vegetation types

will require mitigation, although there is sufficient area north of SDR where uplands mitigation could occur. The real risk of these uplands areas is the potential for a listed (i.e., threatened or endangered) species to occur such as a California gnatcatcher. However, there are no such species currently present.

Similarly, Eucalyptus groves can present a low level of regulatory constraint because these trees provide nesting opportunities to protected raptors such as osprey and red-tailed hawk.

Finally, non-native grasslands present no constraints to project design and implementation as impacts to this vegetation type are not considered to be significant. Non-native grasslands represent areas where mitigation of native vegetation impacts can occur.

5.0 PROJECT DESCRIPTIONS AND PERMIT ANALYSIS

A range of projects are proposed to address issues of water quality, flooding, and reservoir capacity. These projects have been sited with consideration of the relative sensitivity and regulatory constraints associated with the various types of vegetation occurring around SDR. Generally, projects have been sited where non-native grasslands are present as this vegetation type carries not regulatory constraints. Project layouts also are intended to avoid and minimize impacts to wetlands vegetation that is the most constrained vegetation type.

Each project in this section is defined by a statement of the issue to be addressed, a description of the proposed facility and any long term maintenance issues, existing conditions and anticipated biological resource impacts, and the regulatory approach to obtain environmental permits. Anticipated compensatory mitigation is described and accounts for any mitigation ratio that can be expected to be assigned by the resource agencies based on temporal loss and other factors that guide permit negotiations. In some cases, alternatives were considered and rejected for stated reasons. These alternative projects are briefly discussed at the end of each project section.

5.1 Urban Water Pipeline and Nutrient Management /Sedimentation Basin

5.1.1 Issue of Concern

As described in the MS4 discussion (Section 3.0), first-flush stormwater (approximately a 2-year storm return interval) and, to a lesser degree, low flow urban runoff, discharge sediment, nutrients and other undesirable pollutant constituents into SDR. The effects of these discharges over time have resulted in sediment accumulations in the upper reservoir area, water turbidity and algal blooms that complicate water treatment operations, and excessive vegetation growth that contribute to the long term eutrophication of the reservoir operational area. The combined effect of these discharges reduces reservoir capacity as demonstrated by the increase in freshwater marsh vegetation over the past 10-year period (Section 4.0).

The Districts are seeking relief from the sediment inputs through 1) coordination with County storm water staff to determine what options are available to control sediment at the source, and/or 2) construction of a maintainable on-site sediment basin. This section describes a low flow urban runoff bypass pipe project that has been advanced by the County of San Diego and a companion sediment basin project to reduce and/or eliminate sediment discharge into the reservoir.

5.1.2 Project Description

The County of San Diego currently collects urban water runoff in its existing storm water collection system and discharges the urban water runoff in the SDR through the existing stormwater culvert at the northeast portion of the SDR. The County is in the process of replacing

its existing stormwater pipeline upstream of the existing culvert (the existing culver is to remain unchanged). As part of the stormwater pipeline replacement project, the County is proposing to construct an 18-inch "low flow" urban water runoff pipeline that would convey urban water runoff to a point adjacent to the SDR site boundary. In order to relocate the nutrient and sediment laden discharge from its current location, it is recommended that the low flow urban water runoff pipeline be extended 300 feet south, parallel to Lago Lindo, to as proposed nutrient management/sedimentation basin.

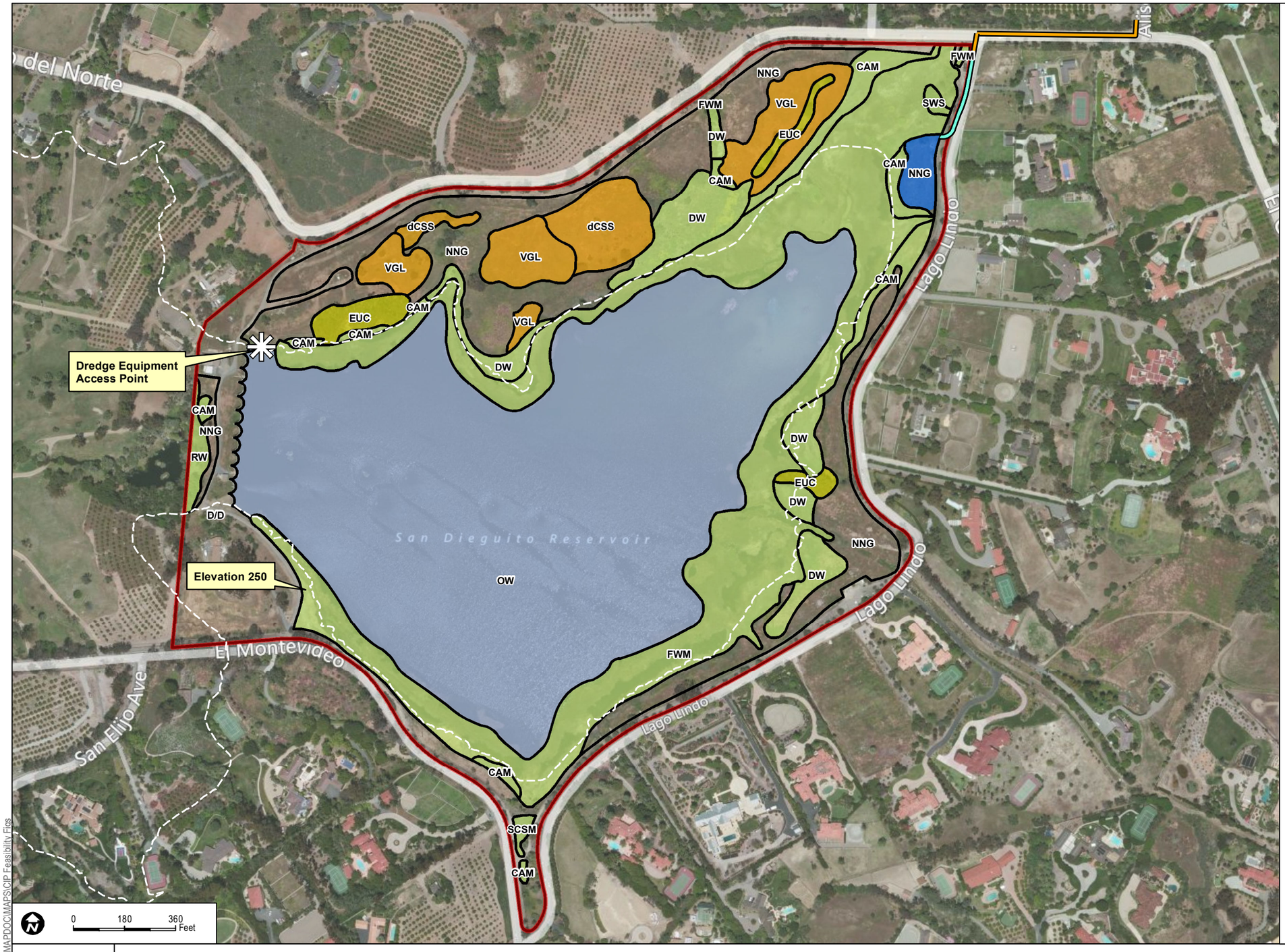
In combination with the urban water pipeline, a sediment basin within an existing upland area will collect sediment from first-flush storm events; defined as the 2-year storm return. These first-flush events have been shown to transport sediment that collects into SDR (Section 3.0). To be consistent with the goal of effectively removing sediment from the first-flush stormwater, it is recommended that the County of San Diego pipeline is sized to efficiently divert and convey the appropriate water volume of the full 2-year storm event that is generated within the watershed. The County pipe will need to be extended approximately 300 feet south to the proposed sediment basin location. This pipeline extension can be located in upland areas adjacent to Lago Lindo without impacting any sensitive wetlands vegetation. The pipe elevation should be established to allow urban runoff and first-flush flows to enter the sediment basin for treatment.

An area of non-native grasslands approximately 0.75 acre in size was located just south of the Lago Lindo/Camino Del Norte intersection where the basin can be built with no significant environmental impacts (Figure 6). The sediment basin will be approximately four feet deep and sized to appropriately treat first-flush events and urban runoff. A maximum of 5,000 cubic yards of excavation may be required to create this basin. The basin would be constructed with a concrete bottom and side walls to facilitate maintenance activities. The concrete bottom is also necessary because of shallow groundwater associated with the reservoir that would continually flood the basin causing bottom and basin side instability that could interfere with basin maintenance.

The basin would be built with a spillway that would allow water to spill directly into SDR or the adjacent treatment wetlands system (Section 5.3). Maintenance access to the basin will be via a ramp that is designed into the basin.

The construction footprint will extend 10 feet outside the edge of the basin boundary (top of bank). However, construction will remain within the non-native upland area. Temporarily impacted areas will be revegetated with appropriate native uplands vegetation.

Periodic maintenance of the sediment basin will be required when sediment collects to a level that silt removal from the water flow is no longer effective. Sediment removal will be performed with small equipment that will access the basin from the access ramp off of Lago Lindo. Maintenance work will be scheduled to avoid the bird breeding season to avoid direct and/or indirect impacts to wildlife in the adjacent wetlands.



Legend

Study Area

Project Components

Proposed County Low-flow Pipe

Proposed Low-flow Pipe Extension

Sediment Basin Area 0.68 Ac.

Vegetation Mapping

Vegetation Communities

CAM, Cismontane Alkali Marsh

D/D, Developed/Disturbed

DW, Disturbed Wetlands

EUC, Eucalyptus Woodland

FWM, Freshwater Marsh

NNG, Non-Native Grassland

OW, Open Water

RW, Riparian Woodland

SCSM, Southern Coastal Salt Marsh

SWS, Southern Willow Scrub

VGL, Valley Needlegrass Grassland

dCSS, Disturbed Coastal Sage Scrub

Waters of the U.S. - Moderate Sensitivity

Wetlands - High Sensitivity

Upland Habitat - Moderate Sensitivity

Upland Habitat - Low Sensitivity

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MAY 2012

AERIAL SOURCE: BING MAPPING SERVICE

FIGURE 6

Sediment Basin and Low-flow Pipe Project

SAN DIEGUITO RESERVOIR PROJECT DEVELOPMENT AND FEASIBILITY REPORT

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5.1.3 Existing Conditions

The proposed location of the urban runoff-pipeline and sediment basin is flat and dominated by non-native grasses. The site slopes gently toward the reservoir and is located outside the 250-foot contour representing the operational reservoir area. Existing wetlands vegetation is present within the adjacent reservoir, but outside the project footprint. These wetlands communities include freshwater marsh, southern willow scrub, and cismontane alkali marsh

5.1.4 Anticipated Biological Resource Impacts

The proposed pipeline and sediment basin would impact no more than approximately 0.75 acre of non-native grassland, which is not regulated as waters of the U.S., including wetlands, by the ACOE, RWQCB, and CDFG. Assuming the Districts, as a special district, would be the lead agency under the California Environmental Quality Act (CEQA), non-native grassland is not considered a sensitive vegetation community and as such mitigation would not be required to compensate for impacts to this community. Surveys to determine the presence/absence of special-status plant species would be required as would nesting bird surveys, if impacts were to occur during the breeding season.

5.1.5 Other Anticipated Impacts

There are potential visual impacts associated with the sediment basin. A reduction of natural open space and replacement with a concrete facility may reduce visual quality for nearby residents and the adjacent community, including equestrians. A similar mitigation approach to this issue would be to 1) establish a low shrub hedge along the trail and Lago Lindo to screen views of the basin from adjacent viewpoints. A second approach would involve using colored, stamped concrete to reduce the visual impact through the introduction of color and texture that will help the basin feature blend with local vegetation.

5.1.6 Permit Scenario

Assuming the negative results of focused rare plant surveys, the implementation of the sediment basin project is not expected to require regulatory permits. The principal biological impact would likely be the noise associated with maintenance of the basin. As such, the project should include an Operations and Maintenance Plan that includes measures to implement maintenance during the non-breeding season, to the extent feasible and contingency measures such as pre-maintenance nesting bird surveys for maintenance that must occur during the breeding season.

Because construction of the sediment basin and pipe extension is not anticipated to impact waters of the U.S., including wetlands, no environmental permitting for this project component is necessary. However, it will be critical for the discharger to maintain the function and operability of this basin by removing vegetation from this facility frequently to avoid “creating” wetlands and inadvertently manifesting a future wetlands permitting issue.

A California Environmental Quality Act (CEQA) Mitigated Negative Declaration (MND) document will be needed to satisfy State of California environmental documentation requirements. CEQA documents are required prior to obtaining RWQCB 401 certifications or waivers.

The cost to prepare and obtain a RMA and the MND is estimated to be $90,000. This cost estimate assumes that no Section 7 Consultation with the U.S. Fish and Wildlife Service (USFWS) to address listed species would be necessary.

5.1.7 Mitigation Requirements

This project component does not require mitigation because the Districts, as the assumed lead agency, does not consider non-native grassland to be a sensitive vegetation community pursuant to the CEQA. Therefore, impacts to this vegetation community are not considered significant. Standard measures would likely be required to avoid impacts to nesting birds (avoidance of impacts during the breeding season or completion of nesting bird survey prior to impacts). Although the potential is relatively low, the presence/absence of special-status plant species would need to be determined and most populations of species with a California Rare Plant Rank (CRPR) of 1 or 2 would likely need to be mitigated at a minimum 1:1 ratio through conservation of habitat supporting the same species.

5.1.8 Resource Agency Comments

The resource agencies were generally supportive of this project and the goal of improving water quality in SDR. The proposed permit strategy and mitigation finding was validated: no environmental permits and no mitigation are required from the represented agencies. CDFG suggested that a Routine Maintenance Agreement (RMA) would document the ongoing maintenance requirements of the facility. The RMA would act as formal acknowledgement of the facility maintenance by CDFG and will avoid future confusion about maintenance activities.

5.1.9 Project Cost and Schedule

The planning level cost for this project is $330,000 for design and construction costs and $58,500 for permitting costs. The total cost is $388,500. The schedule for project design, permitting, and construction is 12–18 months.

5.2 Stormwater Discharge Flow Management Improvements

5.2.1 Issue of Concern

The sediment has accumulated in SDR over a period of years near the Camino Del Norte box culvert. These deposits come from first-flush storm events and are conveyed through the County of San Diego stormwater system (Section 3.0). The storm flows create high turbidity,

sedimentation, and elevated nutrient loading in SDR. A clear pathway for stormwater influent needs to be established into the reservoir to reduce the localized effect of these conditions by allowing greater mixing with reservoir water.

5.2.2 Project Description

To reduce the negative water quality effects from flood events in the County of San Diego stormwater system, a broad floodway is proposed to be constructed and maintained through the middle of the existing FWM area; extending 700–900 feet from the Camino Del Norte box culverts into the open reservoir water (operational) area at approximately the 250-foot elevation (Figure 7). The channel would be a maximum of 4 feet deep and 150 feet wide to promote the recovery of freshwater marsh species and to provide the desired water mixing benefits. Recovery of FWM in the floodwater will be viewed as temporary impacts and on-site mitigation. Therefore, no additional wetlands mitigation will be associated with this project. To reinforce this temporary impact concept, FWM roots will be salvaged and replanted into the dragged floodway, at low densities, to promote regrowth and demonstrate active revegetation efforts. The frequency of maintenance to maintain flow capacity into the reservoir is expected to be low if the urban runoff pipe and sediment basin project (Section 5.1) is implemented.

The floodway would be created with an excavator or dredge equipment (excavator and barge) that can also be used to remove the sediment accumulation (Section 5.4) in a single project, if desired. Long term maintenance of the channel would be implemented on a 5-year frequency or as-needed as sediment fills in the floodway. Similar dredge equipment would be used to accomplish maintenance activities. Seasonal restrictions associated with the Migratory Bird Treaty Act (MBTA) and potentially other sensitive species issues will need to be incorporated into the project design and maintenance plan.

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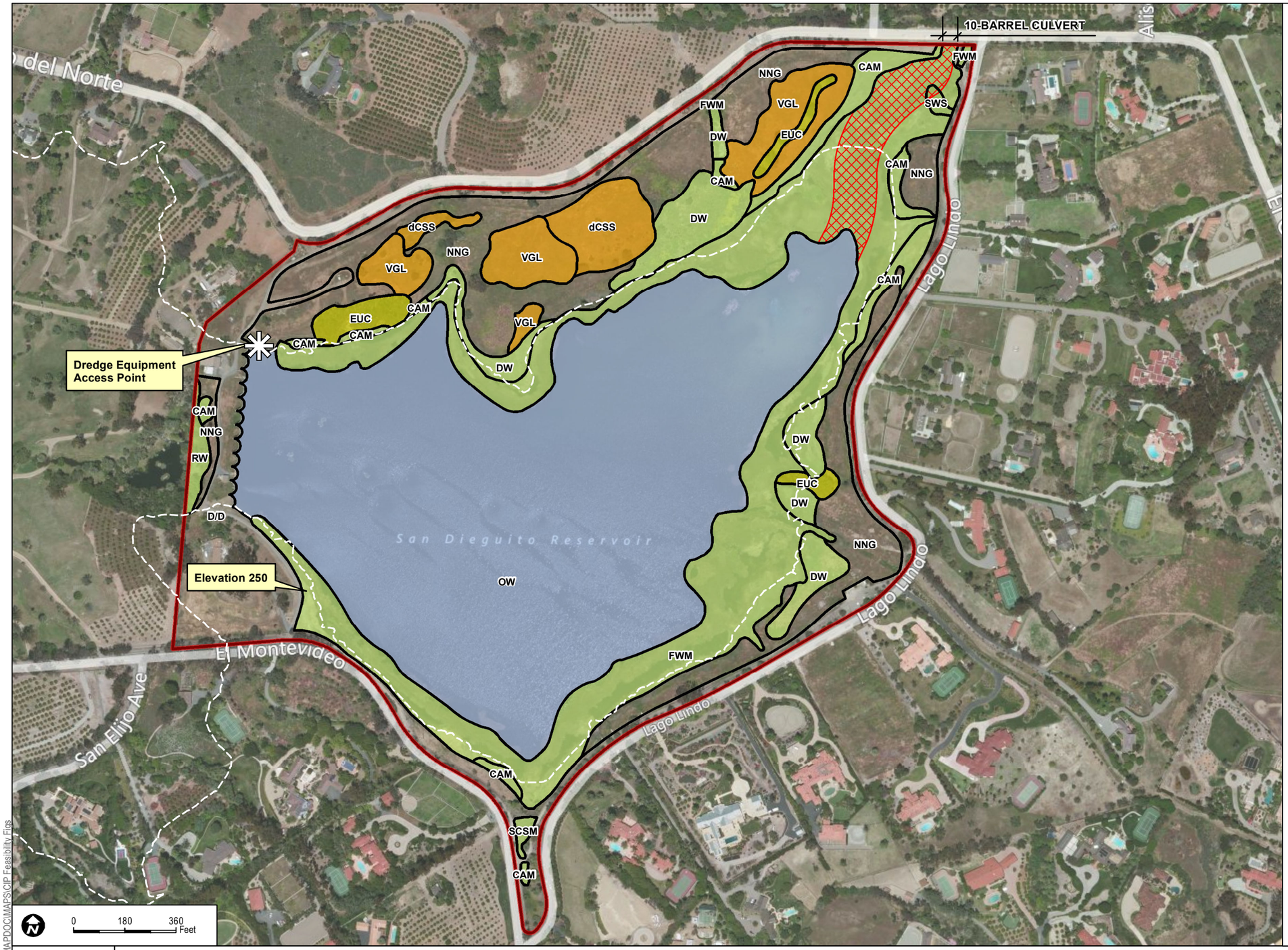

Legend

- Study Area
- Stormwater Discharge Flow Management Improvement 2.64 Ac.
- Vegetation Mapping

Vegetation Communities

- CAM, Cismontane Alkali Marsh
- D/D, Developed/Disturbed
- DW, Disturbed Wetlands
- EUC, Eucalyptus Woodland
- FWM, Freshwater Marsh
- NNG, Non-Native Grassland
- OW, Open Water
- RW, Riparian Woodland
- SCSM, Southern Coastal Salt Marsh
- SWS, Southern Willow Scrub
- VGL, Valley Needlegrass Grassland
- dCSS, Disturbed Coastal Sage Scrub
- Waters of the U.S. - Moderate Sensitivity
- Wetlands - High Sensitivity
- Upland Habitat - Moderate Sensitivity
- Upland Habitat - Low Sensitivity

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MAY 2012

AERIAL SOURCE: BING MAPPING SERVICE

FIGURE 7

Stormwater Discharge Flow Management Improvement Project

SAN DIEGUITO RESERVOIR PROJECT DEVELOPMENT AND FEASIBILITY REPORT

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5.2.3 Existing Conditions

The SDR is bounded by residential properties on all sides. Adjacent public roads include Montevideo on the south, Lago Lindo on the east, and Camino Del Norte north of the reservoir. A County of San Diego equestrian and pedestrian trail is located between the reservoir and Lago Lindo. In addition, there is a small equestrian staging area on the east side of the reservoir off Lago Lindo.

Several large residences face toward the reservoir at elevated locations around the open water. These residences have a significant setback from the adjacent street and intervening landscape vegetation obstructs views to the reservoir.

Flood water from the County of San Diego stormwater collection system presently flows west along the north side of Camino Del Norte through an open swale. Immediately west of the intersection with Lago Lindo, the channel passes under Camino Del Norte and discharges through a 10-barrel box culvert to the reservoir. However, existing native wetlands vegetation and federal and state jurisdictional wetlands that occupy the upper portion of the reservoir blocks clear passage for this water resulting in turbidity, and concentrated sedimentation in the reservoir. The vegetation is the result of annual vegetation growth and sediment discharges over many decades that together have raised the bed elevation such that flow into the reservoir is impeded.

The wetlands consist primarily of freshwater emergent marsh that is dominated by cattails and bulrush. A small patch of southern willow scrub is present in the inlet area. This vegetation is dominated by arroyo willow *(Salix lasiolepis).* The open water of the reservoir pool is located beyond the wetlands vegetation (Figure 7).

5.2.4 Anticipated Biological Resource Impacts

A 150-foot wide channel would result in approximately 2.64 acres of temporary impacts to freshwater marsh. Freshwater marsh provides potential suitable habitat for tricolored blackbird; focused surveys for this species may be required.

5.2.5 Permit Scenario

Because the anticipated impacts of the proposed project are temporary and involve restoration of the FWM area, the project may qualify for a Nationwide Permit (NWP) 27 from the ACOE in accordance with Section 404 of the federal Clean Water Act. A NWP would permit the initial channel construction as well as routine, repeat maintenance activities including, but not limited to, vegetation, sediment, and debris removal. NWPs are routinely issued on a five-year basis, subject to expiration, modification, or renewal by the ACOE. Authorization under a NWP generally requires 9 to 12 months for ACOE review and approval.

The proposed project would also require a Standard Section 1602 Lake and Streambed Alteration Agreement and Routine Maintenance Agreement from the California Department of Fish and Game (CDFG) and Section 401 Water Quality Certification from the Regional Water Quality Control Board (RWQCB). Permitting includes preparing and processing permit applications with these wetlands regulatory agencies. The permit application preparation and processing will be conducted concurrently; however each agency has different reporting requirements and evaluation criteria to be addressed during the process. Aspects of the proposed project that are likely to receive scrutiny from wetland regulatory staff include the basis for proposed channel dimensions, methods used to maintain the channel width and depth, and maintenance frequency.

A CEQA MND document will be needed to satisfy State of California environmental documentation requirements. CEQA documents are required prior to obtaining RWQCB 401 certifications or waivers.

The cost to prepare all permits and the MND is estimated to be $215,000. This cost estimate assumes that no Section 7 Consultation with the U.S. Fish and Wildlife Service (USFWS) to address listed species would be necessary.

5.2.6 Mitigation Requirements

For all intents and purposes, a 1:1 mitigation ratio for impacts to freshwater marsh should be assumed for planning purposes. FWM mitigation may be achieved on site to establish the project impacts as temporary. Mitigation would involve pre-construction salvage of cattail and bulrush roots and replanting post-dredging. This activity reinforces the impacts a temporary and demonstrates active on-site mitigation. Both scenarios may include transplantation of existing vegetation rhizomes to facilitate vegetation establishment at the selected mitigation site.

- Revegetate 2.64 acres of FWM within the proposed disturbance area. The cost of this mitigation scenario including salvage and replanting is estimated to be $250,000.

On-site mitigation for FWM will require a 5-year maintenance and monitoring period and attainment of performance standards prior to resource agency sign-off. All mitigation is required to be managed in perpetuity.

Standard measures would likely be required to avoid impacts to nesting birds (avoidance of impacts during the breeding season or completion of nesting bird survey prior to impacts). Potential impacts to tricolored blackbird would need to be assessed through focused survey; however it is likely there would remain suitable nesting opportunities for this species on site and therefore, with avoiding of construction during the breeding season, impacts to this species would not require mitigation.

5.2.7 Resource Agency Comments

This alternative was suggested by the ACOE representative during the resource agency briefing meeting. The resource agencies were generally supportive of this project and the goal of improving water quality in SDR. The proposed permit strategy and mitigation was validated: using NWP 27, a standard CDFG SAA, and a RWQCB 401 waiver or certification. CDFG suggested that a Routine Maintenance Agreement (RMA) would document the ongoing maintenance requirements of the facility. The RMA would act as formal acknowledgement of the facility maintenance by CDFG and will avoid future confusion about maintenance activities.

5.2.8 Alternatives Considered

Three alternatives to the proposed project were studied but ultimately rejected because these alternatives either do not meet project goals or the alternative is considered to have greater vegetation impacts and/or adverse environmental implications than does the proposed project. These alternatives are presented below as background information and for discussion with the resource agencies.

5.2.8.1 Alternative 1

Alternative 1 is similar to the proposed project. However, in lieu of a 150-foot-wide channel, a 50-foot-wide by 10-foot-deep channel was considered through the middle of the FWM area extending from the Camino Del Norte culvert into the open water (operational) area of the reservoir at approximately the 250-foot elevation. The narrower channel design would impact less FWM vegetation, but impacts would be considered to be permanent. Permanent FWM impacts would require 1:1 mitigation somewhere around the reservoir. In order to preserve on-site mitigation, areas for other project mitigation, this alternative was rejected.

5.2.8.1 Alternative 2

Alternative 2 is identical to Alternative 1. However, in lieu of a 50-foot-wide channel, a 24-foot-wide by 700- to 900-foot-long channel was considered through the middle of the FWM area extending from the Camino Del Norte culvert into the open water (operational) area of the reservoir at approximately the 250-foot elevation. The narrower channel design would impact less FWM vegetation. However, impacts would still be permanent, requiring on-site mitigation that could be used for other projects

This alternative was rejected because 1) on-site mitigation creation areas are limited and need to be conserved for other reservoir improvement projects, 2) the smaller channel design does not provide the required 100-year flood capacity needed to relieve local flooding, and 3) maintenance frequency of this alternative would likely be greater due to the narrower channel. Increased maintenance frequency is not only more costly, but also would result in greater disturbance to wildlife that occupies the FWM and open water channel.

5.2.8.2 Alternative 3

Alternative 3 involves a southerly channel alignment paralleling Lago Lindo that would extend from the Camino Del Norte culvert approximately 1,350 feet to the operational reservoir area at the 250-foot elevation. The channel would be constructed with concrete due to limited topographic fall and proximity to shallow groundwater associated with the reservoir. Channel dimensions to convey the 100-year storm event would be approximately 31 feet wide at the top, 25 feet wide at the base and 3 feet deep with 1:1 side slopes. A soft bottom channel was also considered. The lack of structural support of an earthen channel would require the channel dimensions to be approximately 50-foot-wide with greater wetlands impacts. The southerly route would temporarily and permanently impact FWM, SWS, CAM, and NNG.

There are potential visual impacts associated with the channel project that would be noticeable by the surrounding community and equestrian users of the adjacent trail. Channel construction will replace native and non-native vegetation with a concrete channel. Although the channel will have modest dimensions, the conversion of open space to a flood control channel may be jarring to some residents.

This alternative was rejected due to anticipated regulatory objections to a concrete channel scenario and greater construction cost. The soft bottom channel is not feasible due to the lack of topographic fall to convey water down the channel via gravity flow, likely groundwater discharge into the channel due to shallow groundwater associated with the reservoir, increased wetlands impacts, channel instability due to constant soil saturation, and increased vegetation maintenance.

5.2.9 Project Cost and Schedule

The planning level cost for this project is $1,000,000 for design and construction costs and $215,000 for permitting, and $264,000 for mitigation. The total cost is $1,479,000. The schedule for project design, permitting, and construction is 36 months.

5.3 Urban Water Natural Treatment Wetlands

5.3.1 Issue of Concern

The MS4 overview (Section 3.0) suggests that high nutrient loads in first-flush and urban runoff discharge from the County of San Diego stormwater system into the reservoir. Low water quality can have many serious effects on the reservoir and the vegetation and wildlife that it supports. For example, high nutrient loads in particular can accelerate eutrophication of the reservoir by increasing vegetation growth and biomass production that can accumulate and shrink reservoir capacity, if left unchecked.

Recent water quality data taken before and after a recent storm event suggests that sediment, nutrient (Nitrogen, Nitrate, and total Phosphorus), and other pollutant constituents are being discharged into the reservoir. This section describes a potential treatment wetlands project to reduce and/or eliminate water quality issues in receiving waters at the reservoir. However, prior to committing to this project, more intensive water testing at the sediment basin is recommended

to determine if a treatment wetlands is justified by actual discharge levels and a subsequent cost/benefit analysis.

5.3.2 Project Description

The treatment wetlands will consist of a soft-bottom, vegetated channel that accepts first-flush and urban runoff water from the sediment basin (Section 5.1) and conveys the water 700 feet to a larger constructed wetlands (Figure 8). The treatment wetlands system will terminate at an existing influent channel where water from Lake Hodges enters SDR. This influent channel provides conveyance of treated water discharging from the treatment wetlands into SDR. The vegetated channel is anticipated to have an 8-foot wide bottom width and a 10-foot-wide top width.

The treatment wetlands system would be constructed within an area of non-native grasslands, eucalyptus, and developed land located on the south shore of the reservoir. A minor wetlands impact is required to provide a return channel to the reservoir. This channel will create a small wetlands impact where it ties into the existing conveyance channel for Lake Hodges water. The total area available for the treatment wetlands and vegetated channel is approximately 2.2 acres. This area was selected to avoid impacts to jurisdictional wetlands and thereby avoid the need for any project mitigation.

It is anticipated that up to a two-year storm event (representing the first-flush storm event) will be treated to remove nutrients and other pollutant constituents found in the County's discharged stormwater prior to reaching the reservoir. The treatment wetland will function as a soft bottom spreading area that is vegetated with native wetlands species, such as cattails, bulrush, arrowweed (*Pluchea sericea*), and willows (*Salix* sp.).

Long term maintenance of the treatment wetland will require periodic removal of vegetation, detritus, trash and other organic and non-organic materials that accumulate. The frequency of maintenance needed to retain water quality treatment effectiveness will be determined through regular monitoring of influent and effluent water quality. Trash and debris accumulation is anticipated to be minimal, but periodic removal will be performed. Potential vector breeding issues can be addressed through design measures that limit standing water or by creating water surface disruptions during dawn and dusk hours when mosquito breeding is most active.

5.3.3 Existing Conditions

A treatment wetland facility is proposed to be constructed in upland areas south of the reservoir (Figure 8). The site gently slopes northward toward the reservoir. The area supports non-native grasslands and eucalyptus forest. The entire wetlands area would be constructed outside the 250-foot contour that represents the operational area of the reservoir. Vegetation types adjacent to the constructed wetlands that is associated with the SDR pond includes cismontane alkali marsh and FWM. However, these vegetation types occur outside the proposed treatment wetlands project footprint. An existing 24-inch water line runs adjacent to the area and must be avoided.

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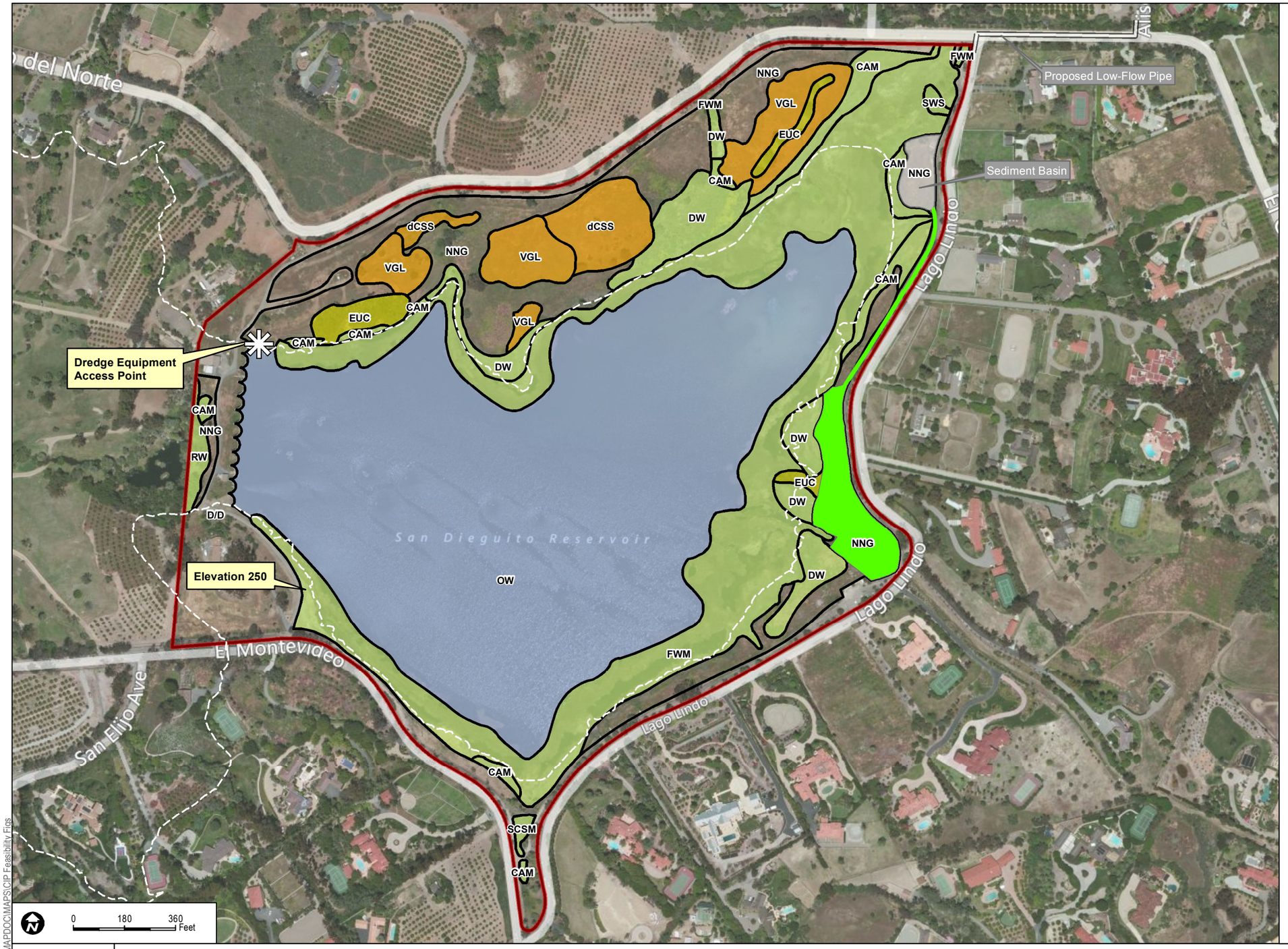

Legend

- Study Area
- Potential Treatment Wetlands Area
  2.25 Ac.
- Vegetation Mapping

Vegetation Communities

- CAM, Cismontane Alkali Marsh
- D/D, Developed/Disturbed
- DW, Disturbed Wetlands
- EUC, Eucalyptus Woodland
- FWM, Freshwater Marsh
- NNG, Non-Native Grassland
- OW, Open Water
- RW, Riparian Woodland
- SCSM, Southern Coastal Salt Marsh
- SWS, Southern Willow Scrub
- VGL, Valley Needlegrass Grassland
- dCSS, Disturbed Coastal Sage Scrub

- Waters of the U.S. - Moderate Sensitivity
- Wetlands - High Sensitivity
- Upland Habitat - Moderate Sensitivity
- Upland Habitat - Low Sensitivity

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AERIAL SOURCE: BING MAPPING SERVICE

FIGURE 8

Treatment Wetlands Project

SAN DIEGUITO RESERVOIR PROJECT DEVELOPMENT AND FEASIBILITY REPORT

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5.3.4 Anticipated Biological Resource Impacts

A summary of the biological resource impacts for construction of the treatment wetland is described in Table 8.

Table 8
Summary of Impacts to Vegetation Communities and Land Covers

Vegetation Communities	Impacts (acres)
Waters of the U.S., including Wetlands	
Freshwater Marsh	0.02
Subtotal	*0.02*
Upland Communities and Land Covers	
Non-Native Grassland	0.77
Eucalyptus	0.06
Disturbed/Developed	0.07
Subtotal	*0.92*
TOTAL	**0.94**

A majority of the impacts (98%) are to non-native upland vegetation communities and land covers. Temporary impacts to wetland communities represent a fraction of the overall site (2%). These communities may support special-status plant species, the presence/absence of which would need to be determined through focused surveys.

5.3.5 Other Anticipated Impacts

No other potential environmental impacts are anticipated with this facility.

5.3.6 Permit Scenario

There are several permitting options available to authorize the construction and potential long-term maintenance of the proposed treatment wetlands. To briefly summarize, impacts include construction of the treatment wetland largely within annual non-native grassland vegetation, with the exception of 0.02 acre of temporary impacts to jurisdictional wetlands (i.e., freshwater marsh). If routine, repeat maintenance of this facility is not anticipated for five or more years, pre-construction notification to the ACOE pursuant to Nationwide Permit 43 (Stormwater Management Facilities) would be necessary to permit construction of the treatment wetlands along with Section 401 Water Quality Certification from the RWQCB and a Section 1602 Lake and Streambed Alteration Agreement from the CDFG. If the treatment wetland can be constructed to avoid wetland impacts, environmental permits would not be required. The Districts should assume permits will be issued within 9 to 12 months following the date that permit applications are received by the resource agencies and deemed complete.

If, however, the Districts would prefer to include maintenance of the treatment wetlands under this permit action, then maintenance agreements with a combination of the resource agencies would be necessary. This is because the treatment wetlands not only impacts wetlands as currently proposed but it is immediately adjacent to a waters of the U.S. and will be hydrologically connected to the reservoir by way of an outlet or spillway. However, the type of maintenance proposed directly influences the type of environmental permit needed. For example, vegetation trimming, thinning, mowing, and debris removal by hand are not regulated activities under Sections 401 and 404 of the Clean Water Act because they do not constitute a discharge. Therefore, if proposed maintenance falls under these categories, programmatic permits from the ACOE and RWQCB would not be necessary. However, these activities are often regulated by the CDFG and as such the CDFG would likely require a Routine Maintenance Agreement under Sections 1600-1602 of the California Fish and Game Code to authorize this work. The average cost to prepare and process a maintenance agreement with the CDFG is approximately $6,500. The Districts should assume a minimum 3 to 6 months to obtain a CDFG Routine Maintenance Agreement from the date the application is received and deemed complete by the CDFG.

In the event that maintenance activities would extend to include vegetation removal (i.e., grubbing) and/or sediment removal, then the following permits would be necessary: an RGP from the ACOE, a Standard Section 1602 Lake and Streambed Alteration Agreement and Routine Maintenance Agreement from the CDFG, and a Section 401 Water Quality Certificate from the RWQCB. For planning purposes, the Districts should assume permits will be issued within 9 to 12 months following the date that permit applications are received by the resource agencies and deemed complete.

A CEQA MND document will be needed to satisfy State of California environmental documentation requirements. CEQA documents are required prior to obtaining RWQCB 401 certifications or waivers.

Under this approach, the cost to prepare and process these permits and an MND is estimated to be $155,000. This cost estimate assumes that no Section 7 Consultation with the USFWS to address listed species would be necessary.

5.3.7 Mitigation Requirements

The mitigation ratio is often subjective and in the case of maintaining a treatment wetlands, the ratio would be commensurate with the type and quality of wetlands impacted. Other factors that can lower or increase the mitigation ratio include the incorporation, or lack thereof, of avoidance and minimization measures into the project design, maintenance methods and frequency, and the type of facility in which the habitat occurs (i.e., a manmade facility or a natural stream course). Impacts to freshwater marsh would likely require a 1:1 to 2:1 mitigation ratio.

If the minor impacts associated with the project cannot be avoided, mitigation opportunities are present on site to fully mitigate impacts from this facility.

Standard measures would likely be required to avoid impacts to nesting birds (avoidance of impacts during the breeding season or completion of nesting bird survey prior to impacts). Although the potential is relatively low, the presence/absence of special-status plant species would need to be determined and most populations of species with a CRPR of 1 or 2 would likely need to be mitigated at a minimum 1:1 ratio through conservation of habitat supporting the same species.

The cost to mitigate temporary impacts to existing wetlands is estimated to be $55,000. This includes replanting and a 5-year maintenance, monitoring, and reporting program.

5.3.8 Resource Agency Comments

The resource agencies were generally supportive of this project and the goal of improving water quality in SDR. The proposed permit strategy and mitigation was validated: CDFG suggested that a Routine Maintenance Agreement (RMA) would document the ongoing maintenance requirements of the facility. The RMA would act as formal acknowledgement of the facility maintenance by CDFG and will avoid future confusion about maintenance activities.

5.3.9 Project Cost and Schedule

The planning level cost for this project is $770,000 for design and construction costs and $155,000 for permitting, and $55,000 for mitigation. The total cost is $980,000. The schedule for project design, permitting, and construction is 36 months.

5.4 Sediment Mound Removal

5.4.1 Issue of Concern

An accumulation of sediment that is a byproduct of the water treatment process has formed in the reservoir open water (operations) area. The sediment is discharged into the reservoir after backwashing the treatment plant filters. Most of this sediment is non-organic material that does not support plant growth. However, the sediment has accumulated to an elevation that now becomes exposed during normal reservoir operations that require the water level to be lowered during winter for flood control. Odors form as the sediment contacts air and neighboring properties and local residents are subjected to these undesirable odors.

5.4.2 Project Description

The removal area is located to avoid impacts to existing FWM vegetation. The objective of this project is not to remove all of the sediment, but to lower the top elevation of the sediment

accumulation to one foot below the winter reservoir pond elevation of 244 feet AMSL (Figure 9). Therefore, the target elevation for the top of the excavated mound will be 243 feet AMSL. Based on an estimated top elevation of 248 feet AMSL, removal of the sediment will result in a dredge volume of approximately 25,975 cubic yards of material. The haul-off volume is expected to be less than the dredge volume due to dewatering prior to trucking the material off site.

Sediment removal will be accomplished using hydraulic dredge equipment that is floated on a barge. A barge and dredge equipment will deployed into the reservoir via an existing ramp located on the north side of the dam structure. A small passage to route dredge pipes is expected to be approximately 100 feet long and 50 feet wide. FWM vegetation in this access passage will not be grubbed to allow vegetation regrowth after the dredge work is complete.

Sediment will be pumped to a temporary treatment building that will occupy the same area that is proposed for the treatment wetland. The building will house centrifuge equipment that will remove the water content of the dredged sediment. This water will be treated and returned to the reservoir. The dewatered sediment will be trucked in enclosed container trucks to the nearest landfill.

5.4.3 Existing Conditions

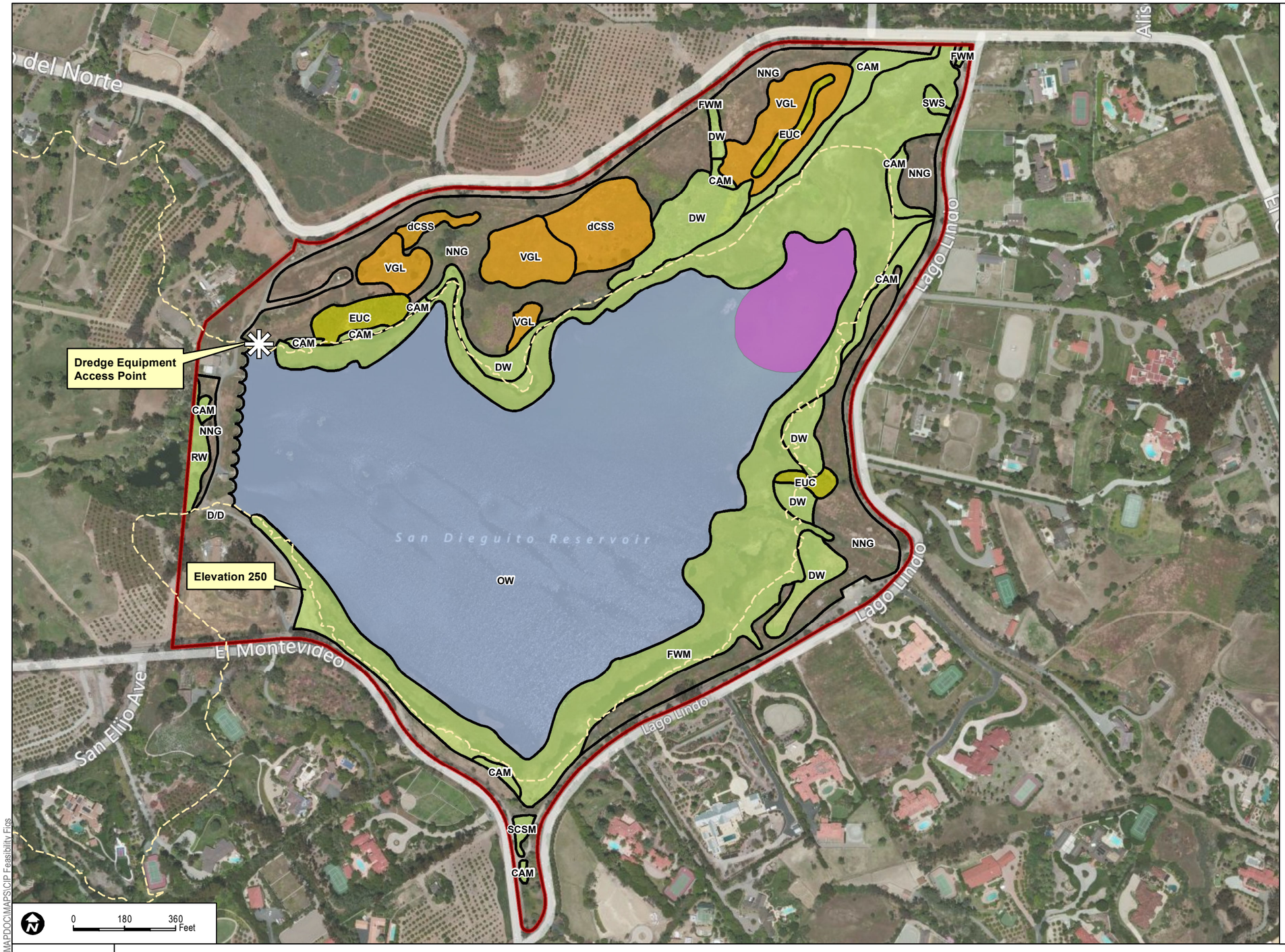
The sediment accumulation to be removed is located in the open water area of the reservoir (Figure 9). A band of FWM rings the reservoir open water area (Figure 9). This band of vegetation varies in wide from 20–300 feet wide. In many areas, a band of cismontane alkali marsh is present immediately behind the FWM along the shoreline.

5.4.4 Anticipated Biological Resource Impacts

Sediment removal will be restricted to an approximately 3-acre area where no FWM vegetation is present. However, the access route for equipment deployment will pass through FWM vegetation at a point that is approximately 100 feet wide. Therefore, approximately 0.11 acre of temporary FWM impact is anticipated from project implementation.

5.4.5 Other Anticipated Impacts

No visual impacts from the dredging activity are anticipated. However, construction impacts could lead to increased traffic, noise, and air quality issues that require analysis under CEQA.



Legend

Study Area

Layer

Sediment Removal Area 3.22 Ac.

Vegetation Mapping

Vegetation Communities

CAM, Cismontane Alkali Marsh

D/D, Developed/Disturbed

DW, Disturbed Wetlands

EUC, Eucalyptus Woodland

FWM, Freshwater Marsh

NNG, Non-Native Grassland

OW, Open Water

RW, Riparian Woodland

SCSM, Southern Coastal Salt Marsh

SWS, Southern Willow Scrub

VGL, Valley Needlegrass Grassland

dCSS, Disturbed Coastal Sage Scrub

Waters of the U.S. - Moderate Sensitivity

Wetlands - High Sensitivity

Upland Habitat - Moderate Sensitivity

Upland Habitat - Low Sensitivity

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AERIAL SOURCE: BING MAPPING SERVICE

FIGURE 9

Sediment Removal Project

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5.4.6 Permit Scenario

Because the removal of accumulated sediment from the reservoir bottom provides a net benefit to the beneficial uses of the reservoir, in terms of water quality, and no wetlands (i.e., vegetated) vegetation will be permanently impacted by the activity, this project should be proposed as a beneficial project, with minimal impacts to jurisdictional waters, with no need for compensatory mitigation. If mitigation is required by the agencies, enhancement of disturbed wetlands should be considered adequate. Although sediment accumulation will be monitored by the Districts, actual sediment removal is not likely to be necessary on a routine, frequent basis. The physical act of dredging the reservoir bottom to remove accumulated sediment is not regulated by the ACOE under Section 404 of the Clean Water Act. However, the effluent discharge from the disposal site, or "return water" can constitute a discharge if it has the potential to be discharged into adjacent waters of the U.S.

To elaborate, the methods in which dredged material is discharged to an upland-contained disposal site is critical in determining whether or not a Section 404 permit from the ACOE is needed to authorize this activity. Most disposal methods result in some sort of effluent discharge, defined for purposes of this analysis as that material discharged directly to receiving waters during the filling operation (i.e., disposing of dredged material to an upland disposal site). The quality of effluent discharged from these sites is an environmental concern and is regulated as a discharge under Section 404 of the Clean Water Act. In addition, Section 401 provides the State a certification role as to project compliance with applicable State water quality standards; effluent standards may be set as a condition of the certification.

The discharge of effluent from a contained disposal site is defined as a dredged material discharge in 33 CFR 323.2 (d):

> ...the term "discharge of dredged material" means any addition of dredged material into, including any redeposit of dredged material within, the waters of the United States. The term includes, but is not limited to, the following: ...the runoff or overflow from a contained land or water disposal area...

Nationwide general permit 16 (33 CFR 330, Appendix A, part B (16)) authorizes the return water from an upland, contained dredged material disposal area, where the quality of the return water is controlled by the State through Section 401 Certification procedures. Assuming return water is discharged back into waters of the U.S., the Districts would be required to process a stacked Nationwide Permit from the ACOE, a standard Section 401 Water Quality Certification from the RWQCB, and a Section 1602 Lake and Streambed Alteration Agreement from the CDFG.

The term "stacked" refers to a permit process in which multiple Nationwide Permits are used to authorize project activities. It is presumed that shoreline vegetation will be temporarily impacted to allow crews temporary access to the sediment mound. Temporary access can be permitted under Nationwide Permit 33 (Temporary Construction, Access, and Dewatering). Thus, a stacked

Nationwide Permit would be the best approach to permitting the project through the ACOE. Under this approach, the Districts should assume permits will be issued within 9 to 12 months following the date that permit applications are received by the resource agencies and deemed complete.

A CEQA MND document will be needed to satisfy State of California environmental documentation requirements. CEQA documents are required prior to obtaining RWQCB 401 certifications or waivers.

Under this approach, the cost to prepare and process these permits and an MND is estimated to be $135,000. This cost estimate assumes that no Section 7 Consultation with the USFWS to address listed species would be necessary.

5.4.7 Project Mitigation

No mitigation is anticipated for this project because all impacts will be temporary. Standard measures would likely be required to avoid impacts to nesting birds (avoidance of impacts during the breeding season or completion of nesting bird survey prior to impacts).

5.4.8 Resource Agency Comments

The resource agencies were generally supportive of this project and the goal of improving water quality in SDR. The proposed permit strategy and mitigation was validated.

5.4.9 Project Cost and Schedule

The planning level cost for this project is $1,800,000 for design and construction costs and $135,000 for permitting. The total cost is $1,935,000. The schedule for project design, permitting, and construction is 36 months.

5.5 Reservoir Capacity Recovery Project

5.5.1 Issue of Concern

Bathymetric data indicates that 34% of the total reservoir capacity has been lost since 1918. Approximately 126 acre feet of storage has been lost since 1997 (Anderson 2011) The purpose of this project is to recover reservoir storage capacity that will improve water quality and can be used for emergency storage, water wheeling, and other operations that are beneficial to District's customers.

SDR conditions have slowly deteriorated over the past decade due to several environmental factors. Water quality in the reservoir has degraded in part due to discharged constituents in stormwater entering the reservoir. Existing freshwater vegetation continues to grow and die-off in annual cycles. Sediment discharge inputs from first-flush storm events over the decades have accumulated in vegetated areas and the reservoir bottom. Together, these factors contribute to

and accelerate eutrophication of the reservoir. This process is slowing filling the reservoir with sediment and organic debris that continually reduces reservoir capacity.

5.5.2 Project Description

Reservoir dredging would be accomplished using a hydraulic dredge. The dredge would be deployed to the reservoir open water via the existing boat ramp near the north side of the dam structure.

Two capacity recovery approaches were analyzed for this study. In one approach, the dredge area will generally remain in open water areas of the reservoir and concentrate of on the removal of bottom sediments (Figure 10). This approach would avoid all impacts to FWM vegetation and may require a setback from FWM vegetation to avoid destabilizing the shoreline such that slumping occurs that could submerge vegetation and indirectly impact FWM. This avoidance approach will reduce or eliminate mitigation; however, the approach will also result in less storage recovery.

A second approach contemplates selected removal of FWM around the reservoir to create a more consistent FWM width along the shoreline. This trim line will be maintained as part of normal reservoir operations to maintain the open water area while allowing FWM to persist along the shoreline for the benefit of wildlife and water quality. This approach results in greater FWM impacts and higher mitigation costs as described below.

Bottom sediment and water would be pumped from the reservoir and spread out in a temporary 3–4 acre upland area to dry and be processed in preparation for transport (Figure 10). Truck transport to a landfill or soil buyer would occur on a daily basis. Sediment could be dredged from the reservoir adding approximately 250–300 acre feet of water storage capacity. After dredging, the processing area will be revegetated with appropriate native upland vegetation consisting of coastal sage scrub and valley needlegrass grassland.

An undetermined number of daily truck trips would be logged on local roads such as Camino Del Norte, Del Dios Highway, and Via de la Valle. The average daily truck trips are dependent upon the duration and intensity of the dredge operation.

The storage capacity added by reservoir dredging is expected to remain functional for 50–100 years when other project benefits are considered. No maintenance activities are associated with reservoir capacity recovery once complete; however a separate vegetation management/biomass removal is proposed (Section 5.6).

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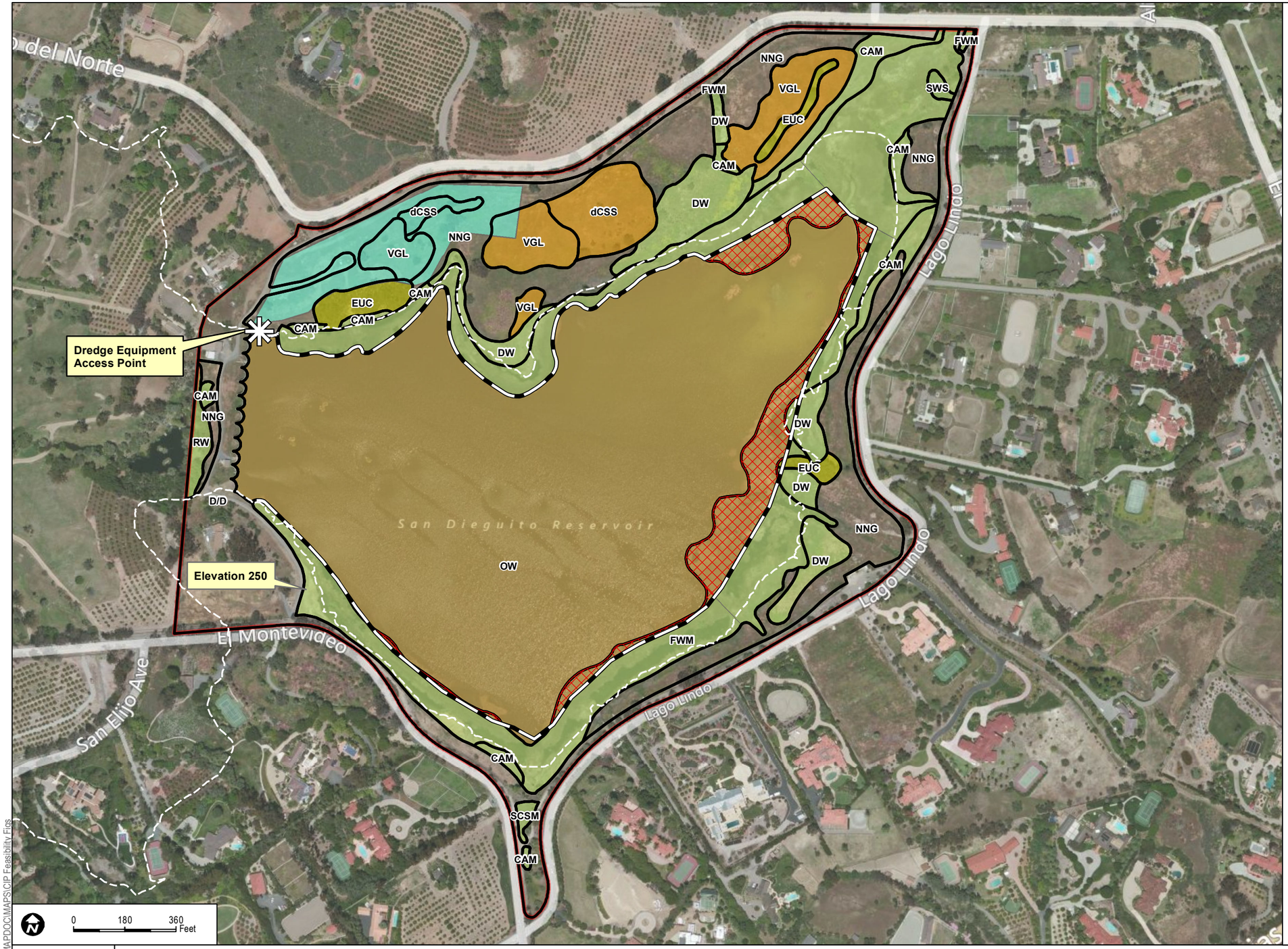

Legend

- Study Area
- Processing Area (4.5 Ac.)
- Dredging Limit
- Dredging Area
- Vegetation Removal Optional Area (Alternative) 4.13 Ac.
- Vegetation Mapping

Vegetation Communities

- CAM, Cismontane Alkali Marsh
- D/D, Developed/Disturbed
- DW, Disturbed Wetlands
- EUC, Eucalyptus Woodland
- FWM, Freshwater Marsh
- NNG, Non-Native Grassland
- OW, Open Water
- RW, Riparian Woodland
- SCSM, Southern Coastal Salt Marsh
- SWS, Southern Willow Scrub
- VGL, Valley Needlegrass Grassland
- dCSS, Disturbed Coastal Sage Scrub

- Wetlands - High Sensitivity
- Upland Habitat - Moderate Sensitivity
- Upland Habitat - Low Sensitivity

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AERIAL SOURCE: BING MAPPING SERVICE

FIGURE 10

Reservoir Capacity Recovery Project

SAN DIEGUITO RESERVOIR PROJECT DEVELOPMENT AND FEASIBILITY REPORT

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5.5.3 Existing Conditions

The reservoir supports FWM along the shorelines and this vegetation completely covers the upper end of the reservoir. FWM vegetation supports many avian species including ducks, blackbirds, grebes, etc. In addition, it provides habitat for fish that inhabit the reservoir. Most of the FWM vegetation lies at or below the reservoir spillway elevation at 250 feet. Behind the FWM there is a band of cismontane alkali marsh consisting primarily of salt grass. Uplands vegetation consists of coastal sage scrub and valley needlegrass grassland, and non-native grasslands. Patches of eucalyptus are present.

5.5.4 Anticipated Biological Resource Impacts

The impacts from reservoir dredging are associated with requisite FWM trimming and the staging and processing area, which have been preliminarily sited to minimize impacts to native upland communities and jurisdictional wetlands. Approximately 4.32 acres of freshwater marsh vegetation will be trimmed to increase the surface area of the reservoir (Table 9). This constitutes a temporary impact. An additional 4.57 acres of temporary impacts to upland communities including 0.34 acre of disturbed coastal sage scrub and 0.98 acre of valley needlegrass grassland, two sensitive upland communities, will occur to process (i.e., dry out) the recovered sediment.

Table 9
Impact Summary for Reservoir Capacity Recovery Project

Vegetation Communities	Temporary Impacts (acres)
Waters of the U.S.	
Freshwater Marsh (selected removal approach only)	4.32
Disturbed Wetland	0
Subtotal	*4.32*
Upland Communities and Land Covers	
Disturbed Coastal Sage Scrub	0.34
Valley Needlegrass Grassland	0.98
Non-Native Grassland	3.01
Eucalyptus	0.03
Disturbed/Developed	0.21
Subtotal	*4.57*
Total	**8.89**

Surveys to determine the presence/absence of tricolored blackbird and special-status plant species would be required.

5.5.5 Other Anticipated Impacts

No visual impacts from the dredging activity are anticipated. However, construction impacts could lead to increased traffic, noise, and air quality issues that require analysis under CEQA.

5.5.6 Permit Scenario

As previously discussed in Section 5.4.6, dredging and excavation are not regulated activities under Section 404 of the Clean Water Act. However, the effluent discharge from the disposal site, or "return water" can constitute a discharge if it has the potential to be discharged into adjacent waters of the U.S.

Because reservoir dredging is expected to occur infrequently on a more as-needed basis, maintenance permits for this work would not likely be required. Assuming return water is discharged back into waters of the U.S., the Districts would be required to process a stacked Nationwide Permit from the ACOE (Nationwide Permit 16 and 33), a standard Section 401 Water Quality Certification from the RWQCB, and a Section 1602 Lake and Streambed Alteration Agreement from the CDFG.

The selected vegetation trimming and removal approach carries other permit considerations. Depending on how crews access the shoreline vegetation to facilitate trimming (land- side versus water-side), temporary impacts to disturbed wetland cismontane alkali marsh beyond the immediate shoreline could occur to facilitate access. Because the access points and/or access routes are not yet known, impacts cannot be quantified. However, temporary impacts for a one-time event/activity could be permitted under Nationwide Permit 33 (Temporary Construction, Access, and Dewatering) from the ACOE, a Section 1602 Lake and Streambed Alteration Agreement from the CDFG, and a Section 401 Water Quality Certificate from the RWQCB.

An Environmental Impact Report (EIR) is the likely CEQA document that would be required to analyze project impacts. An EIR is recommended due to potentially significant impacts associated with truck transport over local two-lane roads to dispose of dredged sediment. Air quality, noise, and odors associated with the processing of potentially anaerobic sediments may also cause the project to be controversial within the Rancho Santa Fe community.

For planning purposes, the Districts should assume permits will be issued within 9 to 12 months following the date that permit applications are received by the resource agencies and deemed complete. The cost to prepare all three permits and an EIR for the project is estimated to be $750,000. This cost estimate assumes that no Section 7 Consultation with the USFWS to address listed species would be necessary.

Because no jurisdictional wetlands will be adversely impacted by the staging and processing area, no permits are necessary to accommodate this aspect of the project. However, native upland

communities (i.e., disturbed coastal sage scrub and valley needlegrass grassland) impacted by project staging and processing would require restoration following project completion.

5.5.7 Mitigation Requirements

Under the avoidance approach, the reservoir dredging, although subject to ACOE/CDFG/RWQCB review and approval, is not expected to result in adverse environmental impacts and the extent of agency jurisdictional area would not change following these activities. Therefore, no mitigation would be proposed for the avoidance approach.

Under the selective removal approach, the removal of FWM would require mitigation at a 1:1 ratio through in-kind FWM creation. It appears sufficient non-native upland areas are present on the south and north shorelines of SDR to provide the needed on-site mitigation acreage. If site constraints limit the acreage of FWM creation to less than is required, the mitigation shortfall could be closed utilizing floating islands of FWM habitat that would be tethered to the reservoir bottom. The vegetation can serve fish and avian species in a similar manner to the functions and services of the present shoreline condition. Based on an impact of 4.32 acres of FWM impacts, the mitigation at 1:1 will require 4.32 acres of on-site creation and/or floating islands. However, reliance on floating islands should be minimized due to high costs and ongoing maintenance.

Temporary impacts to disturbed coastal sage scrub (0.34 acre) and valley needlegrass grasslands will result from operation of the dredge spoil processing area. Mitigation of these sensitive plan communities in compliance with County of San Diego standards will require 1:1 replacement through restoration. Mitigation is required to be monitored and maintained for 5-years post-construction and must achieve established performance criteria before the mitigation obligation is considered to be satisfied by the County.

The cost of mitigation is estimated to be $800,000 if selected FWM removal is implemented. The cost of mitigation will be less to the degree that impact avoidance is achieved through the project design.

Standard measures would likely be required to avoid impacts to nesting birds (avoidance of impacts during the breeding season or completion of nesting bird survey prior to impacts). Potential impacts to tricolored blackbird would need to be assessed through focused survey; however it is likely there would remain suitable nesting opportunities for this species on site and therefore, with avoiding of construction during the breeding season, impacts to this species would not require mitigation. Although the potential is relatively low, the presence/absence of special-status plant species would need to be determined and most populations of species with a CRPR of 1 or 2 would likely need to be mitigated at a minimum 1:1 ratio through conservation of habitat supporting the same species.

5.5.8 Resource Agency Comments

The resource agency discussion indicated that the capacity recovery project was too vague at this time for the resource agencies to make comment. A large part of the discussion revolved around whether the area within the spillway elevation would be considered to be jurisdictional. However, the consensus is that any attempt to establish the operational area as non-jurisdictional would be lengthy and the outcome uncertain. Resource agency representative were concerned about the potential loss of FWM vegetation and questioned the approach as opposed to avoidance.

5.5.9 Project Cost and Schedule

The planning level cost for this project could be up to $8,000,000 for design and construction costs, depending on the number of acre feet recovered, $450,000 for permitting, and $800,000 for mitigation. The total cost is $9,250,000. The schedule for project design, permitting, and construction is 84 months.

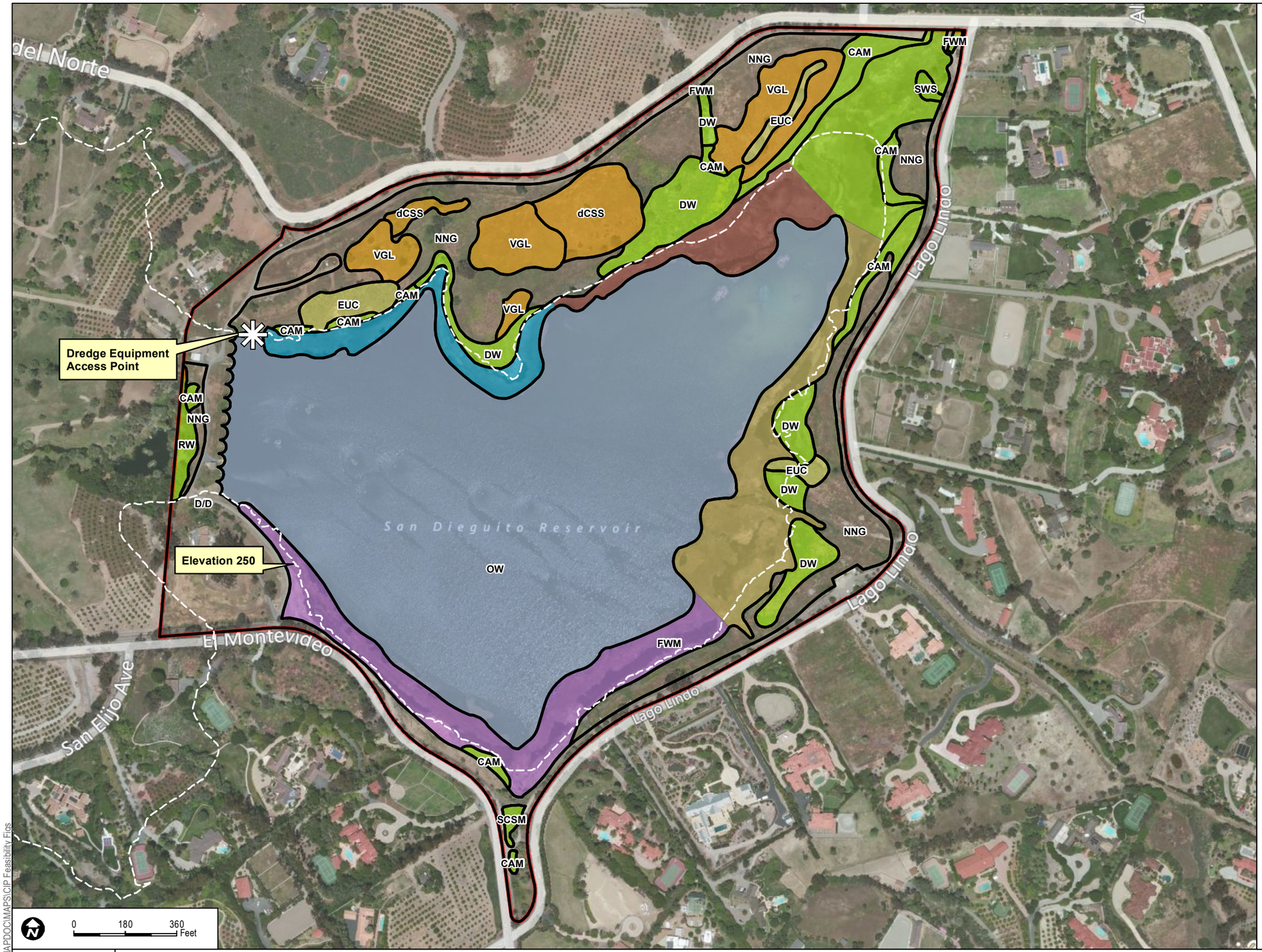
5.6 Shoreline Vegetation Management Program

5 6.1 Issue of Concern

The purpose of this project is to slow eutrophication processes in the reservoir to maintain reservoir capacity at current levels. SDR conditions have slowly deteriorated over the past decade due to several environmental factors. Water quality in the reservoir has degraded in part due to discharged constituents from stormwater entering the reservoir. Existing freshwater vegetation continues to grow and die-off in annual cycles. Together, these factors contribute to accelerated eutrophication of the reservoir. This process is slowing filling the reservoir with organic debris that continually reduces reservoir capacity.

5.6.2 Project Description

Vegetation management to address the issue of biomass build-up within the reservoir operational area (below 250 feet) will involve rotational management actions that will treat four management zones around the reservoir shoreline while preserving FWM in the upper reservoir area (Figure 11). Management of vegetation growth would be implemented in a phased approach. Vegetation would be cut to approximately 4 inches above ground level. Biomass would be trucked to the nearest landfill for disposal or recycled as mulch. The goal of vegetation management is to remove biomass build-up on an annual basis.



Legend

- Study Area

Shoreline Vegetation Management-Phased Areas

- North Shore West 2.36 ac
- North Shore East 2.81 ac
- South Shore West 5.56 ac
- South Shore East 5.38 ac
- Vegetation Mapping

Vegetation Communities

- CAM, Cismontane Alkali Marsh
- D/D, Developed/Disturbed
- DW, Disturbed Wetlands
- EUC, Eucalyptus Woodland
- FWM, Freshwater Marsh
- NNG, Non-Native Grassland
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- SWS, Southern Willow Scrub
- VGL, Valley Needlegrass Grassland
- dCSS, Disturbed Coastal Sage Scrub

- Waters of the U.S.
- Wetlands
- Moderate Sensitivity Upland Habitat
- Low Sensitivity Upland Habitat

Z:\Projects\7173001\MAPDOC\MAPS\CIP Feasibility Figs

DUDEK

7173-01

MAY 2012

AERIAL SOURCE: BING MAPPING SERVICE

FIGURE 11

Shoreline Vegetation Management

SAN DIEGUITO RESERVOIR DEVELOPMENT PROJECT AND FEASIBILITY REPORT

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A 4.2-acre area of FWM in the upper reservoir would remain protected in place. Vegetation management will occur on the north and south shorelines. The phased management project would establish four separate shoreline management zones ranging from 2.36–5.56 acres of FWM. Each zone would be treated sequentially, such that each zone is treated once every four years. Vegetation management will allow natural regrowth of FWM vegetation within the managed zone of the vegetated shoreline by protecting rhizomes in place. Therefore, in any given year, management zones not being treated will have 1–3 years of regrowth to support wildlife that utilizes this vegetation community and the reservoir open water. FWM regrowth to support wildlife and provide refuge for individuals evicted from areas experiencing active vegetation management.

Once removed from the shoreline, cut vegetation would be spread to dry on the adjacent upland areas, and then trucked off site.

Vegetation management will be accomplished by cutting down FWM vegetation to ground or waterline level and disposal of above-ground biomass. Vegetation rhizomes will be protected in place to facilitate regrowth over the intervening period until the zone is schedule for subsequent biomass removal. Access may be gained from the shoreline or via open water.

Management operations will be conducted outside the bird breeding season. A pre-construction survey of the management zone to be treated will be conducted to observe species and numbers of individuals that occupy the area. Birds will be actively flushed from the FWM prior to biomass removal to avoid and minimize mortality.

The proposed project is a maintenance project that will be implemented for the maximum permit period of 5–10 years. Maintenance would include annual biomass removal along the entire north and south shoreline or annual removal of one of four phased vegetation management zones as described above.

5.6.3 Existing Conditions

Freshwater marsh accounts for 20.01 acres of the SDR. Of this total, 15.65 acres (78%) of FWM occur below the 250-foot contour representing the operational area of the reservoir. The FWM plant community essentially rings the reservoir edge and grows out into the reservoir open water until water depths exceed the ability of cattails and bulrush to root into the reservoir bottom sediments. The band of FWM varies in width from 26–300 feet wide. Most shoreline areas are 80–140 feet wide.

5.6.4 Anticipated Biological Resource Impacts

For all intents and purposes, it is assumed that the 16.11 acres of proposed biomass removal would be accomplished by mechanical means and could employ several different types of

equipment to facilitate biomass removal depending on how crews intend on accessing the shoreline vegetation areas. FWM vegetation would be trimmed down to approximately four inches above ground level. The rhizomes would remain intact, allowing the freshwater marsh to resprout and recolonize rapidly. Assuming these assumptions are correct, temporary impacts to a total of 16.11 acres of freshwater marsh would occur through a phased approach in which each zone would be treated sequentially once every four years. The benefit of the phased approach from a permitting perspective is that by managing the different shoreline management zones at different times, freshwater marsh vegetation is allowed to recolonize and remain in place until the next maintenance cycle. Meanwhile the recolonized vegetation is providing wildlife habitat, localized habitat diversity, and promoting nutrient cycling and improved water quality.

Determining site access will be critical during the permitting phase of the project. If land-based access is proposed to facilitate biomass removal, additional impacts to cismontane alkali marsh and disturbed wetland could occur. Because the points of access are not yet known, these impacts cannot be quantified. If water-based access is proposed, no additional impacts due to access are anticipated.

Freshwater marsh provides suitable habitat for tricolored blackbird thus focused surveys for this species may be required. If upland vegetation areas are utilized for access, focused special-status plant species surveys would also be required.

5.6.5 Other Anticipated Impacts

Visual quality at the reservoir will experience various levels of impact depending upon the time of year and the location of the active management zone relative to viewers. Vegetation management is expected to have low impact on the visual quality of the reservoir because the change is temporary and regrowth will limit visual contrast to a short term period.

5.6.6 Permit Scenario

Reservoirs are unique situations and the application of the law can vary from site to site. In some cases, activities within the existing spillway elevation of a dam or reservoir are considered to be part of operations of the existing facility and thus any habitat changes within the spillway elevation are considered to be a normal part of operations and are therefore exempt from resource agency regulation. To an extent is applicable to SDR, but it is more relevant in cases where maintenance of the facility (i.e., vegetation management, sediment removal, dredging, etc.) has occurred more frequently and has been clearly documented. Given the lack of recent maintenance at SDR for over 10 years, the resource agencies will likely require maintenance permits to authorize any form of maintenance regardless of whether or not the maintenance occurs above or below the 250-foot spillway elevation contour.

The proposed methods and access are critical to determining the type of permits needed to authorize this work. Sections 404 and 401 of the federal Clean Water Act provide for regulation of the discharge of fill material to waters of the U.S. If access to the four proposed shoreline management zones will occur from land, then cismontane alkali marsh and disturbed wetlands will be temporarily impacted as equipment is driven through these areas to gain better access to the vegetation management areas. This would constitute a temporary impact under Sections 404 and 401 of the federal Clean Water Act. If land access is proposed, then the following permits would be necessary: an RGP from the ACOE, a Standard Section 1602 Lake and Streambed Alteration Agreement and Routine Maintenance Agreement from the CDFG, and a Section 401 Water Quality Certificate from the RWQCB. For planning purposes, the Districts should assume permits will be issued within 9 to 12 months following the date that permit applications are received by the resource agencies and deemed complete.

An EIR is recommended as the appropriate level of CEQA analysis due to anticipated local community concerns related to visual resource impacts, traffic, and noise.

If, however, access to the vegetation management zones and vegetation trimming can occur from the water side, it is likely that only a Routine Maintenance Agreement from the CDFG will be required. Vegetation trimming is not regulated by the ACOE and RWQCB and the use of a boat to provide access and facilitate work does not typically constitute a temporary discharge. If the Districts were to proceed with this approach, a minimum 3 to 6 months to obtain a CDFG Routine Maintenance Agreement from the date the application is deemed complete by the CDFG should be expected.

The cost to prepare and process these three permits and an EIR can range anywhere from $150,000 to $350,000. This cost estimate assumes that no Section 7 Consultation with the USFWS to address listed species would be necessary.

5.6.7 Mitigation Requirements

As previously discussed, the resource agencies typically require anywhere from a 1:1 to 2:1 mitigation ratio for impacts to freshwater marsh. However, because freshwater marsh vegetation colonizes rapidly and it is assumed that a phased approach to vegetation management would be implemented (thereby preserving large sections of vegetation at any given time), it is assumed that the removal of freshwater marsh can be mitigated through in-kind, on-site freshwater marsh creation. The mitigation could utilize non-native upland areas on the north and south shores of SDR. Floating islands of freshwater marsh vegetation could be used to make-up any shortfall in FWM creation acreage.

For the purposes of this evaluation, it is assumed that 1:1 mitigation will be required for the largest of the management zones to offset the permanent loss of functions and services of any of the management zones that are treated in any given year of the vegetation management cycle. All

other managed areas that are allowed to recover over the 3-year interim period would be considered a temporary impact. Therefore, a total of 5.6 acres of FWM vegetation creation would be required to fully mitigate the impacts of the vegetation management program. The cost of this mitigation approach is estimated to be in the range of $1,112,000 to $3,140,000 depending upon the level of reliance on floating islands to provide the required mitigation acreage.

Standard measures would likely be required to avoid impacts to nesting birds (avoidance of impacts during the breeding season or completion of nesting bird survey prior to impacts). Potential impacts to tricolored blackbird would need to be assessed through focused survey; however it is likely there would remain suitable nesting opportunities for this species on site and therefore, with avoiding of construction during the breeding season, impacts to this species would not require mitigation.

5.6.8 Resource Agency Comments

Resource agency representatives expressed concern with the project as presented. CDFG suggested that smaller management areas could be used to reduce overall impacts to FWM vegetation is any given year. A discussion of the potential benefits of the program ensued. It was suggested that creating areas of different FWM density as sequential recovery of the management zones progressed could benefit a greater range of aquatic and avian species. This idea is predicated on the ecological principle that vegetation with greater structural complexity will attract and serve a greater diversity of wildlife. However, all participants agreed that this hypothesis, as applied to FWM vegetation, requires greater research into existing scientific literature and might be worthy of a pilot project to determine what effects might occur if a diversity of habitat density is presented to wildlife that inhabits SDR. Such a study could be implemented at a small scale and the results used to extrapolate to the larger project. The pilot study could require several years to complete. However, existing peer-reviewed research studies may already have looked at this issue.

5.6.9 Alternatives Considered

Removal of FWM vegetation was considered as an alternative to the phased management approach. Removal would include excavation and disposal of the foliage and root mass of this vegetation community resulting in permanent impacts to FWM and removal of the open water-FWM interface that is an important resource to avian and aquatic species. The work would be accomplished by a tracked excavator that can reach and scoop out vegetation. Haul-off would be accomplished via truck transport and likely disposal at the nearest landfill. Turbidity would be controlled with silt curtains within the reservoir.

Under this project alternative, the proposed foliage and root mass of the freshwater marsh vegetation would be removed from the reservoir and the shoreline would be replaced with a resource-agency approved edge treatment that would better control and manage vegetation

growth in perpetuity. It is assumed that most if not all of the existing 16.11 acres of shoreline vegetation along the north and south shores of the reservoir would be removed, thereby eradicating all emergent wetlands vegetation from the facility shoreline. Impacts to 16.11 acres of freshwater marsh would be considered a substantial and permanent. Land access to the vegetation management zones would incur additional temporary impacts to disturbed wetland and cismontane alkali marsh, which are both wetland communities under the jurisdiction of the ACOE, RWQCB, and CDFG. Because the location of specific access routes is not yet known, temporary wetland impacts due to site access cannot be quantified.

Given the impact magnitude, permanent nature of the impact (16.11 acres) and the reality that over 16 acres of freshwater marsh mitigation most likely could not be accommodated on site, the successful permitting of this project alternative within a reasonable timeframe is not likely. Mitigation costs would be prohibitive due to reliance on floating islands to meet the mitigation acreage requirements. Therefore, this alternative was rejected.

5.6.10 Project Cost and Schedule

The planning level cost for this project is $780,000 for design and construction costs over each 4-year maintenance cycle, $150,000–$350,000 for permitting, and $1,112,000–$3,140,000 for mitigation. The total cost is $2,042,000–$4,270,000. The schedule for project design, permitting, and construction is 18 months.

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6.0 SUMMARY OF ESTIMATED CONSTRUCTION AND PERMITTING COSTS

Conceptual-level designs for each proposed project have been estimated for project construction, environmental permitting, and compensatory mitigation costs. These costs are presented in Table 10. These costs are predicated on the project description, recommended permitting approach, and anticipated compensatory mitigation that is based on anticipated biological impact calculations. Therefore, these costs are broad estimates and are subject to change based on design modifications due to resource agency negotiations to minimize and avoid impacts to sensitive biological resources and a more detailed understanding of existing physical site conditions.

Table 10
Projected Project Costs by Activity

Activity Description	Design and Construction Cost [1]	Permitting Cost[2,3]	Mitigation Costs[6]	Total Capital Cost
Urban Water Pipeline and Nutrient Management /Sedimentation Basin	$330,000	$58,500	$0.00	$388,500
Stormwater Discharge Flow Management Improvements	$1,000,000	$215,000	264,000	$1,479,000
Urban Water Natural Treatment Wetlands	$770,000	$155,000	$55,000	$980,000
Sediment Mound Removal	$1,800,000	$135,000[4]	$0.00	$1,935,000
Reservoir Capacity Recovery	$8,000,000	$450,000	800,000	$9,250,000
Shoreline Vegetation Management	$780,000[5]	$150,000 to $350,000	$1,112,000 to $3,140,000	$2,042,000 to $4,270,000

[1] Includes estimated soft costs for engineering, construction management, inspection, etc.
[2] Permitting costs are influenced by a number of factors including impacts, permit type, and whether or not maintenance is proposed. The range of costs presented is dependent on the permitting options available to the Districts. Please see text for more details. Generally, permitting costs are a one-time cost. However, for ongoing projects, permit renewal may be required on a 5–10 year basis.
[3] The total permitting cost, and thus the overall project cost, can be substantially reduced by grouping certain maintenance projects with a similar magnitude of impacts under a single maintenance agreement rather than prepare separate maintenance permits for each, individual project. Please see text for more details.
[4] Cost applicable only if implemented as a stand-alone project, otherwise, permitting cost is inclusive in Influent channel estimates.
[5] Cost shown is for a full 4-year maintenance cycle that would repeat every 4 years.
[6] Mitigation is a one-time cost.

6.1 Critical Assumptions for Cost Estimates

The following assumptions were used to develop budget estimates for each of the proposed projects presented in Table 10.

6.1.1 Urban Water Pipeline and Nutrient Management /Sedimentation Basin

It is assumed that the County pipeline will be sized to accommodate the 2-year storm event flow volume. Assuming a detention basin dimension of approximately 200 foot by 150 foot with an average depth of three feet, the projected detention time for the basin would be approximately 5 days. At a construction cost of $50 per cubic yard, the projected cost, including soft costs, is

projected to be $250,000. No estimate is provided for the proposed County pipeline. However, a 300-foot extension of an 18- to 24-inch pipeline is estimated to be $80,000. Costs include design work. Permitting costs assume only a CDFG Routine Maintenance Agreement will be processed.

6.1.2 Stormwater Discharge Flow Management Improvements

Assuming that the dredged floodway is treated in a similar manner as the sediment mound removal operations, the estimated dredged area is 900 feet by 150 feet by 4 feet. This operation results in a disposal volume of approximately 20,000 cubic yards of material. At $50 per cubic yard, the floodway is estimated to cost approximately $1,000,000. Mitigation costs assume planning and design for a 2.64-acre mitigation site, salvage and replanting activities, and a 5-year maintenance and monitoring period at a cost of $100,000 per acre.

6.1.3 Urban Water Natural Treatment Wetlands

The cost of the Urban Water Natural Treatment Wetlands is based on a total basin area of approximately 98,000 square feet by 3 feet deep. As with the sediment basin, only first flush and low flow nuisance water is anticipated to be diverted to the wetland treatment system. The projected cost of construction including approximately 11,000 cubic yards of disposal at $50 per cubic yard and soft costs (40% of estimated construction), is approximately $770,000. Mitigation assumes a 0.06 acre wetlands mitigation area. Wetlands mitigation is assumed to cost $55,000 including planning and design costs and a five-year maintenance, monitoring, and reporting post-construction program.

6.1.4 Sediment Mound Removal

As stated, dredging of the sediment from the SDR is intended to lower the surface of the sediment (assumed at 248 feet AMSL) over an area of approximately 3.22 acres, to approximately one foot below the winter pool elevation of the reservoir (244 feet AMSL). As such, dredging is projected to produce approximately 26,000 cubic yards of material. Based on information from local dredging contractors, a cost of $50 per cubic yard is used for dredging and disposal operations. The resulting cost, including soft costs, is approximately $1,820,000.

6.1.5 Reservoir Capacity Recovery

Regaining reservoir capacity lost over time to sedimentation and eutrophication impacts is important to long-term reservoir operations. However, extensive dredging is a costly venture. For purposes of this analysis, a total cost of $8,000,000 was established for the dredging effort to regain approximately 250 acre-foot of the original reservoir volume. Mitigation costs are assumed to be $200,000 per acre of on-site (shoreline) FWM creation. Floating islands are estimated at $1,500,000 per acre. It is assumed that all mitigation will occur at on-site shoreline mitigation areas where non-native grasslands occur. Floating islands would only be used in the event that insufficient on-site (shoreline) mitigation is not available at the required acreage based on the project impact acreage.

6.1.6 Shoreline Vegetation Removal

The vegetation area of SDR is primarily around the shoreline perimeter, estimated to be approximately 5,300 feet in length. Clearing of this perimeter area is projected to produce approximately 5,000 cubic yards of material per acre, which can be removed, dried and disposed of at a cost of approximately $35 per cubic yard. Based on the four identified management zones, the resulting cost including soft costs (20%) for each management zone is as follows:

Northshore West (2.36 acres):	2,710 cubic yards	$113,820
Northshore East (2.81 acres):	3,230 cubic yards	$135,660
Southshore West (5.56 acres):	6,410 cubic yards	$269,220
Southshore East (5.38 acres):	6,220 cubic yards	$261,240

Mitigation costs are assumed to be $200,000 per acre of on-site (shoreline) FWM creation. The low range mitigation cost estimate assumes that all mitigation can be accomplished on the shoreline in non-native grassland areas. The larger number assumes that only 4 acres of shoreline mitigation is available and the remaining 1.56 acres of mitigation will be achieved using floating islands at a cost of $1,500,000 per acre.

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APPENDIX A

Summary Tables of Dry Weather Water Quality Monitoring Data for the Years 2009–2010 and 2010–2011

Carlsbad WMA 2010-2011 Wet Weather MS4 Summary

WMA	Carlsbad Watershed Management Area																											
HA	Loma Alta (904.10)		Buena Vista Creek (904.20)				Agua Hedionda (904.30)				Encinas (904.40)		San Marcos (904.50)									Escondido Creek (904.60)						
Subwatershed	Loma Alta (904.10)	LAC-TWAS-J Summary	El Salto (904.21)	Vista (904.22)	BVC-TWAS1 Summary	Los Monos (904.31)	Buena (904.32)	AHC-MLS Summary	Encinas (904.40)	ESC-MLS Summary	Batiquitos (904.51)	Richland (904.52)	Twin Oaks (904.53)	SM-TWAS-1a Summary	San Elijo (904.61)	Escondido (904.62)	Lake Wohlford (904.63)	ESC-MLS Summary										
Parameter	NA	NA	n	% > Criteria	NA	NA	n	% > Criteria	NA	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	NA	NA	NA	NA				
pH	NA	NA	1*	0%	NA	NA	1*	0%	NA	1*	0%	1*	0%	1*	0%	2	0%	1*	0%	3	0%	NA	NA	NA	NA				
Nitrate as N	NA	NA	1*	0%	NA	NA	1*	0%	NA	1*	0%	1*	0%	1*	0%	2	0%	1*	0%	3	0%	NA	NA	NA	NA				
Nitrate/Nitrite as N	NA	NA	1*	0%	NA	NA	1*	0%	NA	1*	0%	1*	0%	1*	0%	2	0%	1*	0%	3	0%	NA	NA	NA	NA				
Nitrite as N	NA	NA	1*	0%	NA	NA	1*	0%	NA	1*	0%	1*	0%	1*	0%	2	0%	1*	0%	3	0%	NA	NA	NA	NA				
Phosphorus, Total	NA	NA	1*	0%	NA	NA	1*	0%	NA	1*	0%	1*	0%	1*	0%	2	0%	1*	0%	3	0%	NA	NA	NA	NA				
Total Dissolved Phosphorus	NA	NA	0	NA	NA	NA	0	NA	NA	1*	0%	0	NA	0	NA	0	NA	0	NA	0	NA	NA	NA	NA	NA				
Total Suspended Solids	NA	NA	1*	0%	NA	NA	1*	0%	NA	1*	0%	1*	0%	1*	0%	2	0%	1*	100%	3	33%	NA	NA	NA	NA				
Total Dissolved Solids	NA	NA	1*	0%	NA	NA	1*	0%	NA	1*	0%	0	NA	1*	100%	2	0%	1*	0%	3	0%	NA	NA	NA	NA				
Fecal Coliform	NA	NA	1*	100%	NA	NA	1*	100%	NA	1*	100%	1*	100%	1*	100%	2	100%	1*	100%	3	100%	NA	NA	NA	NA				
Additonal Analytes																												
Ammonia as N							1*	0%		1*	0%																	
BOD							1*	0%		1*	0%																	
COD							1*	0%		1*	0%																	
Turbidity							1*	100%		1*	100%																	
Chloride							1*	0%		1*	0%																	
Sulfate							1*	0%		1*	0%																	
Antimony (Sb), Dissolved							1*	0%		1*	0%																	
Arsenic (As), Dissolved							1*	0%		1*	0%																	
Cadmium (Cd), Dissolved							1*	0%		1*	0%																	
Chromium (Cr), Dissolved							1*	0%		1*	0%																	
Copper (Cu), Dissolved							1*	100%		1*	100%																	
Lead (Pb), Dissolved							1*	0%		1*	0%																	
Nickel (Ni), Dissolved							1*	0%		1*	0%																	
Zinc (Zn), Dissolved							1*	100%		1*	100%																	
Selenium (Se), Total							1*	0%		1*	0%																	
Chlorpyrifos							1*	0%		1*	0%																	
Diazinon							1*	0%		1*	0%																	
Malathion							1*	0%		1*	0%																	
MBAS							1*	0%		1*	0%																	
Oil & Grease							1*	0%		1*	0%																	

*One station was used in the summary

Carlsbad WMA 2010-2011 MS4 Random Wet Weather

Analyte	Units	Water Quality Benchmarks	Benchmark References	MS4W-CAR-03 378SWOUTL 10/6/2010	MS4W-CAR-04 1D-20 10/19/2010	MS4W-CAR-06 35B-56 2/16/2011	MS4W-CAR-12 OUT019 2/19/2011	MS4W-CAR-15 11188 11/8/2010	MS4W-CAR-17 11443 2/26/2011
Physical Chemistry									
Conductivity	µmhos/cm	NA	NA	1,220	153.8	1,163	64.8	335	354
pH	pH units	6.5-9.0	1. Basin Plan	7.79	7.95	8.48	8.26	7.99	7.62
Water Temperature	Celsius	NA	NA	20.5	19.2	17.1	12.7	18.3	11.7
General Chemistry									
Nitrate as N	mg/L	10	1. Basin Plan	5.37	0.23	2.68	0.36	2.45	7.02
Nitrate/Nitrite as N	mg/L	10	1. Basin Plan	5.44	0.26	2.84	0.38	2.59	7.11
Nitrite as N	mg/L	1	1. Basin Plan	0.07	<0.05	0.16	<0.05	0.14 H	0.09
Total Kjeldahl Nitrogen	mg/L	NA	NA	3	1.6	3.2	2.3	2.6	2.2
Total Nitrogen	mg/L	NA	NA	8.4	1.9	6	2.7	5.2	9.3
Total Phosphorus	mg/L	2	4. MSGP 2000	0.43	0.26	0.36	0.3	0.62	0.41
Total Dissolved Solids (calculated)[1]	mg/L	500 (a)	1. Basin Plan	**854**	108	814	45	235	248
Total Suspended Solids	mg/L	100	4. MSGP 2000	28	27	84	62	50	**139**
Bacteriological									
Enterococcus	MPN/100 mL	NA	NA	110,000	50,000	17,000	170,000	70,000	80,000
Fecal Coliform	MPN/100 mL	400/4000	1. Basin Plan (REC-1/REC-2)	**110,000**	**30,000**	**23,000**	**50,000**	**170,000**	**3,000**
Total Coliform	MPN/100 mL	NA	NA	900,000	80,000	900,000	170,000	900,000	17,000

< - results are less than the reporting limit.

[1]Total dissolved solids was calculated by multiplying the conductivity by a factor of 0.4 (TDS=Conductivity x 0.7) per SM1030F.

(a) Water Quality Benchmark for total dissolved solids is based on the San digeo Regional Water Quality Control Plan by watershed for the San Diego Region (Basin Plan), 1994 (with ammendments effective prior to April 25, 2007). Benchmark applies to hydrologic areas 904.2, 904.3, 904.5, 904.6.

H - Sample received and or/analyzed past the recommended holding time.

NA - No criteria or published value was available or applicable to the matrix or program.

Sources

Please refer to the San Diego County Copermittee Regional Monitoring Program Benchmark Sources for benchmark source citations

Carlsbad WMA 2010-2011 MS4 Targeted Wet Weather

Analyte	Units	Water Quality Benchmarks	Benchmark References	MS4T-CAR-1-RISE 2/16/2011	MS4T-CAR-1-PEAK 2/16/2011	MS4T-CAR-1-FALL 2/16/2011	EMC 2/16/2011
Physical Chemistry							
Electrical Conductivity	µmhos/cm	NA		108	60	114	103
pH	pH units	6.5-9.0	1. Basin Plan	7.91	8.1	7.83	7.92
Water Temperature	Celsius	NA		14.1	14.1	14.3	14.13
Bacteriological							
Enterococcus	MPN/100 mL	NA		8,000	17,000	13,000	9,708
Fecal Coliform	MPN/100 mL	400	1.Basin Plan REC-1/REC-2	1,300	2,300	5,000	1,915
Total Coliform	MPN/100 mL	NA		50,000	11,115	130,000	56,376
General Chemistry							
Ammonia as N	mg/L	(a)	6. USEPA Water Quality Criteria (Freshwater)	0.24	0.23	0.21	0.23
Biochemical Oxygen Demand	mg/L	30	4. MSGP 2000, 8. McNeeley (1979)	15	4.8	5.4	12.53
Chemical Oxygen Demand	mg/L	120	4. MSGP 2000	36	86	26	40.37
Chloride	mg/L	250 (b)	1. Basin Plan	3.3	5	4.5	3.66
Dissolved Phosphorus	mg/L	2	4. MSGP 2000	0.14	0.09	0.11	0.13
Nitrate as N	mg/L	10	1. Basin Plan	0.43H	0.35	0.39	0.42
Nitrate/Nitrite as N	mg/L	10	1. Basin Plan	0.51	0.41	0.45	0.49
Nitrite as N	mg/L	1	1. Basin Plan	0.078J H	0.064J	0.067J	0.07
Oil & Grease	mg/L	10	1. Basin Plan, 3. Anacostia River TMDL, 4. MSGP 2000	<2	<2	2.2J	1.16
Sulfate	mg/L	250 (c)	1. Basin Plan	4.5	4.2	6	4.67
Surfacants (MBAS)	mg/L	0.5	1. Basin Plan	0.22	0.57	0.26	0.27
Total Dissolved Solids	mg/L	500 (d)	1. Basin Plan	73	78	64	72
Total Hardness	mg $CaCO_3$/L	NA		21	24	20	21.21
Total Kjeldahl Nitrogen	mg/L	NA		0.83	1.1	0.56	0.82
Total Nitrogen	mg/L	NA		1.3	1.5	1	1.28
Total Phosphorus	mg/L	2	4. MSGP 2000	0.19	0.21	0.14	0.19
Total Suspended Solids	mg/L	100	4. MSGP 2000, 1. Basin Plan	19	94	6	25.83
Turbidity	NTU	20	1. Basin Plan	27H	43	12	26.80
Organophosphorus Pesticides							
Chlorpyrifos	µg/L	0.02 acute / 0.014 chronic	12. CA Dept. of Fish & Game, 2000	<0.0069	<0.0069	<0.0069	0.0035
Diazinon	µg/L	0.08 acute / 0.05 chronic	12. CA Dept. of Fish & Game, 2000, 11. Chollas Creek TMDL for Diazinon, 10. USEPA, Aquatic Life Ambient Water Quality Criteria Diazinon	0.0058J	<0.0052	<0.0052	0.0050
Malathion	µg/L	0.43	13. CA Dept. of Fish & Game, 1998, 5. Goldbook	<0.0076	<0.0076	<0.0076	0.0038
Total Metals							
Antimony, Total	mg/L	NA		0.00083	0.00087	0.00055	0.0008
Arsenic, Total	mg/L	NA		0.0021	0.0026	0.0023	0.0022
Cadmium, Total	mg/L	NA		0.00013	0.00023	0.000064J	0.0001
Chromium, Total	mg/L	NA		0.0015	0.003	0.00066	0.0016
Copper, Total	mg/L	NA		0.016	0.029	0.011	0.0168
Lead, Total	mg/L	NA		0.0016	0.0041	0.00055	0.0017
Manganese, Total	mg/L	NA		0.019	0.047	0.0083	0.0208
Nickel, Total	mg/L	NA		0.0022	0.0035	0.0013	0.0022
Selenium, Total	mg/L	0.005	16. 40 CFR 131.38	0.00016J	0.00018J	0.00015J	0.0002
Zinc, Total	mg/L	NA		0.077	0.17	0.039	0.0825
Dissolved Metals							
Antimony, Dissolved	mg/L	0.006	1. Basin Plan	0.00068	0.00056	0.00051	0.0006
Arsenic, Dissolved	mg/L	0.34 (e)	16. 40 CFR 131.38	0.002	0.0019	0.0023	0.0020
Cadmium, Dissolved	mg/L	(f)	16. 40 CFR 131.38	0.000071J	0.000088J	0.000046J	0.0001
Chromium, Dissolved	mg/L	(f)	16. 40 CFR 131.38	0.00049	0.00035	0.00044	0.0005
Copper, Dissolved	mg/L	(f)	16. 40 CFR 131.38	0.01	0.011	0.0093	0.0100
Lead, Dissolved	mg/L	(f)	16. 40 CFR 131.38	0.0002	0.00018J	0.00011J	0.0002
Nickel, Dissolved	mg/L	(f)	16. 40 CFR 131.38	0.0014	0.0014	0.0011	0.0014
Selenium, Dissolved	mg/L	NA		0.0001J	0.000098J	0.00014J	0.0001
Zinc, Dissolved	mg/L	(f)	16. 40 CFR 131.38	0.044	0.054	0.032	0.0435

<-Results less than the method detection limit.

NA indicate no criteria or published value was available or applicable to the matrix or program.

(a) Water Quality Benchmark is based on CMC (salmonids absent) using pH described in the USEPA, 1999 Update of Ambient Water Quality Criteria for Ammonia, EPA-822-R-99-014, December 1999.

(b) Water Quality Benchmark for chloride is based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego Region (Basin Plan), 1994 (with amendments effective prior to April 25, 2007).

(c) Water Quality Benchmark for sulfate is based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego Region (Basin Plan), 1994 (with amendments effective prior to April 25, 2007).

(d) Water Quality Benchmark for total dissolved solids is based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego Region (Basin Plan), 1994 (with amendments effective prior to April 25, 2007).

(e) Water Quality Benchmark for dissolved metal fractions are based on a default water effects ratios (WER) value of 1 and are calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000.

(f) Water Quality Benchmark for dissolved metal fractions are based on total hardness and are calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, May 18, 2000. The Criteria Maximum Concentration (CMC) was used.

H-Samples analyzed/and or received past recommended holding time.

J-Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.

Shaded text – exceeds water quality benchmark and the CMC water quality benchmarks for metals.

Sources

Please refer to the San Diego County Copermittee Regional Monitoring Program Benchmark Sources for benchmark source citations.

Carlsbad WMA 2010-2011 MS4 Random Dry Weather

Analyte	Units	Water Quality Benchmarks	Benchmark References	MS4D-CAR-02 B026 6/15/2011	MS4D-CAR-03 378SWOUTL 5/31/2011	MS4D-CAR-07 12491 6/15/2011	MS4D-CAR-13 825.0.1 6/15/2011	MS4D-CAR-15 11188 5/31/2011	MS4D-CAR-27 35B-55 6/20/2011
Physical Chemistry									
Conductivity	µmhos/cm	NA	NA	4,970	2,630	1,606	1,865	2,970	1,741
pH	pH units	6.5-9.0	1. Basin Plan	8.14	7.2	7.78	8.18	7.04	7.54
Temperature	Celsius	NA	NA	21.4	17	16.4	22.8	23.3	22
General Chemistry									
Nitrate as N	mg/L	10	1. Basin Plan	2.6	5.65	5.03	8.16	**11.7**	1.78
Nitrate/Nitrite as N	mg/L	10	1. Basin Plan	2.64	6.15	5.05	8.17	**11.7**	2.12
Nitrite as N	mg/L	1	1. Basin Plan	<0.05	0.49	<0.05	<0.05	<0.05	0.35
Total Kjeldahl Nitrogen	mg/L	NA	NA	4.4	2.1	3.7	1.8	<0.5	4.7
Total Nitrogen*	mg/L	1	1. Basin Plan	**7**	**8.3**	**8.8**	**10**	**11.7**	**6.8**
Total Phosphorus*	mg/L	0.1	4. MSGP 2000	**0.23**	**0.2**	**0.13**	**0.24**	**0.18**	**0.3**
Total Dissolved Solids (calculated)[1]	mg/L	500 (a)	1. Basin Plan	**3,479**	**1,841**	**1,124**	**1,306**	**2,079**	1,219
Total Suspended Solids	mg/L	58	4. MSGP 2000	**170**	<20	32	<20	<20	22
Bacteriological									
Enterococcus	MPN/100 mL	151	NA	**3,000**	**170**	**700**	**800**	40	**30,000**
Fecal Coliform	MPN/100 mL	400/4,000	1. Basin Plan (REC-1/REC-2)	130	20	230	**500**	<20	1,700
Total Coliform	MPN/100 mL	NA	NA	3,000	7,000	3,000	3,000	700	300,000

< - results are less than the reporting limit.

*Total Nitrogen and Total Phosphorus are narrative standards in the Basin Plan based on biostimulatory response to nutrients.

[1]Total dissolved solids was calculated by multiplying the conductivity by a factor of 0.4 (TDS=Conductivity x 0.7) per SM1030F.

(a) Water Quality Benchmark for total dissolved solids is based on the San digeo Regional Water Quality Control Plan by watershed for the San Diego Region (Basin Plan), 1994 (with ammendments effective prior to April 25, 2007). Benchmark applies to hydrologic areas 904.2, 904.3, 904.5, 904.6.

NA - No criteria or published value was available or applicable to the matrix or program.

Sources

Please refer to the San Diego County Copermittee Regional Monitoring Program Benchmark Sources for benchmark source citations

Carlsbad WMA 2010-2011 MS4 Targeted Dry Weather

Analyte	Units	WQB CMC	WQB CCC	904.10 L009 6/22/2011	904.10 L027 6/22/2011	904.10 L111 6/22/2011	904.21 1C-21 6/15/2011	904.21 1D-20 6/14/2011	904.21 1D-21 6/15/2011	904.21 B002 6/22/2011	904.21 B002 6/23/2011	904.21 BV-1 5/16/2011	904.21 BV-4 5/16/2011	904.31 16C-61 6/14/2011	904.31 19C-1 6/16/2011	904.31 21C-14 6/16/2011	904.31 AH-17 7/12/2011
Electrical Conductivity	µS/cm	NA	NA	4,530	4,380	2,830	NS	NS	NS	3,530	NS	NS	NS	NS	NS	NS	NS
pH	pH units	NA	NA	8.55	7.96	7.73	NS	NS	NS	8.48	NS	NS	NS	NS	NS	NS	NS
Water Temperature	Celsius	NA	NA	19.75	19.75	20.82	NS	NS	NS	21.47	NS	NS	NS	NS	NS	NS	NS
Ammonia as N	mg/L	(a)	(a)	1.65	1.45	1.35	NS	NS	NS	1.15	NS	NS	NS	NS	NS	NS	NS
Nitrate as N	mg/L	10	NA	2.1	1.2	2.6	NS	NS	NS	6.8	NS	NS	NS	NS	NS	NS	NS
Nitrate/Nitrite as N	mg/L	10	NA	NS	NS	NS	0.86	5.55	7.88	NS	NS	0.23	0.93	NS	NS	7.25	1.56
Nitrite as N	mg/L	1	NA	0.02	<0.02	<0.02	NS	NS	NS	0.042	NS	NS	NS	NS	NS	NS	NS
Total Kjeldahl Nitrogen	mg/L	NA	NA	1.72	1.58	1.4	3.6	2.5	1.8	NS	1.2	4.2	3.8	NS	NS	2.4	40
Total Nitrogen (calculated)	mg/L	1	NA	3.84	2.79	4.01	4.5	8.1	9.7	NS	8.042	4.4	4.7	NS	NS	9.7	42
Dissolved Phosphorus	mg/L	0.1	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Orthophosphate as P	mg/L	NA	NA	0.13	0.1	0.05	NS	NS	NS	0.12	NS	NS	NS	NS	NS	NS	NS
Total Phosphorus	mg/L	0.1	NA	0.15	0.11	0.05	0.26	0.19	0.24	0.14	NS	0.39	0.22	NS	NS	0.17	0.249
Total Suspended Solids	mg/L	58	NA	NS	NS	NS	47	28	31	3.6	NS	3.6	7.2	15E	3E	18E	17.2
Total Dissolved Solids	mg/L	500 (b)	NA	3280	2550	1680	NS	NS	NS	2,240	NS	4,692	1,050	NS	4,670	NS	3,040
Turbidity	NTU	20	NA	<0.1	0.3	48.1	NS	NS	NS	5.7	NS	NS	NS	NS	NS	NS	NS
Salinity	%	NA	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Sulfate	mg/L	250 (d)	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	1,780	NS	759
Surfactants (MBAS)	mg/L	0.5	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dissolved Oxygen	mg/L	NA	NA	8.09	7.96	5.2	NS	NS	NS	15.6	NS	NS	NS	NS	NS	NS	NS
Oil and Grease	mg/L	10	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Enterococcus	MPN/100 mL	151	NA	6,590	680	55	5,000	170	1,300	5,880	NS	7,800	645	500	4,200	40	2,800
Fecal Coliform	MPN/100 mL	400/4,000	NA	110,000	1,700	130	1,700	500	3,000	30,000	NS	3,500	930	8,000	3,000	40	8,600
Total Coliform	MPN/100 mL	NA	NA	500,000	22,000	9,000	80,000	13,000	13,000	50,000	NS	5,100	4,900	17,000	130,000	11,000	19,950
Chlorpyrifos	µg/L	0.02	0.014	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Diazinon	µg/L	0.08	0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Malathion	µg/L	0.43	0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Total Hardness	mg $CaCO_3$/L	NA	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	2,310	NS	NS
Manganese, Total	mg/L	NA	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.077	NS	0.009
Selenium, Total	mg/L	0.005	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.01	NS	0.006
Manganese, Dissolved	mg/L	NA	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Selenium, Dissolved	mg/L	NA	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Cadmium, Dissolved	mg/L	(e)	(e)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Copper, Dissolved	mg/L	(e)	(e)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Lead, Dissolved	mg/L	(e)	(e)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Zinc, Dissolved	mg/L	(e)	(e)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

<-Results less than the reporting limit.

E indicates estimated result.

NA indicates no criteria or published value was available or applicable to the matrix or program.

NS indicates no sample taken.

(a) Water Quality Benchmark is based on CMC (salmonids absent) and CCC (early life stages present) using water temperature and pH described in the U.S. EPA, 1999 Update of Ambient Water Quality Criteria for Ammonia, EPA-822-R-99-014, December 1999.

(b) Water Quality Benchmark (WQB) for Total Dissolved Solids is based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego region (Basin Plan), 1994 (with amendments affective prior to April 25, 2007). (Note: Loma Alta, 904.10 does not have a TDS WQB).

(d) Water Quality Benchmark for Sulfate is based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego region (Basin Plan), 1994 (with amendments affective prior to April 25, 2007).

(e) Water Quality Benchmark for dissolved metal fractions are based on total hardness and are calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, Mat 18, 2000. The Criteria Maximum Concentration (CMC) was used.

Carlsbad WMA 2010-2011 MS4 Targeted Dry Weather

Analyte	Units	WQB CMC	WQB CCC	904.31 AH-21 7/12/2011	904.32 CAR05 6/23/2011	904.51 A-10 7/11/2011	904.51 ENC-10 8/3/2011	904.51 LCS-1 7/6/2011	904.52 B-02 7/11/2011	904.52 C-05A 7/11/2011	904.52 CAR13 6/24/2011	904.52 CAR17 7/22/2011	904.52 CAR21 7/20/2011	904.53 B-04 7/11/2011	904.61 CAR09 6/21/2011	904.61 CAR18 7/22/2011	904.61 CAR19 7/22/2011	904.61 CBS-2 7/6/2011
Electrical Conductivity	µS/cm	NA	NA	NS	NS	NS	3,480	3,670	NS	NS	NS	NS	NS	NS	NS	NS	NS	5,280
pH	pH units	NA	NA	NS	NS	NS	7.74	7.14	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.28
Water Temperature	Celsius	NA	NA	NS	NS	NS	22.93	23.96	NS	NS	NS	NS	NS	NS	NS	NS	NS	33.57
Ammonia as N	mg/L	(a)	(a)	NS	0.07E	NS	NS	NS	NS	NS	0.2	0.12	0.23	NS	0.18	0.43	0.72	NS
Nitrate as N	mg/L	10	NA	NS	12.3	NS	NS	NS	NS	NS	0.06	0.5	0.14	NS	0.04E	1.19	0.33	NS
Nitrate/Nitrite as N	mg/L	10	NA	0.142	NS	0.13	NS	1.69	1.71	1.65	NS	NS	NS	9.19	NS	NS	NS	1.46
Nitrite as N	mg/L	1	NA	NS	<0.05	NS	NS	NS	NS	NS	0.01E	<0.05	<0.05	NS	<0.05	0.11	0.01E	NS
Total Kjeldahl Nitrogen	mg/L	NA	NA	46	<0.5	3.5	NS	2.9	0.7	2.6	0.8	1.7	13.2	2.7	2.8	3.1	3.3	2.2
Total Nitrogen (calculated)	mg/L	1	NA	46.1	0.6	3.6	NS	4.59	2.4	4.3	0.9	2.2	13.3	11.9	2.8	4.4	3.6	3.66
Dissolved Phosphorus	mg/L	0.1	NA	NS	0.19	NS	NS	NS	NS	NS	0.18	<0.05	0.46		0.11	0.44	0.09	NS
Orthophosphate as P	mg/L	NA	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Total Phosphorus	mg/L	0.1	NA	0.129	0.23	0.22	1.2	0.17	0.16	0.02E	0.19	0.04E	0.54	0.56	0.12	0.56	0.28	0.078
Total Suspended Solids	mg/L	58	NA	4.8	3E	NS	NS	NS	NS	NS	<20	5E	19E		11E	4E	95	6
Total Dissolved Solids	mg/L	500 (b)	NA	1,010	1320	660	1,266	1,930	1,260	973	1710	2160	1,020	1,210	5390	2290	479	3,719
Turbidity	NTU	20	NA	NS	NS	NS	6.5	12.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	9.4
Salinity	%	NA	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Sulfate	mg/L	250 (d)	NA	353	339	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	356	126	NS
Surfactants (MBAS)	mg/L	0.5	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dissolved Oxygen	mg/L	NA	NA	NS	NS	NS	8.4	4.07	NS	NS	NS	NS	NS	NS	NS	NS	NS	7.46
Oil and Grease	mg/L	10	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Enterococcus	MPN/100 mL	151	NA	4,900	800	29,000	3,500	40	1,400	180	160,000	220	70	10,000	110	50,000	<20	750
Fecal Coliform	MPN/100 mL	400/4,000	NA	18,450	700	4,900	4,000	1,280	460	330	5,000	1,400	28,000	17,000	20	23,000	<2	340
Total Coliform	MPN/100 mL	NA	NA	25,250	23,000	79,000	43,000	2,850	49,000	2,300	300,000	17,000	28,000	350,000	3,000	80,000	<2	650
Chlorpyrifos	µg/L	0.02	0.014	NS	<0.01	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Diazinon	µg/L	0.08	0.05	NS	<0.01	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Malathion	µg/L	0.43	0.1	NS	<0.01	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Total Hardness	mg $CaCO_3$/L	NA	NA	NS	774	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	831	235	NS
Manganese, Total	mg/L	NA	NA	0.123	0.038	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.241	0.884	NS
Selenium, Total	mg/L	0.005	NA	<0.005	0.0008E	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.002	0.0006E	NS
Manganese, Dissolved	mg/L	NA	NA	NS	0.008	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.208	0.016	NS
Selenium, Dissolved	mg/L	NA	NA	NS	0.0008E	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.002	0.0006E	NS
Cadmium, Dissolved	mg/L	(e)	(e)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Copper, Dissolved	mg/L	(e)	(e)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Lead, Dissolved	mg/L	(e)	(e)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Zinc, Dissolved	mg/L	(e)	(e)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

<-Results less than the reporting limit.

E indicates estimated result.

NA indicates no criteria or published value was available or applicable to the matrix or program.

NS indicates no sample taken.

(a) Water Quality Benchmark is based on CMC (salmonids absent) and CCC (early life stages present) using water temperature and pH described in the U.S. EPA, 1999 Update of Ambient Water Quality Criteria for Ammonia, EPA-822-R-99-014, December 1999.

(b) Water Quality Benchmark (WQB) for Total Dissolved Solids is based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego region (Basin Plan), 1994 (with amendments affective prior to April 25, 2007). (Note: Loma Alta, 904.10 does not have a TDS WQB).

(d) Water Quality Benchmark for Sulfate is based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego region (Basin Plan), 1994 (with amendments affective prior to April 25, 2007).

(e) Water Quality Benchmark for dissolved metal fractions are based on total hardness and are calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, Mat 18, 2000. The Criteria Maximum Concentration (CMC) was used.

Carlsbad WMA 2010-2011 MS4 Targeted Dry Weather

Analyte	Units	WQB CMC	WQB CCC	904.61 ESC-1 7/6/2011	904.62 818.0.0 6/8/2011	904.62 820.0.1 6/7/2011	904.62 825.0.2 6/7/2011	904.62 826.0.1 6/7/2011	904.62 843.2.0 6/7/2011	904.62 863.0.0 6/8/2011	904.62 CAR02 6/22/2011	904.62 CAR08 6/23/2011	904.62 CAR15 6/23/2011	904.62 CAR20 7/22/2011	904.62 CAR22 8/2/2011
Electrical Conductivity	µS/cm	NA	NA	3,060	1,840	2,080	2,660	2,250	2,240	2,050	NS	NS	NS	NS	NS
pH	pH units	NA	NA	7.98	8.09	6.81	7.22	7.25	7.35	7.47	NS	NS	NS	NS	NS
Water Temperature	Celsius	NA	NA	24.55	28.43	25.67	23.37	22.25	23.32	19.81	NS	NS	NS	NS	NS
Ammonia as N	mg/L	(a)	(a)	NS	0.3	0.17	<0.05	<0.05	0.23	0.25	0.1	0.13	0.08E	0.12	0.2
Nitrate as N	mg/L	10	NA	NS	2.2	7.5	23.8	11.5	4.4	7.6	7.05	7.37	0.6	3.03	7.78
Nitrate/Nitrite as N	mg/L	10	NA	0.31E	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Nitrite as N	mg/L	1	NA	NS	NS	NS	NS	NS	NS	NS	0.17	0.06	<0.05	0.02E	0.05
Total Kjeldahl Nitrogen	mg/L	NA	NA	<0.5	NS	NS	NS	NS	NS	NS	<0.5	1.5	0.6	1.9	1.4
Total Nitrogen (calculated)	mg/L	1	NA	0.31E	3.8	8.4	24.7	12.3	5.2	8.4	7.2	8.9	1.2	5	9.2
Dissolved Phosphorus	mg/L	0.1	NA	NS	NS	NS	NS	NS	NS	NS	0.08	0.07	0.06	0.34	0.07
Orthophosphate as P	mg/L	NA	NA	NS	0.05	0.15	0.21	0.14	0.1	0.21	NS	NS	NS	NS	NS
Total Phosphorus	mg/L	0.1	NA	0.091	<0.1	0.17	0.13	<0.1	<0.1	0.11	0.08	0.12	0.11	0.36	0.12
Total Suspended Solids	mg/L	58	NA	25.2	17.4	13.6	9.6	<1	8.6	<1	3E	<20	2E	107	1E
Total Dissolved Solids	mg/L	500 (b)	NA	2,115	1.23E	1.39E	1.78E	1.51E	1.5E	1.37E	1280	1620	1260	1,060	1,370
Turbidity	NTU	20	NA	3.8	6.7	22.9	4.6	0.8	18.7	2.4	NS	NS	NS	NS	NS
Salinity	%	NA	NA	NS	0.09	0.11	0.14	0.11	0.11	0.1	NS	NS	NS	NS	NS
Sulfate	mg/L	250 (d)	NA	465	350	318	610	385	377	342	308	448	269	363	380
Surfactants (MBAS)	mg/L	0.5	NA	NS	0.5	0.25	0.5	0.25	0.25	0.25	NS	NS	NS	NS	NS
Dissolved Oxygen	mg/L	NA	NA	7.93	2.51	1.61	1.45	0.84	1.92	2.98	NS	NS	NS	NS	NS
Oil and Grease	mg/L	10	NA	NS	≤5	≤5	≤5	≤5	≤5	≤5	NS	NS	NS	NS	NS
Enterococcus	MPN/100 mL	151	NA	300	206	160	197	425	388	1,330	800	1,700	300	8,000	3,000
Fecal Coliform	MPN/100 mL	400/4,000	NA	1,280	62	130	192	208	295	522	300	5,000	300	11,000	1,300
Total Coliform	MPN/100 mL	NA	NA	5,600	8,280	9,800	15,400	14,100	13,200	6,330	700	23,000	1,100	240,000	17,000
Chlorpyrifos	µg/L	0.02	0.014	NS	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NS	NS	NS	NS	NS
Diazinon	µg/L	0.08	0.05	NS	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NS	NS	NS	NS	NS
Malathion	µg/L	0.43	0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Total Hardness	mg $CaCO_3$/L	NA	NA		510	530	940	660	760	670	583	781	598	503	702
Manganese, Total	mg/L	NA	NA	0.03	<0.02	0.06	<0.02	<0.02	0.18	0.11	0.112	0.074	0.051	0.088	0.091
Selenium, Total	mg/L	0.005	NA	0.004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.002	0.0005E	<0.001	<0.001	0.0007E
Manganese, Dissolved	mg/L	NA	NA	NS	NS	NS	NS	NS	NS	NS	0.005	0.041	0.004E	0.002E	0.07
Selenium, Dissolved	mg/L	NA	NA	NS	NS	NS	NS	NS	NS	NS	0.002	<0.001	<0.001	<0.001	0.0007E
Cadmium, Dissolved	mg/L	(e)	(e)	NS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	NS	NS	NS	NS	NS
Copper, Dissolved	mg/L	(e)	(e)	NS	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NS	NS	NS	NS	NS
Lead, Dissolved	mg/L	(e)	(e)	NS	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	NS	NS	NS	NS	NS
Zinc, Dissolved	mg/L	(e)	(e)	NS	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NS	NS	NS	NS	NS

<-Results less than the reporting limit.

E indicates estimated result.

NA indicates no criteria or published value was available or applicable to the matrix or program.

NS indicates no sample taken.

(a) Water Quality Benchmark is based on CMC (salmonids absent) and CCC (early life stages present) using water temperature and pH described in the U.S. EPA, 1999 Update of Ambient Water Quality Criteria for Ammonia, EPA-822-R-99-014, December 1999.

(b) Water Quality Benchmark (WQB) for Total Dissolved Solids is based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego region (Basin Plan), 1994 (with amendments affective prior to April 25, 2007). (Note: Loma Alta, 904.10 does not have a TDS WQB).

(d) Water Quality Benchmark for Sulfate is based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego region (Basin Plan), 1994 (with amendments affective prior to April 25, 2007).

(e) Water Quality Benchmark for dissolved metal fractions are based on total hardness and are calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, Mat 18, 2000. The Criteria Maximum Concentration (CMC) was used.

Carlsbad WMA 2010-2011 Dry Weather MS4 Summary

WMA	Carlsbad Watershed Management Area																	
HA	Loma Alta (904.10)				Buena Vista Creek (904.20)					Agua Hedionda (904.30)					Encinas (904.40)			
Subwatershed	Loma Alta (904.10)		LAC-TWAS-I Summary		El Salto (904.21)		Vista (904.22)	BYC-TWAS-I Summary		Los Monos (904.31)		Buena (904.32)		AHC-MLS Summary		Encinas (904.40)		
Parameter	n	% > Criteria	n	% > Criteria	n	% > Criteria	NA	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	
pH	3	0%	3	0%	2	0%	NA	1*	0%	0	NA	0	NA	0	NA	1*	0%	
Nitrate as N	3	0%	3	0%	2	0%	NA	1*	0%	0	NA	1*	100%	1*	100%	1*	0%	
Nitrate/Nitrite as N	0	NA	0	NA	6	0%	NA	3	0%	3	0%	0	NA	2	0%	1*	0%	
Nitrite as N	3	0%	3	0%	2	0%	NA	1*	0%	0	NA	1*	0%	1*	0%	1*	0%	
Total Nitrogen (calculated)	3	100%	3	100%	7	100%	NA	3	100%	3	100%	1*	0%	3	67%	1*	100%	
Total Phosphorus	3	67%	3	67%	7	100%	NA	3	100%	3	100%	1*	100%	3	100%	1*	100%	
Total Dissolved Phosphorus	0	NA	0	NA	0	NA	NA	0	NA	0	NA	1*	100%	1*	100%	0	NA	
Total Suspended Solids	0	NA	0	NA	7	14%	NA	3	33%	5	0%	1*	0%	4	0%	1*	0%	
Total Dissolved Solids	0	NA	0	NA	4	100%	NA	3	100%	3	100%	1*	100%	4	100%	0	NA	
Fecal Coliform	3	33%	3	33%	7	85%	NA	3	66%	5	80%	1*	100%	4	100%	1*	0%	
Enterococcus	3	67%	3	67%	7	100%	NA	3	100%	5	80%	1*	100%	4	100%	1*	100%	
Ammonia-N	3	33%	3	33%	1*	100%	NA	0	NA	0	NA	0	NA	0	NA	0	NA	
Turbidity	3	33%	3	33%	1*	0%	NA	0	NA	0	NA	0	NA	0	NA	0	NA	
Chloride	0	NA	0	NA	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	
Sulfate	0	NA	0	NA	0	NA	NA	0	NA	3	100%	1*	100%	4	100%	0	NA	
Cadmium (Cd), Dissolved	0	NA	0	NA	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	
Copper (Cu), Dissolved	0	NA	0	NA	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	
Lead (Pb), Dissolved	0	NA	0	NA	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	
Zinc (Zn), Dissolved	0	NA	0	NA	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	
Selenium (Se), Total	0	NA	0	NA	0	NA	NA	0	NA	3	67%	1*	0%	4	50%	0	NA	
Chlorpyrifos	0	NA	0	NA	0	NA	NA	0	NA	0	NA	1*	0%	1*	0%	0	NA	
Diazinon	0	NA	0	NA	0	NA	NA	0	NA	0	NA	1*	0%	1*	0%	0	NA	
Malathion	0	NA	0	NA	0	NA	NA	0	NA	0	NA	1*	0%	1*	0%	0	NA	
MBAS	0	NA	0	NA	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	
Oil & Grease	0	NA	0	NA	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	
Dissolved Oxygen	3	0%	3	0%	1*	0%	NA	0	NA	0	NA	0	NA	0	NA	0	NA	

*One station was used in the summary

Carlsbad WMA 2010-2011 Dry Weather MS4 Summary

WMA	Carlsbad Watershed Management Area															
HA	San Marcos (904.50)								Escondido Creek (904.60)							
Subwatershed	Batiquitos (904.51)		Richland (904.52)		Twin Oaks (904.53)		SM-TWAS-1b Summary		San Elijo (904.61)		Escondido (904.62)		Lake Wohlford (904.63)		ESC-MLS Summary	
Parameter	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria
pH	3	0%	1*	0%	0	NA	1*	0%	2	50%	7	0%	1*	0%	9	0%
Nitrate as N	1*	0%	4	25%	0	NA	2	50%	3	0%	12	17%	1*	0%	13	15%
Nitrate/Nitrite as N	3	0%	3	33%	1*	0%	4	25%	2	0%	1*	0%	1*	0%	3	0%
Nitrite as N	1*	0%	4	0%	0	NA	2	0%	3	0%	6	0%	1*	0%	7	0%
Total Nitrogen (calculated)	3	100%	6	83%	1*	100%	5	100%	5	80%	12	100%	1*	100%	14	93%
Total Phosphorus	4	100%	6	67%	1*	100%	5	80%	5	60%	12	67%	1*	100%	14	64%
Total Dissolved Phosphorus	0	NA	3	67%	0	NA	1*	100%	3	67%	5	20%	0	NA	5	20%
Total Suspended Solids	1*	0%	4	0%	0	NA	2	0%	5	20%	12	8%	1*	0%	14	7%
Total Dissolved Solids	4	100%	6	100%	1*	100%	5	100%	5	80%	12	50%	1*	100%	14	57%
Fecal Coliform	4	75%	6	67%	1*	100%	5	60%	5	40%	12	42%	1*	0%	14	43%
Enterococcus	4	75%	6	67%	1*	100%	5	60%	5	60%	12	100%	1*	100%	14	100%
Ammonia-N	0	NA	0	NA	0	NA	0	NA	0	NA	6	0%	0	NA	6	0%
Turbidity	2	0%	0	NA	0	NA	0	NA	2	0%	6	17%	0	NA	7	14%
Chloride	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
Sulfate	0	NA	0	NA	0	NA	0	NA	3	67%	11	100%	0	NA	12	100%
Cadmium (Cd), Dissolved	0	NA	0	NA	0	NA	0	NA	0	NA	6	0%	0	NA	6	0%
Copper (Cu), Dissolved	0	NA	0	NA	0	NA	0	NA	0	NA	6	0%	0	NA	6	0%
Lead (Pb), Dissolved	0	NA	0	NA	0	NA	0	NA	0	NA	6	0%	0	NA	6	0%
Zinc (Zn), Dissolved	0	NA	0	NA	0	NA	0	NA	0	NA	6	0%	0	NA	6	0%
Selenium (Se), Total	0	NA	0	NA	0	NA	0	NA	3	0%	11	0%	0	NA	12	0%
Chlorpyrifos	0	NA	0	NA	0	NA	0	NA	0	NA	6	0%	0	NA	6	0%
Diazinon	0	NA	0	NA	0	NA	0	NA	0	NA	6	0%	0	NA	6	0%
Malathion	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA
MBAS	0	NA	0	NA	0	NA	0	NA	0	NA	6	0%	0	NA	6	0%
Oil & Grease	0	NA	0	NA	0	NA	0	NA	0	NA	6	0%	0	NA	6	0%
Dissolved Oxygen	2	50%	0	NA	0	NA	0	NA	2	0%	6	100%	0	NA	7	86%

*One station was used in the summary

Carlsbad WMA 2010-2011 Wet Weather MS4 Summary

WMA	Carlsbad Watershed Management Area																											
HA	Loma Alta (904.10)		Buena Vista Creek (904.20)				Agua Hedionda (904.30)					Encinas (904.40)		San Marcos (904.50)								Escondido Creek (904.60)						
Subwatershed	Loma Alta (904.10)	LAC-TWAS-I Summary	El Salto (904.21)		Vista (904.22)	BVC-TWAS-I Summary	Los Monos (904.31)		Buena (904.32)	AHC-MLS Summary		Encinas (904.40)		Batiquitos (904.51)		Richland (904.52)		Twin Oaks (904.53)		SM-TWAS-I e Summary		San Elijo (904.61)	Escondido (904.62)	Lake Wohlford (904.63)	ESC-MLS Summary			
Parameter	NA	NA	n	% > Criteria	NA	NA	n	% > Criteria	NA	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	NA	NA	NA	NA			
pH	NA	NA	1*	0%	NA	NA	1*	0%	NA	1*	0%	1*	0%	1*	0%	2	0%	1*	0%	3	0%	NA	NA	NA	NA			
Nitrate as N	NA	NA	1*	0%	NA	NA	1*	0%	NA	1*	0%	1*	0%	1*	0%	2	0%	1*	0%	3	0%	NA	NA	NA	NA			
Nitrate/Nitrite as N	NA	NA	1*	0%	NA	NA	1*	0%	NA	1*	0%	1*	0%	1*	0%	2	0%	1*	0%	3	0%	NA	NA	NA	NA			
Nitrite as N	NA	NA	1*	0%	NA	NA	1*	0%	NA	1*	0%	1*	0%	1*	0%	2	0%	1*	0%	3	0%	NA	NA	NA	NA			
Phosphorus, Total	NA	NA	1*	0%	NA	NA	1*	0%	NA	1*	0%	1*	0%	1*	0%	2	0%	1*	0%	3	0%	NA	NA	NA	NA			
Total Dissolved Phosphorus	NA	NA	0	NA	NA	NA	0	NA	NA	1*	0%	0	NA	0	NA	0	NA	0	NA	0	NA	NA	NA	NA	NA			
Total Suspended Solids	NA	NA	1*	0%	NA	NA	1*	0%	NA	1*	0%	1*	0%	1*	0%	2	0%	1*	100%	3	33%	NA	NA	NA	NA			
Total Dissolved Solids	NA	NA	1*	0%	NA	NA	1*	0%	NA	1*	0%	0	NA	1*	100%	2	0%	1*	0%	3	0%	NA	NA	NA	NA			
Fecal Coliform	NA	NA	1*	100%	NA	NA	1*	100%	NA	1*	100%	1*	100%	1*	100%	2	100%	1*	100%	3	100%	NA	NA	NA	NA			
Additonal Analytes																												
Ammonia as N							1*	0%		1*	0%																	
BOD							1*	0%		1*	0%																	
COD							1*	0%		1*	0%																	
Turbidity							1*	100%		1*	100%																	
Chloride							1*	0%		1*	0%																	
Sulfate							1*	0%		1*	0%																	
Antimony (Sb), Dissolved							1*	0%		1*	0%																	
Arsenic (As), Dissolved							1*	0%		1*	0%																	
Cadmium (Cd), Dissolved							1*	0%		1*	0%																	
Chromium (Cr), Dissolved							1*	0%		1*	0%																	
Copper (Cu), Dissolved							1*	100%		1*	100%																	
Lead (Pb), Dissolved							1*	0%		1*	0%																	
Nickel (Ni), Dissolved							1*	0%		1*	0%																	
Zinc (Zn), Dissolved							1*	100%		1*	100%																	
Selenium (Se), Total							1*	0%		1*	0%																	
Chlorpyrifos							1*	0%		1*	0%																	
Diazinon							1*	0%		1*	0%																	
Malathion							1*	0%		1*	0%																	
MBAS							1*	0%		1*	0%																	
Oil & Grease							1*	0%		1*	0%																	

*One station was used in the summary

Carlsbad WMA 2010-2011 Dry Weather Assessment
Analytical Data for ESC-MLS

Category Group	Analyte	Units	Water Quality Benchmarks	Benchmark References	ESC-MLS 09/21/10-09/22/10	ESC-MLS 05/11/11-05/12/11	2010-2011 Exceedances	Historical Mean Ratio to Benchmarks	Historical Frequency Above Benchmarks
General/Physical/Organic									
NA	Electrical Conductivity	µmhos/cm	NA		2,610	2,510	-	-	-
CHEM-Conventional	Oil and Grease	mg/L	10	1. Basin Plan, 3. Anacostia River TMDL	<5	<5	0%	NA[1]	0%
CHEM-Conventional	pH	pH units	6.5-9.0	1. Basin Plan	8.02	7.69	0%	NA[1]	0%
NA	Water Temperature	Celcius	NA		19.2	17.2	-	-	-
Bacteriological									
BACT-Enterococci	Enterococcus	MPN/100 mL	151 (a)	1. Basin Plan	130	**230**	50%	NA[1]	100%
BACT-Fecal Coliform	Fecal Coliform	MPN/100 mL	400	1.Basin Plan REC-1/REC-2	230	20	0%	NA[1]	0%
BACT-Total Coliform	Total Coliform	MPN/100 mL	NA		1,400	700	-	-	-
Wet Chemistry									
CHEM-Conventional	Ammonia as N	mg/L	(b)	6. USEPA Water Quality Criteria (Freshwater)	<0.1	0.1	0%	NA[1]	0%
CHEM-Conventional	Biochemical Oxygen Demand	mg/L	10	8. McNeeley (1979)	2.5	1.1J	0%	NA[1]	0%
CHEM-Conventional	Chemical Oxygen Demand	mg/L	120	4. MSGP 2000	20	18	0%	NA[1]	0%
CHEM-Conventional	Nitrite as N	mg/L	1	1. Basin Plan	<0.1	0.026J	0%	NA[1]	0%
CHEM-Conventional	Surfactants (MBAS)	mg/L	0.5	1. Basin Plan	0.021J	0.066	0%	NA[1]	0%
CHEM-Conventional	Total Suspended Solids	mg/L	58	14. NSQD, 1. Basin Plan	4	3	0%	NA[1]	0%
CHEM-Conventional	Turbidity	NTU	20	1. Basin Plan	1.2	3.2	0%	NA[1]	0%
NA	Dissolved Organic Carbon	mg/L	NA		3.6	3.2	-	-	-
NA	Total Kjeldahl Nitrogen	mg/L	NA		0.44	0.4	-	-	-
NA	Total Organic Carbon	mg/L	NA		3.5	3.2	-	-	-
NUTR-Nitrate as N	Nitrate as N	mg/L	10	1. Basin Plan	1.4	0.14	0%	NA[1]	0%
NUTR-Total Nitrogen	Total Nitrogen (calculated)	mg/L	1	1. Basin Plan	**1.84**	0.566	50%	NA[1]	100%
NUTR-Total/Dissolved Phosphorus	Dissolved Phosphorus	mg/L	0.1	1. Basin Plan	**0.11**	0.042	50%	NA[1]	0%
NUTR-Total/Dissolved Phosphorus	Total Phosphorus	mg/L	0.1	1. Basin Plan	**0.13**	0.088	50%	NA[1]	50%
TDS-Total Dissolved Solids	Total Dissolved Solids	mg/L	500 (c)	1. Basin Plan	**1,700**	**2,200**	100%	NA[1]	100%
Pesticides									
CHEM-Pesticides	Chlorpyrifos	µg/L	0.02 acute / 0.014 chronic	12. CA Dept. of Fish & Game, 2000	<0.01	<0.01	0%	NA[1]	0%
CHEM-Pesticides	Diazinon	µg/L	0.08 acute / 0.05 chronic	12. CA Dept. of Fish & Game, 2000, 11. Chollas Creek TMDL for Diazinon, 10. USEPA, Aquatic Life Ambient Water Quality Criteria Diazinon	<0.01	<0.01	0%	NA[1]	0%
CHEM-Pesticides	Malathion	µg/L	0.43 acute / 0.1 chronic	13. CA Dept. of Fish & Game, 1998, 5. Goldbook	<0.01	<0.01	0%	NA[1]	0%
Hardness									
NA	Total Hardness	mg $CaCO_3$/L	NA		680	890	-	-	-
Total Metals									
NA	Antimony	mg/L	0.006	1. Basin Plan	0.00019J	0.00005J	0%	NA[1]	0%
NA	Arsenic	mg/L	0.05	1. Basin Plan	0.00081	0.0019	0%	NA[1]	0%
NA	Cadmium	mg/L	0.005	1. Basin Plan	0.000092J	0.00002J	0%	NA[1]	0%
NA	Chromium	mg/L	0.05	1. Basin Plan	0.00036	0.00008J	0%	NA[1]	0%
NA	Copper	mg/L	1	1. Basin Plan	0.0026	0.00031J	0%	NA[1]	0%
NA	Lead	mg/L	NA		0.00028	0.00008J	-	-	-
NA	Nickel	mg/L	0.1	1. Basin Plan	0.0029	0.0011	0%	NA[1]	0%
CHEM-Metals	Selenium	mg/L	0.005	16. 40 CFR 131.38	0.0012	0.00018J	0%	NA[1]	0%
NA	Zinc	mg/L	5.0	1. Basin Plan	0.0028J	0.0018J	0%	NA[1]	0%
Dissolved Metals									
CHEM-Metals	Antimony	mg/L	0.006	1. Basin Plan	0.00018J	0.00005J	0%	NA[1]	0%
CHEM-Metals	Arsenic	mg/L	0.34 acute / 0.15 chronic	16. 40 CFR 131.38	0.00076	0.0015	0%	NA[1]	0%
CHEM-Metals	Cadmium	mg/L	(d)	16. 40 CFR 131.38	0.000042J	0.00002J	0%	NA[1]	0%
CHEM-Metals	Chromium	mg/L	(d)	16. 40 CFR 131.38	0.000083J	0.00002J	0%	NA[1]	0%
CHEM-Metals	Copper	mg/L	(d)	16. 40 CFR 131.38	0.0021	0.00007J	0%	NA[1]	0%
CHEM-Metals	Lead	mg/L	(d)	16. 40 CFR 131.38	<0.0002	0.00003J	0%	NA[1]	0%
CHEM-Metals	Nickel	mg/L	(d)	16. 40 CFR 131.38	0.0026	0.001	0%	NA[1]	0%
NA	Selenium	mg/L	NA		0.0011	0.00022J	-	-	-
CHEM-Metals	Zinc	mg/L	(d)	16. 40 CFR 131.38	0.0021J	0.0032J	0%	NA[1]	0%

NA indicate no criteria or published value was available or applicable to the matrix or program.

(a) Water Quality Benchmark for Enterococci is based on the maximum criteria for infrequently used freshwater area by the San Diego Regional Water Quality Control Plan for the San Diego Region (Basin Plan), 1994 (with amendments effective prior to April 25, 2007).

(b) Water Quality Benchmark is based on CMC (salmonids absent) and CCC (early life stages present) using water temperature and pH described in the U.S. EPA, 1999 Update of Ambient Water Quality Criteria for Ammonia, EPA-822-R-99-014, December 1999.

(c) Water Quality Benchmark for total dissolved solids is based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego Region (Basin Plan), 1994 (with amendments effective prior to April 25, 2007).

(d) Water Quality Benchmark for dissolved metal fractions are based on total hardness and are calculated as described by the USEPA Federal Register Doc 40 CFR Part 131, may 18, 2000. The Criteria Maximum Concentration (CMC) and Continuous Criteria Concentration (CCC) were used.

J-Analyte was detected at a concentration below the reporting limit and above the method detection limit. Reported value is estimated.

NA[1]Three or more years of data required to calculate the Historical Mean Ratio To Benchmarks.

(-) Unable to calculate because there is no criteria or published value available for the analyte.

Shaded text = exceeds water quality benchmark.

Sources

Please refer to the San Diego County Copermittee Regional Monitoring Program Benchmark Sources for benchmark source citations.

Carlsbad WMA Dry Weather MS4 Summary

WMA	Carlsbad Watershed Management Area																													
HA	Loma Alta (904.1)		Buena Vista Creek (904.2)			Agua Hedionda (904.3)				AHCMLS Summary		Encinas (904.4)		San Marcos (904.5)						Escondido Creek (904.6)								EC-MLS Summary	
Subwatershed	Loma Alta (904.10)		El Salto (904.21)		Vista (904.22)	Los Monos (904.31)		Buena (904.32)				Encinas (904.40)		Batiquitos (904.51)		Richland (904.52)		Twin Oaks m (904.53)		San Elijo (904.61)		Escondido (904.62)		Lake Wohlford (904.63)					
Parameter	n	% > Criteria	n	% > Criteria	NA	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	NA	n	% > Criteria			
pH	3	0%	1*	0%	NA	0	NA	0	NA	0	NA	2	0%	2	0%	1*	0%	0	NA	4	25%	5	0%	NA	5	0%			
Nitrate as N	3	0%	1*	100%	NA	0	NA	2	50%	2	50%	2	0%	0	NA	2	0%	0	NA	3	0%	8	13%	NA	8	13%			
Nitrate/Nitrite as N	0	NA	5	0%	NA	3	0%	0	NA	0	NA	2	0%	1*	0%	3	0%	1*	0%	2	0%	0	NA	NA	0	NA			
Nitrite as N	3	0%	1*	0%	NA	0	NA	2	0%	2	0%	2	0%	0	NA	2	0%	0	NA	3	0%	3	0%	NA	3	0%			
Total Nitrogen (calculated)	3	67%	6	67%	NA	3	67%	2	100%	4	75%	2	100%	3	100%	4	100%	1*	100%	5	80%	8	88%	NA	9	78%			
Total Phosphorus	3	100%	6	100%	NA	3	33%	2	100%	2	100%	2	100%	3	100%	4	100%	1*	100%	5	40%	8	63%	NA	8	63%			
Total Suspended Solids	0	NA	6	0%	NA	5	0%	2	0%	3	0%	2	50%	0	NA	2	0%	0	NA	5	20%	8	0%	NA	8	0%			
Total Dissolved Solids	0	NA	3	100%	NA	3	100%	2	100%	3	100%	0	NA	3	100%	4	100%	1*	100%	5	100%	8	100%	NA	8	100%			
Fecal Coliform	3	0%	6	75%	NA	5	60%	2	50%	3	67%	2	0%	3	100%	4	75%	1*	100%	5	60%	8	75%	NA	8	75%			
Enterococcus	3	67%	6	100%	NA	5	100%	2	50%	3	67%	2	100%	3	100%	4	50%	1*	100%	5	80%	8	88%	NA	8	88%			
Additional Analytes																														
Ammonia-N	3	0%	1*	0%	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	5	20%	NA	5	20%			
Turbidity	3	0%	1*	0%	NA	0	NA	0	NA	0	NA	0	NA	2	50%	0	NA	0	NA	2	0%	5	0%	NA	5	0%			
Sulfate	0	NA	0	NA	NA	3	100%	2	100%	3	100%	0	NA	0	NA	0	NA	0	NA	1*	100%	7	100%	NA	7	100%			
Cadmium(Cd),Dissolved	0	NA	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	5	0%	NA	5	0%			
Copper(Cu),Dissolved	0	NA	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	5	0%	NA	5	0%			
Lead(Pb),Dissolved	0	NA	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	5	0%	NA	5	0%			
Zinc(Zn),Dissolved	0	NA	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	5	0%	NA	5	0%			
Selenium(Se),Total	0	NA	0	NA	NA	3	33%	2	0%	3	33%	0	NA	0	NA	0	NA	0	NA	1*	0%	8	13%	NA	8	13%			
Chlorpyrifos	0	NA	0	NA	NA	0	NA	2	0%	2	0%	0	NA	0	NA	0	NA	0	NA	0	NA	5	0%	NA	5	0%			
Diazinon	0	NA	0	NA	NA	0	NA	2	0%	2	0%	0	NA	0	NA	0	NA	0	NA	0	NA	5	0%	NA	5	0%			
Malathion	0	NA	0	NA	NA	0	NA	2	0%	2	0%	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	NA	0	NA			
MBAS	0	NA	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	5	0%	NA	5	0%			
Oil & Grease	0	NA	0	NA	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	0	NA	5	0%	NA	5	0%			
Dissolved Oxygen	3	33%	1*	0%	NA	0	NA	0	NA	0	NA	0	NA	2	0%	0	NA	0	NA	2	0%	5	0%	NA	5	0%			

*one station was used in the summary

Carlsbad Watershed Management Area MS4 Random Dry Weather

Analyte	Units	Water Quality Benchmarks	Benchmark References	MS4D-CAR-05 37B-128 6/9/2010	MS4D-CAR-08 36A-25 6/9/2010	MS4D-CAR-09 447SWOUTL 6/9/2010	MS4D-CAR-11 11182 6/9/2010	MS4D-CAR-19 11248 6/9/2010
Physical Chemistry								
Conductivity	µS/cm	NA	NA	5,935	2,210	4,500	2,270	1,145
pH	pH Units	6.5-9.0	1. Basin Plan	7.09	7.12	7.5	8.56	7.45
Water Temperature	Celcius	NA	NA	16.7	17.6	18	21.7	17.9
General Chemistry								
Nitrate as N	mg/L	10	1. Basin Plan	0.06	0.52	1.1	5.8	0.39
Nitrate/Nitrite as N	mg/L	10	1. Basin Plan	0.09	0.56	1.14	5.8	0.4
Nitrite as N	mg/L	1	1. Basin Plan	<0.007	<0.007	<0.007	<0.007	<0.007
Phosphorus, Total*	mg/L	0.1	1. Basin Plan	**0.34**	**0.4**	**0.52**	**1.06**	<0.02
Total Kjeldahl Nitrogen	mg/L	NA	NA	3.2	1.4	1.8	2.2	1.2
Total Nitrogen*	mg/L	1	1. Basin Plan	**3.3**	**1.9**	**2.9**	**8**	**1.6**
Total Dissolved Solids (calculated)[1]	mg/L	500 (a)	1. Basin Plan	4,155	**1,547**	3,150	**1,589**	**802**
Total Suspended Solids	mg/L	58	14. NSQD	**116**	25	**167**	<1	<1
Bacteriological								
Enterococcus	MPN/100 mL	151	1. Basin Plan	**300**	**1,100**	**170,000**	**1,400**	**50,000**
Fecal Coliforms	MPN/100 mL	400/4,000	1. Basin Plan	110	500	**5,000**	**500**	**1,100**
Total Coliforms	MPN/100 mL	NA	1. Basin Plan	30,000	11,000	300,000	800	28,000

<-Results less than the method detection limit.

NA indicate no criteria or published value was available or applicable to the matrix or program.

*Total Nitrogen and Total Phosphorus are narrative standards in the Basin Plan based on biostimulatory responses to nutrients.

[1] Total dissolved solids was calculated by multiplying the conductivity by a factor of 0.7 (TDS=Conductivity x 0.7) per SM1030F.

(a) Water Quality Benchmark for total dissolved solids is based on the San Diego Regional Water Quality Control Plan by watershed for the San Diego Region (Basin Plan), 1994 (with amendments effective prior to April 25, 2007).

Sources

Please refer to the San Diego County Copermittee Regional Monitoring Program Benchmark Sources for benchmark source citations.

Carlsbad Watershed Management Area MS4 Targeted Dry Weather

Analyte	Unit	WQB CMC	WQB CCC	904.1 L009 5/13/2010	904.1 L027 5/12/2010	904.1 L111 5/24/2010	904.21 1C 21 6/29/2010	904.21 1D 20 6/29/2010	904.21 1D 21 6/29/2010	904.21 B002 5/24/2010	904.21 BV 1 7/15/2010	904.21 BV 4 7/20/2010	904.31 16C 61 6/29/2010	904.31 19C 1 6/30/2010	904.31 21C 14 6/30/2010	904.31 AH 17 7/13/2010	904.31 AH 21 7/13/2010
Conductivity	µS/cm	NA	NA	3,440	4,540	530	NS	NS	NS	3,760	NS	NS	NS	NS	NS	NS	NS
pH	pH Units	NA	NA	7.9	7.8	7.0	NS	NS	NS	7.9	NS	NS	NS	NS	NS	NS	NS
Temperature	Celcius	NA	NA	19.5	19.3	18.2	NS	NS	NS	16.6	NS	NS	NS	NS	NS	NS	NS
Ammonia as N	mg/L	(a)	NA	<0.1	<0.1	<0.1	NS	NS	NS	<0.1	NS	NS	NS	NS	NS	NS	NS
Nitrate as N	mg/L	10	NA	2.18	<0.05	0.60	NS	NS	NS	15.60	NS	NS	NS	NS	NS	NS	NS
Nitrate/Nitrite as N	mg/L	10	NA	NS	NS	NS	2.38	4.24	8.42	NS	0.39	0.22	NS	NS	6.55	1.18	0.22
Nitrite as N	mg/L	1	NA	<0.05	<0.05	<0.05	NS	NS	NS	<0.05	NS	NS	NS	NS	NS	NS	NS
Total Kjeldahl Nitrogen	mg/L	NA	NA	1.00	0.90	0.80	2.70	<0.5	0.60	<0.5	<1	<1	NS	NS	<0.5	<1	<1
Total Nitrogen (calculated)	mg/L	1.0	NA	3.2	0.9	1.4	5.1	4.2	9.0	15.6	<0.5	<0.5	NS	NS	6.6	1.2	<0.5
Orthophosphate as P	mg/L	NA	NA	0.10	0.42	0.19	NS	NS	NS	0.08	NS	NS	NS	NS	NS	NS	NS
Total Phosphorus	mg/L	0.10	NA	0.19	0.50	0.45	0.30	0.33	0.30	0.18	0.15	0.12	NS	NS	0.15	0.09	<0.05
Total Suspended Solids	mg/L	58	NA	NS	NS	NS	22	6E	1E	2	16	18	5E	2E	3E	5	2
Total Dissolved Solids	mg/L	500 (b)	NA	3,740	2,740	1,600	NS	NS	NS	2,530	4,218	1,172	NS	5,450	NS	1,422	2,356
Turbidity	NTU	20	NA	3.00	1.00	4.00	NS	NS	NS	2.00	NS	NS	NS	NS	NS	NS	NS
Salinity	%	NA	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Sulfate	mg/L	250 (d)	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	2,120.00	NS	365.00	1,044.00
MBAS	mg/L	0.5	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Dissolved Oxygen	mg/L	5	NA	8.40	10.20	4.90	NS	NS	NS	9.00	NS	NS	NS	NS	NS	NS	NS
Oil & Grease	mg/L	10	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Enterococcus	MPN/100 mL	151	NA	1,460	97	310	30,000	1,400	230	610	9,100	1,600	700	2,400	1,100	2,000	2,700
Fecal Coliform	MPN/100 mL	400/4,000	NA	1,100	300	20	3,000	700	800	270	1,600	1,800	20	2,200	40	2,100	4,000
Total Coliform	MPN/100 mL	NA	NA	23,000	5,000	700	30,000	5,000	23,000	11,000	11,600	8,200	2,300	50,000	8,000	7,600	8,800
Chlorpyrifos	µg/L	0.02	0.014	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Diazinon	µg/L	0.08	0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Malathion	µg/L	0.43	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Total Hardness	mg $CaCO_3$/L	NA	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Manganese, Total	µg/L	NA	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	49.00	NS	16.00	23.00
Selenium, Total	µg/L	5	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	11.00	NS	<5	<5
Cadmium, Dissolved	µg/L	(e)	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Copper, Dissolved	µg/L	(e)	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Lead, Dissolved	µg/L	(e)	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Zinc, Dissolved	µg/L	(e)	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

<-Results less than the method detection limit.
NA indicates no criteria or published value was available or applicable to the matrix or program.
NS indicates no sample taken.
(a) Water Quality Benchmark is based on CMC (Salmonids absent) using pH described in the USEPA, 1999 Update of Ambient Water Quality Criteria for Ammonia, EPA-822-R-99-014, December 1999.
(b) Water Quality Benchmark for Total Dissolved Solids is based on then San Diego
(d) Water Quality Benchmark for Sulfate is based on then San Diego Regional Water Quality Control Plan by watershed for the San Diego region (Basin Plan), 1994 (w/ amendments affective prior to April 25, 2007).
(e) Water Quality Benchmark for dissolved metal fractions are based on total hardness and are calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, Mat 18, 2000. The Criteria Maximum Concentration (CMC) was used.

Carlsbad Watershed Management Area MS4 Targeted Dry Weather

Analyte	Unit	WQB CMC	WQB CCC	904.32 CAR 05 6/21/2010	904.32 CAR 16 6/21/2010	904.51 A 10 7/12/2010	904.51 ENC 10 6/7/2010	904.51 LCS1 6/7/2010	904.52 B02 7/12/2010	904.52 C05A 7/12/2010	904.52 CAR13 6/21/2010	904.53 B04 7/12/2010	904.61 CAR09 6/21/2010	904.61 CBS2 6/7/2010	904.61 ESC1 6/7/2010	904.62 818.0.0 6/30/2010	904.62 820.0.1 6/30/2010
Conductivity	µS/cm	NA	NA	NS	NS	NS	3,130	2,380	NS	NS	NS	NS	NS	6,060	3,410	2,780	3,040
pH	pH Units	NA	NA	NS	NS	NS	7.9	7.7	NS	NS	NS	NS	NS	9.6	8.3	8.4	7.6
Temperature	Celcius	NA	NA	NS	NS	NS	22.5	22.2	NS	NS	NS	NS	NS	29.8	23.4	25.3	25.3
Ammonia as N	mg/L	(a)	NA	<0.1	<0.1	NS	NS	NS	NS	NS	1.53	NS	<0.1	NS	NS	0.71	0.59
Nitrate as N	mg/L	10	NA	12.20	<0.05	NS	NS	NS	NS	NS	1.44	NS	<0.05	NS	NS	2.40	7.00
Nitrate/Nitrite as N	mg/L	10	NA	NS	NS	1.63	NS	NS	3.41	2.31	NS	2.55	NS	NS	NS	NS	NS
Nitrite as N	mg/L	1	NA	<0.05	<0.05	NS	NS	NS	NS	NS	0.10	NS	<0.05	NS	NS	NS	NS
Total Kjeldahl Nitrogen	mg/L	NA	NA	0.90	1.40	1.10	NS	NS	1.30	1.40	2.20	2.70	1.40	NS	NS	NS	NS
Total Nitrogen (calculated)	mg/L	1.0	NA	13.1	1.4	2.7	3.1	2.6	4.7	3.7	3.7	5.3	1.4	4.4	<0.5	4.8	8.9
Orthophosphate as P	mg/L	NA	NA	0.27	0.57	NS	NS	NS	NS	NS	0.22	NS	0.32	NS	NS	<0.02	0.08
Total Phosphorus	mg/L	0.10	NA	0.31	0.59	0.60	0.10	0.11	0.25	0.22	0.23	0.92	0.37	0.04	0.09	0.05	0.15
Total Suspended Solids	mg/L	58	NA	<20	<20	NS	NS	NS	NS	NS	<20	NS	<20	5	2	16	10
Total Dissolved Solids	mg/L	500 (b)	NA	1,490	5,020	588	1,973	1,553	1,350	1,130	914	1,200	5,140	3,929	2,327	1,863	2,037
Turbidity	NTU	20	NA	NS	NS	NS	19.90	22.00	NS	NS	NS	NS	NS	1.50	1.60	19.60	16.60
Salinity	%	NA	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.14	0.16
Sulfate	mg/L	250 (d)	NA	320.00	950.00	NS	NS	NS	NS	NS	NS	NS	NS	NS	496.00	388.00	NS
MBAS	mg/L	0.5	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.50	0.25
Dissolved Oxygen	mg/L	5	NA	NS	NS	NS	8.08	7.77	NS	NS	NS	NS	NS	8.49	8.31	11.35	11.33
Oil & Grease	mg/L	10	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	<4.9	<4.9
Enterococcus	MPN/100 mL	151	NA	500	2	420	1,100	3,900	1,100	20	50	680	9	900	300	960	5,474
Fecal Coliform	MPN/100 mL	400/4,000	NA	1,300	40	1,300	950	5,600	2,300	80	50,000	3,500	20	9,950	200	1,414	4,138
Total Coliform	MPN/100 mL	NA	NA	5,000	3,000	50,000	7,600	5,300	80,000	1,400	240,000	500,000	2,300	14,000	1,900	387,000	24,200
Chlorpyrifos	µg/L	0.02	0.014	<0.01	<0.01	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	<0.05	<0.05
Diazinon	µg/L	0.08	0.05	<0.01	<0.01	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	<0.05	<0.05
Malathion	µg/L	0.43	NA	<0.01	<0.01	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Total Hardness	mg $CaCO_3$/L	NA	NA	728.00	2,520.00	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	471.00	523.00
Manganese, Total	µg/L	NA	NA	<300	<300	NS	NS	NS	NS	NS	NS	NS	NS	NS	23.00	20E	80.00
Selenium, Total	µg/L	5	NA	<100	<100	NS	NS	NS	NS	NS	NS	NS	NS	NS	5.00	<10	<10
Cadmium, Dissolved	µg/L	(e)	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	<5	<5
Copper, Dissolved	µg/L	(e)	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	<10	<10
Lead, Dissolved	µg/L	(e)	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	<5	<5
Zinc, Dissolved	µg/L	(e)	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	20.00	<20

<-Results less than the method detection limit.
NA indicates no criteria or published value was available or applicable to the matrix or program.
NS indicates no sample taken.
(a) Water Quality Benchmark is based on CMC (Salmonids absent) using pH described in the USEPA, 1999 Update of Ambient Water Quality Criteria for Ammonia, EPA-822-R-99-014, December 1999.
(b) Water Quality Benchmark for Total Dissolved Solids is based on then San Diego
(d) Water Quality Benchmark for Sulfate is based on then San Diego Regional Water Quality Control Plan by watershed for the San Diego region (Basin Plan), 1994 (w/ amendments affective prior to April 25, 2007).
(e) Water Quality Benchmark for dissolved metal fractions are based on total hardness and are calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, Mat 18, 2000. The Criteria Maximum Concentration (CMC) was used.

Carlsbad Watershed Management Area MS4 Targeted Dry Weather

Analyte	Unit	WQB CMC	WQB CCC	904.62 825.0.2 6/29/2010	904.62 826.0.1 6/29/2010	904.62 843.2.0 6/30/2010	904.62 CAR02 6/14/2010	904.62 CAR08 6/30/2010	904.62 CAR15 6/30/2010
Conductivity	µS/cm	NA	NA	2,050	2,600	3,190	NS	NS	NS
pH	pH Units	NA	NA	8.2	7.3	7.6	NS	NS	NS
Temperature	Celcius	NA	NA	21.4	24.5	24.9	NS	NS	NS
Ammonia as N	mg/L	(a)	NA	0.82	0.51	0.57	<0.1	<0.1	<0.1
Nitrate as N	mg/L	10	NA	14.00	8.80	7.00	6.19	2.14	<0.05
Nitrate/Nitrite as N	mg/L	10	NA	NS	NS	NS	NS	NS	NS
Nitrite as N	mg/L	1	NA	NS	NS	NS	0.10	<0.05	<0.05
Total Kjeldahl Nitrogen	mg/L	NA	NA	NS	NS	NS	0.50	<1	<1
Total Nitrogen (calculated)	mg/L	1.0	NA	15.6	10.6	8.6	6.8	2.1	<1
Orthophosphate as P	mg/L	NA	NA	0.27	0.08	0.07	0.12	0.10	0.25
Total Phosphorus	mg/L	0.10	NA	0.26	0.05	0.08	0.15	0.20	0.28
Total Suspended Solids	mg/L	58	NA	2	1	6	<20	<20	<20
Total Dissolved Solids	mg/L	500 (b)	NA	1,374	1,742	2,137	1,220	1,610	1,560
Turbidity	NTU	20	NA	0.10	1.00	10.80	NS	NS	NS
Salinity	%	NA	NA	0.15	0.14	0.17	NS	NS	NS
Sulfate	mg/L	250 (d)	NA	469.00	396.00	423.00	294.00	380.00	391.00
MBAS	mg/L	0.5	NA	0.50	0.25	0.25	NS	NS	NS
Dissolved Oxygen	mg/L	5	NA	10.21	10.23	12.72	NS	NS	NS
Oil & Grease	mg/L	10	NA	<4.9	<4.9	<4.9	NS	NS	NS
Enterococcus	MPN/100 mL	151	NA	909	8,160	1,180	17	800	3,000
Fecal Coliform	MPN/100 mL	400/4,000	NA	804	7,786	624	210	170	800
Total Coliform	MPN/100 mL	NA	NA	8,660	52,000	81,300	2,800	7,000	5,000
Chlorpyrifos	µg/L	0.02	0.014	<0.05	<0.05	<0.05	NS	NS	NS
Diazinon	µg/L	0.08	0.05	<0.05	<0.05	<0.05	NS	NS	NS
Malathion	µg/L	0.43	NA	NS	NS	NS	NS	NS	NS
Total Hardness	mg $CaCO_3$/L	NA	NA	598.00	669.00	682.00	474.00	981.00	541.00
Manganese, Total	µg/L	NA	NA	<20	<20	110.00	<30	132.00	<30
Selenium, Total	µg/L	5	NA	20.00	<10	<10	<10	<10	<10
Cadmium, Dissolved	µg/L	(e)	NA	<5	<5	<5	NS	NS	NS
Copper, Dissolved	µg/L	(e)	NA	<10	<10	<10	NS	NS	NS
Lead, Dissolved	µg/L	(e)	NA	<5	<5	<5	NS	NS	NS
Zinc, Dissolved	µg/L	(e)	NA	20.00	<20	<20	NS	NS	NS

<-Results less than the method detection limit.
NA indicates no criteria or published value was available or applicable to the matrix or program.
NS indicates no sample taken.
(a) Water Quality Benchmark is based on CMC (Salmonids absent) using pH described in the USEPA, 1999 Update of Ambient Water Quality Criteria for Ammonia, EPA-822-R-99-014, December 1999.
(b) Water Quality Benchmark for Total Dissolved Solids is based on then San Diego
(d) Water Quality Benchmark for Sulfate is based on then San Diego Regional Water Quality Control Plan by watershed for the San Diego region (Basin Plan), 1994 (w/ amendments affective prior to April 25, 2007).
(e) Water Quality Benchmark for dissolved metal fractions are based on total hardness and are calculated as described by the USEPA Federal Register Doc. 40 CFR Part 131, Mat 18, 2000. The Criteria Maximum Concentration (CMC) was used.

Carlsbad Watershed Management Area MS4 Random Wet Weather

Analyte	Units	Water Quality Benchmarks	Benchmark References	MS4W-CAR-03	MS4W-CAR-07	MS4W-CAR-09	MS4W-CAR-10	MS4W-CAR-11	MS4W-CAR-20	MS4W-SLR-14
				11447	11191	447SWOUTL	58	11182	2429SWOUTL	S124
				1/18/2010	12/7/2009	2/27/2010	2/20/2010	12/11/2009	2/5/2010	12/7/2009
Physical Chemistry										
Conductivity	µS/cm	NA	NA	3,150	178.6	3,590	320	1,054	183	145
pH	pH Units	6.5-9.0	1. Basin Plan	8.63	8.78	7.69	6.9	8.24	8.9	8.55
Water Temperature	Celcius	NA	NA	9.9	13.3	16.4	13.3	13.6	10.2	13.5
General Chemistry										
Nitrate as N	mg/L	10	1. Basin Plan	4.24	1.01	1.77	0.59	1.92	0.53	0.34
Nitrate/Nitrite as N	mg/L	10	1. Basin Plan	4.42	1.14	1.87	0.62	1.96	0.64	0.38
Nitrite as N	mg/L	1	1. Basin Plan	0.18	0.13	0.1	<0.007	<0.007	0.11	<0.007
Phosphorus, Total	mg/L	2	1. Basin Plan	1.82	0.29	0.32	0.27	0.25	0.76	<0.02
Total Kjeldahl Nitrogen	mg/L	NA	NA	0.7	21.1	2.2	<0.3	3.1	1.9	1.1
Total Nitrogen	mg/L	NA	NA	5.1	22.2	4.1	0.6	5.1	2.5	1.5
Total Suspended Solids	mg/L	100	4. MSGP 2000	**315**	57	24	91	<1	**276**	29
Total Dissolved Solids (calculated)[1]	mg/L	500*	1. Basin Plan	**2,205**	125	**2,513**	224	**738**	128	102
Bacterialogical										
Enterococcus	MPN/100 mL	NA	NA	≥160,000	90,000	50,000	50,000	2,200	24,000	30,000
Fecal Coliforms	MPN/100 mL	400-4,000	1. Basin Plan	**17,000**	**28,000**	**13,000**	**35,000**	230	82E	**5,000**
Total Coliforms	MPN/100 mL	NA	NA	300,000	170,000	58,948E	220,000	17,000	60,000	50,000

<-Results less than the method detection limit
E-Result calculated using Tomas Equation.
NA indicate no criteria or published value was available or applicable to the matrix or program.
*applies to hydrologic areas 904.2, 904.3, 904.5, 904.6
[1] Total dissolved solids was calculated by multiplying the conductivity by a factor of 0.7 (TDS=Conductivity x 0.7) per SM1030F.
Sources
Please refer to the San Diego County Copermittee Regional Monitoring Program Benchmark Sources for benchmark source citations

Carlsbad WMA Wet Weather MS4 Summary

WMA	Carlsbad Watershed Management Area																					
HA	Loma Alta (904.1)		Buena Vista Creek (904.2)		Agua Hedionda (904.3)			AHC-MLS Summary		Encinas (904.4)	San Marcos (904.5)					Escondido Creek (904.6)					EC-MLS Summary	
Subwatershed	Loma Alta (904.10)		El Salto (904.21)	Vista (904.22)	Los Monos (904.31)	Buena (904.32)				Encinas (904.40)	Batiquitos (904.51)	Richland (904.52)		Twin Oaks (904.53)		San Elijo (904.61)		Escondido (904.62)		Lake Wohlford (904.63)		
Parameter	n	% > Criteria	NA	NA	NA	n	% > Criteria	n	% > Criteria	NA	NA	n	% > Criteria	n	% > Criteria	n	% > Criteria	n	% > Criteria	NA	n	% > Criteria
pH	1*	0%	NA	NA	NA	1*	0%	1*	0%	NA	NA	1*	0%	1*	0%	2	0%	1*	0%	NA	1*	0%
Nitrate as N	1*	0%	NA	NA	NA	1*	0%	1*	0%	NA	NA	1*	0%	1*	0%	2	0%	1*	0%	NA	1*	0%
Nitrate/Nitrite as N	1*	0%	NA	NA	NA	1*	0%	1*	0%	NA	NA	1*	0%	1*	0%	2	0%	1*	0%	NA	1*	0%
Nitrite as N	1*	0%	NA	NA	NA	1*	0%	1*	0%	NA	NA	1*	0%	1*	0%	2	0%	1*	0%	NA	1*	0%
Phosphorus, Total	1*	0%	NA	NA	NA	1*	0%	1*	0%	NA	NA	1*	0%	1*	0%	2	0%	1*	0%	NA	1*	0%
Total Suspended Solids	1*	0%	NA	NA	NA	1*	0%	1*	0%	NA	NA	1*	0%	1*	100%	2	50%	1*	0%	NA	1*	0%
Total Dissolved Solids (estimated)	0	NA	NA	NA	NA	1*	0%	1*	0%	NA	NA	1*	100%	1*	100%	2	50%	1*	0%	NA	1*	0%
Fecal Coliforms	1*	100%	NA	NA	NA	1*	100%	1*	100%	NA	NA	1*	0%	1*	100%	2	50%	1*	100%	NA	1*	100%

*one station was used in the summary

APPENDIX B

Potential for Special-Status Species within the San Dieguito Reservoir Project Area

Appendix B
Potential for Special-Status Species within the San Dieguito Reservoir Project Area

Table B-1
Special-Status Plant Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/ State	CNPS	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range	Status on Site or Potential to Occur
Abronia maritima	red sand-verbena	None/ None	4.2	Coastal dunes; perennial herb/ February-November/ 0-330 ft.	Low potential to occur, no suitable habitat.
Acanthomintha ilicifolia	San Diego thorn-mint	FT/ SE	1B.1	Chaparral, coastal scrub, valley and foothill grassland, vernal pools; clay/ annual herb/ April-June/ 30-3150 ft.	Moderate potential to occur.
Adolphia californica	California adolphia	None/ None	2.1	Chaparral, coastal scrub, valley and foothill grassland; clay/ deciduous shrub/ December-May/ 150-2430 ft.	Approximately 10 individuals identified onsite, in uplands north of the reservoir.
Agave shawii	Shaw's agave	None/None	2.1	Coastal bluff scrub, coastal scrub; perennial leaf succulent/ September- May/ 30-250 ft.	Low potential to occur, limited suitable habitat, would likely have been previously detected.
Ambrosia pumila	San Diego ambrosia	FE/ None	1B.1	Chaparral, coastal scrub, valley and foothill grassland, vernal pools; often disturbed, sometimes alkaline/ rhizomatous herb/ May - October/ 60-1360 ft.	Moderate potential to occur.
Aphanisma blitoides	Aphanisma	None/ None	1B.2	Coastal bluff scrub, coastal dunes, coastal scrub; annual herb/ March- June/ <1000 ft.	Low potential to occur, limited suitable habitat.
Arctostaphylos glandulosa ssp. *crassifolia*	Del Mar manzanita	FE/ None	1B.1	Maritime chaparral; sandy/ evergreen shrub/ December-June/ < 1200 ft.	Low potential to occur, limited suitable habitat, would likely have been previously detected..
Arctostaphylos rainbowensis	Rainbow manzanita	None/None	1B.1	Chaparral; perennial evergreen shrub/ December- March/ 670-2200 ft.	Low potential to occur, no suitable habitat.
Artemisia palmeri	San Diego sagewort	None/ None	4.2	Chaparral, coastal scrub, riparian forest, scrub, and woodland; sandy, mesic/ deciduous shrub/ May-September/ 50-3000 ft.	Moderate potential to occur.

Table B-1
Special-Status Plant Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/ State	CNPS	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range	Status on Site or Potential to Occur
Asplenium vespertinum	Western spleenwort	None/None	4.2	Chaparral, cismontane woodland, coastal scrub; rocky/ perennial rhizomatous herb/ February- June/ 590- 3300 ft.	Low potential to occur, limited suitable habitat.
Astragalus tener var. *titi*	Coastal dunes milk-vetch	FE/ SE	1B.1	Coastal bluff scrub, coastal dunes, coastal prairie; mesic, often vernallly mesic/ annual herb/ March-May/ < 170 ft.	Low potential to occur, no suitable habitat.
Atriplex coulteri	Coulter's saltbush	None/ None	1B.2	Coastal bluff scrub, coastal dunes, coastal scrub, valley and foothill grassland; alkaline or clay/ perennial herb/ March-October/ 10-1500 ft.	Moderate potential to occur.
Atriplex pacifica	South Coast saltscale	None/ None	1B.2	Coastal bluff scrub, coastal dunes, coastal scrub, playas/ annual herb/ March-October/ < 500 ft.	Low potential to occur, limited suitable habitat.
Atriplex serenana var. *davidsonii*	Davidson's saltscale	None/ None	1B.2	Coastal bluff scrub, coastal scrub; alkaline/ annual herb/ April-October/ 30-650 ft.	Low potential to occur, limited suitable habitat.
Baccharis vanessae	Encinitas baccharis	FT/ SE	1B.1	Chaparral, cismontane woodland; sandstone/ deciduous shrub/ August-November/ 200-2400 ft.	Low potential to occur, no suitable habitat.
Berberis nevinii	Nevin's barberry	FE/SE	1B.1	Chaparral, cismontane woodland, coastal scrub, riparian scrub; sandy, gravelly/perennial evergreen shrub/ March- June/ 900-2700 ft.	Low potential to occur, limited suitable habitat, would likely have been previously detected.
Bergerocactus emoryi	Golden-spined cereus	None/None	2.2	Closed-cone coniferous forest, chaparral, coastal scrub; sandy/perennial stem succulent/ May-June/ 0-1300 ft.	Low potential to occur, no suitable habitat.
Bloomeria (=Muilla) clevelandii	San Diego goldenstar	None/ None	1B.1	Chaparral, coastal scrub, valley and foothill grassland, vernal pools; clay/ bulbiferous herb/ April-May/ 160-1550 ft.	Moderate potential to occur.

Table B-1
Special-Status Plant Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/ State	CNPS	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range	Status on Site or Potential to Occur
Brodiaea filifolia	Thread-leaved brodiaea	FT/ SE	1B.1	Chaparral (openings) cismontane woodland, coastal scrub, playas, valley and foothill grassland, vernal pools; often clay/ bulbiferous herb/ March-June/ 400-2800 ft.	Moderate potential to occur.
Brodiaea orcuttii	Orcutt's brodiaea	None/ None	1B.1	Closed-cone conifer forest, chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland, vernal pools; mesic, clay, sometimes serpentine/ bulbiferous herb/ May-July/ 100-5550 ft.	Moderate potential to occur.
Calandrinia breweri	Brewer's calandrina	None/None	4.2	Chaparral, coastal scrub; sandy, loamy, disturbed sites and burns/ annual herb/ March-June/ 30-4000 ft.	Low potential to occur, no suitable soils.
Camissonia lewisii	Lewis's evening primrose	None/ None	3	Coastal bluff scrub, cismontane woodland, coastal dunes, coastal scrub, valley and foothill grassland; sandy or clay/ annual herb/ March-May (June)/ <1000 ft.	Moderate potential to occur.
Ceanothus cyaneus	Lakeside ceanothus	None/None	1B.2	Closed-cone coniferous forest, chaparral; perennial evergreen shrub/ April-June/ 770-2500 ft.	Low potential to occur, no suitable habitat, would likely have been previously detected.
Ceanothus verrucosus	Wart-stemmed ceanothus	None/ None	2.2	Chaparral/ evergreen shrub/ December-May/ < 1250 ft.	Low potential to occur, no suitable habitat, would likely have been previously detected.
Centromadia (=Hemizonia) parryi spp. *australis*	Southern tarplant	None/ None	1B.1	Marshes and swamps (margins), valley and foothill grassland (vernally mesic), vernal pools/ annual herb/ May-November/ < 400 ft.	Moderate potential to occur.
Centromadia (=Hemizonia) pungens ssp. *laevis*	Smooth tarplant	None/ None	1B.1	Chenopod scrub, meadows and seeps, playas, riparian woodland, valley and foothill grassland; alkaline/ annual herb/ April-September/ <1580 ft.	Moderate potential to occur.

Table B-1
Special-Status Plant Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/ State	CNPS	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range	Status on Site or Potential to Occur
Chaenactis glabriuscula var. *orcuttiana*	Orcutt's pincushion	None/ None	1B.1	Coastal bluff scrub, coastal dunes/ annual herb/ January -August/ 10-330 ft.	Low potential to occur, no suitable habitat.
Chorizanthe orcuttiana	Orcutt's spineflower	FE/ SE	1B.1	Maritime chaparral, closed-cone conifer forest, coastal scrub/ annual herb/ March-May/ < 400 ft.	Low potential to occur, no suitable habitat.
Chorizanthe polygonoides var. *longispina*	Long-spined spineflower	None/ None	1B.2	Chaparral, coastal scrub, meadows and seeps, valley and foothill grassland; often clay/ annual herb/ April-July/ 100-5000 ft.	Moderate potential to occur.
Cistanthe maritima	Seaside cistanthe	None/None	4.2	Coastal bluff scrub, coastal scrub, valley and foothill grassland; sandy/ annual herb/ February- August/ 0-1000 ft.	Low potential to occur, no suitable soils.
Clarkia delicata	Delicate clarkia	None/ None	1B.2	Chaparral, cismontane woodland/ annual herb/ April-June/ 770-3300 ft.	Low potential to occur, no suitable habitat.
Comarostaphylis diversifolia ssp. diversifolia	Summer-holly	None/ None	1B.2	Chaparral, cismontane woodland/ evergreen shrub/ April-June/100-1800 ft.	Low potential to occur, no suitable habitat, would likely have been previously detected.
Convolvulus simulans	Small-flowered morning-glory	None/None	4.2	Chaparral (openings), coastal scrub, valley and foothill grassland; clay, serpentinite seeps/ annual herb/ March-July/ 100- 2300 ft.	Moderate potential to occur.
Corethrogyne filaginifolia var. *incana*	San Diego sand aster	None/ None	1B.1	Chaparral, coastal bluff scrub, coastal scrub/ perennial herb/ June-September/ 10-380 ft.	Moderate potential to occur.
Corethrogyne filaginifolia var. *linifolia*	Del Mar Mesa sand aster	None/ None	1B.1	Coastal bluff scrub, maritime chaparral (openings), coastal scrub; sandy/ perennial herb/ May-September/ 10-380 ft.	Moderate potential to occur.
Deinandra paniculata	Paniculate tarplant	None/None	4.2	Coastal scrub, valley and foothill grassland, vernal pools; usually vernally mesic/ annual herb/ April- November/ 80-3100 ft.	Moderate potential to occur.
Dichondra occidentalis	Western dichondra	None/ None	4.2	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland; perennial rhizomatous herb/ January- July/ 160-1600 ft.	Moderate potential to occur.

Table B-1
Special-Status Plant Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/ State	CNPS	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range	Status on Site or Potential to Occur
Dudleya blochmaniae spp. *blochmaniae*	Blochman's dudleya	None/ None	1B.1	Chaparral, coastal bluff scrub, coastal scrub, valley and foothill grassland, rocky; often clay or serpentinite/ perennial herb/ April-June/ 15-1500 ft.	Moderate potential to occur.
Dudleya brevifolia	Short-leaved dudleya	None/ SE	1B.1	Maritime chaparral (openings), coastal scrub, Torrey sandstone/ perennial herb/ April/ 100-800 ft.	Low potential to occur, no suitable soils.
Dudleya variegata	Variegated dudleya	None/ None	1B.2	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland, vernal pools; clay/ perennial herb/ April-June/ < 1900 ft.	Moderate potential to occur.
Dudleya viscida	Sticky dudleya	None/ None	1B.2	Coastal bluff scrub, chaparral, coastal scrub; rocky/ perennial herb/ May-June/ 30-1800 ft.	Low potential to occur, no suitable soils.
Ericameria palmeri ssp. *palmeri*	Palmer's goldenbush	None/ None	1B.1	Chaparral, coastal scrub; perennial evergreen shrub/ July- November/ 100- 2000 ft.	Low potential to occur, likely would have been previously detected.
Eryngium aristulatum var. *hooveri*	Hoover's button-celery	None/None	1B.1	Vernal pools; annual/perennial herb/ July/ 0-150 ft.	Low potential to occur, no suitable habitat.
Eryngium aristulatum var. *parishii*	San Diego button-celery	FE/ SE	1B.1	Coastal scrub, valley and foothill grassland, vernal pools, mesic/annual-perennial herb/ April-June/ 60-2000 ft.	Low potential to occur, no suitable mesic conditions.
Erysimum ammophilum	Sand-loving wallflower	None/ None	1B.2	Maritime chaparral, coastal dunes, coastal scrub; sandy, openings/ perennial herb/ February-June/ <200 ft.	Low potential to occur, no suitable soils.
Euphorbia misera	Cliff spurge	None/ None	2.2	Coastal bluff scrub, coastal scrub, Mojavean desert scrub; rocky/ shrub/ December-August/ 30-1650 ft.	Low potential to occur, no suitable soils.
Ferocactus viridescens	San Diego barrel cactus	None/ None	2.1	Chaparral, coastal scrub, valley and foothill grassland, vernal pools/ perennial stem succulent/ May-June/ < 1500 ft.	Low potential to occur, likely would have been previously detected.

Table B-1
Special-Status Plant Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/ State	CNPS	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range	Status on Site or Potential to Occur
Geothallus tuberosus	Campbell's liverwort	None/None	1B.1	Coastal scrub, vernal pools; (mesic)/ ephemeral liverwort/ 30-2000 ft.	Low potential to occur, limited suitable mesic conditions.
Grindelia hallii	San Diego gumplant	None/None	1B.2	Chaparral, lower montane coniferous forest, meadows and seeps, valley and foothill grassland/ perennial herb/ July- October/ 600-5725 ft.	Moderate potential to occur.
Harpagonella palmeri	Palmer's grapplinghook	None/ None	4.2	Chaparral, coastal scrub, valley and foothill grassland; clay/ annual herb/ March-May/ 60-3100 ft.	Moderate potential to occur.
Hazardia orcuttii	Orcutt's hazardia	FC/ ST	1B.1	Maritime chaparral, coastal scrub; often clay/ evergreen shrub/ August-October/ 250-280 ft.	Low potential to occur, likely would have been previously detected.
Heterotheca sessiliflora ssp. *sessiliflora*	Beach goldenaster	None/ None	1B.1	Coastal dunes, coastal scrub, coastal chaparral/ annual herb/ July -November/ < 35 ft.	Low potential to occur, site is species above elevation range.
Holocarpha virgata ssp. *elongata*	Graceful tarplant	None/None	4.2	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland; annual herb/ May-November/ 200-3600 ft.	Moderate potential to occur.
Horkelia truncata	Ramona horkelia	None/ None	1B.3	Chaparral, cismontane woodland, clay, gabbroic/ perennial herb/ May-June/ 1300-4300 ft.	Low potential to occur, no suitable habitat, site is below species elevation range.
Isocoma menziesii var. *decumbens*	Decumbent goldenbush	None/ None	1B.2	Chaparral, coastal scrub (sandy, often disturbed areas)/ shrub/ April-November/ 30-450 ft.	Moderate potential to occur.
Iva hayesiana	San Diego marsh-elder	None/ None	2.2	Marshes and swamps, playas/ perennial herb/ April-November/ 30-1650 ft.	High potential to occur.

Table B-1
Special-Status Plant Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/ State	CNPS	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range	Status on Site or Potential to Occur
Juncus acutus spp. leopoldii	Southwestern spiny rush	None/ None	4.2	Coastal dunes(mesic), meadows and alkaline seeps, coastal saltwater marshes and swamps/ rhizomatous herb/ May-June/ <3000 ft.	Observed on site (~30 individuals) during surveys performed by M&A in the northwestern drainage of reservoir (1998).
Lasthenia glabrata ssp. *coulteri*	Coulter's goldfields	None/ None	1B.1	Saltwater marsh and swamps, playas, vernal pools/ annual herb/ February-June/ <4000 ft.	Moderate potential to occur.
Lepidium virginicum var. *robinsonii*	Robinson's pepper-grass	None/ None	1B.2	Chaparral, coastal scrub/ annual herb/ January-July/ < 2900 ft.	Moderate potential to occur.
Leptosyne (=*Coreopsis*) *maritima*	Sea dahlia	None/ None	2.2	Coastal bluff scrub, coastal scrub/ perennial herb/ March-May/ 15-500 ft.	Moderate potential to occur.
Lotus nuttallianus	Nuttall's lotus	None/ None	1B.1	Coastal dunes, coastal scrub; sandy/ annual herb/ March-June/ < 35 ft.	Low potential to occur, no suitable soils, site is above species elevation range.
Microseris douglasii ssp. platycarpha	Small-flower microseris	None/None	4.2	Cismontane woodland, coastal scrub, valley and foothill grassland, vernal pools; clay/annual herb/ March-May/ 50-3500 ft.	Moderate potential to occur.
Mimulus diffusus	Palomar monkeyflower	None/None	4.3	Chaparral, lower montane coniferous forest; sandy or gravelly/ annual herb/ April-June/ 4000-6000 ft.	Low potential to occur, no suitable habitat, site is below species elevation range.
Monardella hypoleuca ssp. *lanata*	Felt-leaved monardella	None/ None	1B.2	Chaparral, cismontane woodland/ rhizomatous herb/ June-August/ 1000-3600 ft.	Low potential to occur, no suitable habitat, site is below species elevation range.
Monardella viminea	Willowy monardella	FE/SE	1B.1	Chaparral, coastal scrub, riparian forest, riparian scrub, riparian woodland; alluvial ephemeral washes/ perennial herb/ June-August/ 160-740 ft.	Low potential to occur, no suitable habitat.

Table B-1
Special-Status Plant Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/ State	CNPS	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range	Status on Site or Potential to Occur
Myosurus minimus ssp. *apus*	Little mousetail	None/ None	3.1	Vernal pools, valley and foothill grassland; alkaline/ annual herb/ March-June/ 60-2100 ft.	Low potential to occur, no suitable habitat.
Nama stenocarpum	Mud nama	None/ None	2.2	Marshes and swamps, lake margins, riverbanks/ annual-perennial herb/ January-July/ 15-1650 ft.	Moderate potential to occur.
Navarretia fossalis	Spreading navarretia	FT/ None	1B.1	Chenopod scrub, shallow freshwater marshes and swamps, playas, vernal pools/ annual herb/ April-June/ 100-4300 ft.	Moderate potential to occur.
Nemacaulis denudata var. *denudata*	Coast woolly-heads	None/ None	1B.2	Coastal dunes/ annual herb/ April-September/ < 330 ft.	Low potential to occur, no suitable habitat.
Opuntia californica var. *californica*	Snake cholla	None/None	1B.1	Chaparral, coastal scrub; perennial stem succulent/ April-May/ 100-500 ft.	Low potential to occur, likely would have been previously detected.
Orcuttia californica	California Orcutt grass	FE/ SE	1B.1	Vernal pools/ annual herb/ April-August/ 50-2200 ft.	Low potential to occur, no suitable habitat.
Orobanche parishii ssp. *brachyloba*	Short-lobed broom-rape	None/ None	4.2	Coastal bluff scrub, coastal dunes, coastal scrub; sandy/ perennial herb parasitic/ April - October/ <1000 ft.	Moderate potential to occur.
Phacelia ramosissima var. *austrolitoralis*	South coast branching phacelia	None/None	3.2	Chaparral, coastal dunes, coastal scrub, marshes and swaps (coastal salt); sandy sometimes rocky/ perennial herb/ March-August/ 20-1000 ft.	Moderate potential to occur.
Pinus torreyana spp. *torreyana*	Torrey pine	None/ None	1B.2	Closed-cone conifer forest, chaparral; sandstone/ evergreen tree/ NA/ 250-550 ft.	Low potential to occur, no suitable habitat, likely would have been previously detected.
Piperia cooperi	Chaparral rein orchid	None/None	4.2	Chaparral, cismontane woodland, valley and foothill grassland; perennial herb/ March-June/ 50-5200 ft.	Moderate potential to occur.

Table B-1
Special-Status Plant Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/ State	CNPS	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range	Status on Site or Potential to Occur
Pogogyne abramsii	San Diego mesa mint	FE/SE	1B.1	Vernal pools; annual herb/ March-July/ 300-660 ft.	Low potential to occur, no suitable habitat.
Pogogyne nudiuscula	Otay Mesa mint	FE/SE	1B.1	Vernal pools; annual herb/ May-July/ 300-660 ft.	Low potential to occur, no suitable habitat.
Psilocarphus brevissimus var. *multiflorus*	Delta woolly-marbles	None/None	4.2	Vernal pools; annual herb/ May-June/ 32-1600 ft.	Low potential to occur, no suitable habitat.
Quercus dumosa	Nuttall's scrub oak	None/ None	1B.1	Chaparral, coastal scrub, closed-cone coniferous forest; sandy, clay loam/ evergreen shrub/ February-April/ 50-1300 ft.	Low potential to occur likely would have been previously detected.
Quercus engelmannii	Engelmann oak	None/ None	4.2	Chaparral, cismontane woodland, riparian woodland, valley and foothill grassland/ deciduous tree/ March -June/ 400-4250 ft.	Low potential to occur, likely would have been previously detected.
Senecio aphanactis	Chaparral ragwort	None/None	2.2	Chaparral, cismontane woodland, coastal scrub; sometimes alkaline/ annual herb/ January- April/ 50-2600 ft.	Moderate potential to occur.
Sphaerocarpos drewei	Bottle liverwort	None/None	1B.1	Chaparral, coastal scrub; openings, mesic/ ephemeral liverwort/ 300-2000 ft.	Moderate potential to occur.
Stemodia durantifolia	Purple stemodia	None/ None	2.1	Sonoran desert scrub; often mesic, sandy/ perennial herb / January -December/ 600-1000 ft.	Low potential to occur, no suitable habitat.
Suaeda esteroa	Estuary seablite	None/ None	1B.2	Coastal salt marshes and swamps/ perennial herb/ May-October (Jan)/ < 20 ft.	Low potential to occur, site is above species elevation range.
Tetracoccus dioicus	Parry's tetracoccus	None/ None	1B.2	Chaparral, coastal scrub/ deciduous shrub/ April-May/ 550-3300 ft.	Low potential to occur, no suitable soils, likely would have been previously detected.
Viguiera laciniata	San Diego County viguiera	None/None	4.2	Chaparral, coastal scrub; perennial shrub/ February-August/ 200-2500 ft.	Low potential to occur, likely would have been previously detected.

Table B-1
Special-Status Plant Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/ State	CNPS	Primary Habitat Associations/ Life Form/ Blooming Period/ Elevation Range	Status on Site or Potential to Occur
Xanthisma junceum	Rush-like bristleweed	None/None	4.3	Chaparral, coastal scrub; perennial herb/ June-January/ 800-3300 ft.	Moderate potential to occur.

Includes CNPS 9-quad search and CNDDB 1, 5-mile search.
Legend (Status updated October 2011)
Status
Federal
FE: Federally-listed as endangered
FT: Federally-listed as threatened
State
SE: State-listed as endangered
ST: State-listed as threatened
SR: State rare

Table 2
Special-Status Wildlife Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/ State/ Other	Primary Habitat Associations	Status on Site or Potential to Occur
Amphibians				
Spea [=*Scaphiopus*] *hammondi*	Western spadefoot	BLM / CSC	Most common in grasslands, coastal sage scrub near rain pools or vernal pools; riparian habitats	Low to moderate potential. Suitable soils and water is present, but the reservoir slope is steep, deep, and permanent so less potential for this species which relies on ephemeral and shallow bodies of water.
Reptiles				

Table 2

Special-Status Wildlife Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/ State/ Other	Primary Habitat Associations	Status on Site or Potential to Occur
Aspidoscelis hyperythra	Orange-throated whiptail	None/ CSC	Coastal sage scrub, chaparral, grassland, juniper and oak woodland	Moderate potential to occur based on habitat.
Aspidoscelis tigris stejnegeri	Coastal western whiptail	None/ None	Coastal sage scrub, chaparral	Moderate potential to occur based on habitat.
Charina [=*Lichanura*] *trivirgata*	Rosy boa	FS/ None	Rocky chaparral, coastal sage scrub, oak woodlands, desert and semi-desert scrub	Low potential to occur due to marginal habitat quality, isolated nature of habitat, and surrounding land uses.
Crotalus ruber ruber	Northern red-diamond rattlesnake	None/ CSC	Variety of shrub habitats where there is heavy brush, large rocks, or boulders	Low potential to occur based on marginal habitat quality and surrounding land uses.
Emys [=*Clemmys*] *marmorata*	Western pond turtle	FS, BLM/ CSC	Slow-moving permanent or intermittent streams, ponds, small lakes, reservoirs with emergent basking sites; adjacent uplands used during winter	Not observed on site during the turtle trap surveys performed in 1998 by Merkel & Associates. Low to moderate potential based on isolated nature of reservoir.
Phrynosoma coronatum (*blainvillei* population)	Coast (San Diego) horned lizard	BLM, FS/ CSC	Coastal sage scrub, annual grassland, chaparral, oak and riparian woodland, coniferous forest	Low potential due to marginal habitat quality, isolation of site, and surrounding land uses.
Salvadora hexalepis virgultea	Coast patch-nosed snake	None/ CSC	Chaparral, washes, sandy flats, rocky areas	Low potential due to marginal habitat quality, isolation of site, and surrounding land uses.
Thamnophis hammondii	Two-striped garter snake	BLM, FS/ CSC	Streams, creeks, pools, streams with rocky beds, ponds, lakes, vernal pools	Moderate potential based on habitat present.
Birds				
Aimophila ruficeps canescens	Southern California rufous-crowned sparrow	None / WL	Grass-covered hillsides, coastal sage scrub, chaparral with boulders and outcrops	Low potential due to poor habitat quality and extent.

Table 2

Special-Status Wildlife Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/ State/ Other	Primary Habitat Associations	Status on Site or Potential to Occur
Amphispiza belli bell (nesting)	Bell's sage sparrow	BCC / WL/ ABC	Coastal sage scrub and dry chaparral along coastal lowlands and inland valleys	Low potential due to poor habitat quality and extent.
Campylorhynchus brunneicapillus sandiegensis (San Diego & Orange Counties only)	Coastal cactus wren	BCC, FS/ CSC	Southern cactus scrub, maritime succulent scrub, cactus thickets in coastal sage scrub	No potential due to lack of suitable habitat.
Charadrius alexandrinus nivosus (nesting)	Western snowy plover (coastal population)	FT, BCC/ CSC/ ABC	Nests primarily on coastal beaches, in flat open areas, with sandy or saline substrates; less commonly in salt pans, dredged spoil disposal sites, dry salt ponds and levees.	No potential due to lack of suitable habitat.
Icteria virens (nesting)	Yellow-breasted chat	None / CSC	Dense, relatively wide riparian woodlands and thickets of willows, vine tangles and dense brush.	Observed on site (M&A 1998)
Laterallus jamaicensis coturniculus	California black rail	BCC/ ST, P/ ABC	Saline, brackish, and fresh emergent wetlands	Low potential due to poor habitat quality and rarity of species.
Nycticorax nycticorax (rookery site)	Black-crowned night heron	BLM/ None	Marshes, ponds, reservoirs, estuaries; nests in dense-foliaged trees and dense fresh or brackish emergent wetlands	Detected in southern portion of reservoir in freshwater marsh (Dudek 2012).
Passerculus sandwichensis beldingi	Belding's savannah sparrow	None/ SE	Saltmarsh, pickleweed	No potential due to lack of suitable habitat.
Polioptila californica californica	Coastal California gnatcatcher	FT/ CSC/ ABC	Coastal sage scrub, coastal sage scrub-chaparral mix, coastal sage scrub-grassland ecotone, riparian in late summer	Not observed during CAGN focused surveys in 2000 and 2002 (M&A). Low potential due to limited suitable habitat.
Rallus longirostris levipes	Light-footed clapper rail	FE/ SE, P/ ABC	Coastal saltmarsh	No potential due to lack of suitable habitat.

Table 2

Special-Status Wildlife Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/ State/ Other	Primary Habitat Associations	Status on Site or Potential to Occur
Speotyto cunicularia hypugaea	Burrowing owl	BLM, BCC/ CSC	Grassland, lowland scrub, agriculture, coastal dunes and other artificial open areas	Low potential. Few suitable burrows present. Should have observed during surveys of area.
Sternula [=*Sterna*] *antillarum browni* (nesting colony)	California least tern	FE/ SE, P/ ABC	Coastal waters, estuaries, large bays and harbors, mudflats; nests on sandy beaches	No potential due to lack of suitable habitat.
Mammals				
Chaetodipus californicus femoralis	Dulzura pocket mouse	None/ CSC	Coastal sage scrub, chaparral, riparian-scrub ecotone; more mesic areas	Low potential due to marginal habitat quality and historical isolation of site.
Chaetodipus fallax fallax	Northwestern San Diego pocket mouse	None/ CSC	Coastal sage scrub, grassland, sage scrub-grassland ecotones, sparse chaparral; rocky substrates, loams and sandy loams	Low potential due to marginal habitat quality and historical isolation of site.
Choeronycteris mexicana	Mexican long-tongued bat	None/ CSC/ WBWG	Desert and montane riparian, desert succulent scrub, desert scrub, and pinyon-juniper woodland. Roosts in caves, mines, and buildings.	Not expected. No suitable vegetation or roosting structures/microhabitat.
Eumops perotis californicus	Western mastiff bat	BLM/ CSC/ WBWG	Roosts in small colonies in cracks and small holes, seeming to prefer man-made structures	Moderate potential to forage over reservoir.
Lepus californicus bennettii	San Diego black-tailed jackrabbit	None/ CSC	Arid habitats with open ground; grasslands, coastal sage scrub, agriculture, disturbed areas, rangelands	Low potential to occur sue to small area and isolation. Should have been observed.
Myotis yumanensis	Yuma myotis	BLM/ None/ WBWG	Closely tied to open water which is used for foraging; open forests and woodlands are optimal habitat	Moderate potential to forage over reservoir.
Neotoma lepida intermedia	San Diego desert woodrat	None/ CSC	Coastal sage scrub, chaparral, pinyon-juniper woodland with rock outcrops, cactus thickets, dense undergrowth	Low potential due to lack of typical habitat. No middens observed.

Table 2

Special-Status Wildlife Species Detected or Potentially Occurring in Project Area

Scientific Name	Common Name	Status Federal/ State/ Other	Primary Habitat Associations	Status on Site or Potential to Occur
Nyctinomops femorosaccus	Pocketed free-tailed bat	None/ CSC/ WBWG	Rocky desert areas with high cliffs or rock outcrops	Low potential due to poor habitat quality.
Perognathus longimembris pacificus	Pacific pocket mouse	FE/ CSC	Grassland, coastal sage scrub with sandy soils; along immediate coast	No potential, due to poor habitat quality.
Invertebrates				
Danaus plexippus	Monarch butterfly	None/ None	Overwinters in eucalyptus groves	Observed on site during the general surveys performed in 1998. Site unlikely to support roosting colonies.
Tryonia imitator	Mimic tryonia (=California brackishwater snail)	None/ None	Coastal lagoons, estuaries and salt marshes	No potential due to lack of suitable habitat.

This list includes CNDDB 1-mile and 5-mile search.
The federal and state status of species primarily is based on the Special Animals List (July 2009), California Department of Fish and Game.

Federal Designations:

- BCC Fish and Wildlife Service: Birds of Conservation Concern
- BLM Bureau of Land Management Sensitive Species
- FC Candidate for federal listing as threatened or endangered
- (FD) Federally-delisted; monitored for five years
- FE Federally-listed Endangered
- FS Forest Service Region 5 Sensitive Species
- FT Federally-listed as Threatened
- PFT Proposed for listing as Federally Threatened

State Designations:

- CDF California Department of Forestry and Fire Protection Sensitive Species
- CSC California Species of Special Concern
- P California Department of Fish and Game Protected and Fully Protected Species
- SC Candidate for state listing as threatened or endangered
- (SD) State-delisted
- SE State-listed as Endangered
- ST State-listed as Threatened

	WL	California Department of Fish and Game Watch List
Other:		
	ABC	American Bird Conservancy: United States Watch List of Birds of Conservation Concern:
	WBWG	Western Bat Working Group High Priority species

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