CALIFORNIA AMERICAN WATER COMPANY

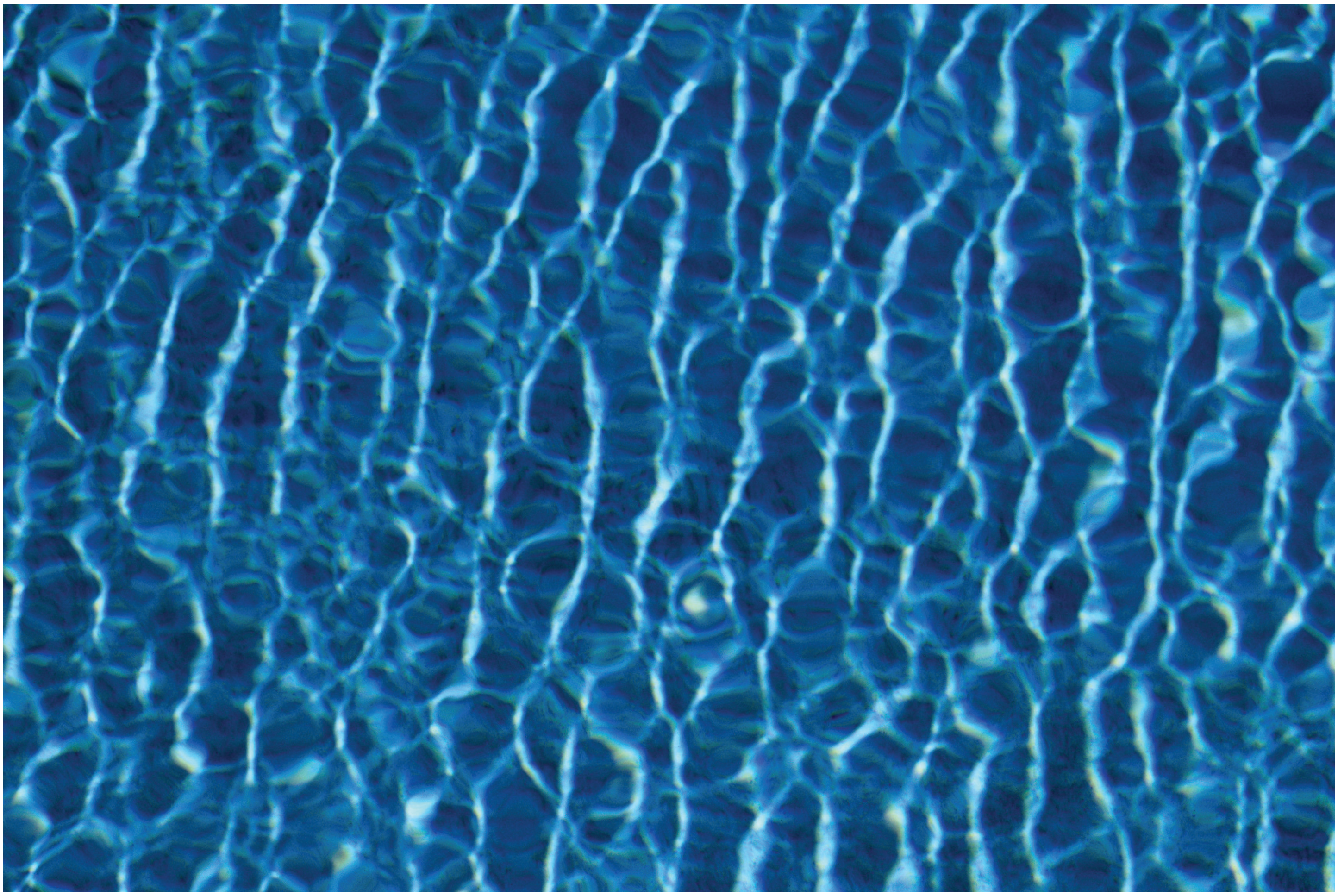
COASTAL WATER PROJECT

Final Environmental Impact Report
Volume 1 of 5

SCH No. 2006101004

Prepared for
California Public Utilities
Commission

October 30, 2009



PREFACE TO THE FINAL EIR

The California Public Utilities Commission (CPUC or Commission), as the CEQA Lead Agency, has prepared this Final Environmental Impact Report (Final EIR or FEIR) for the Coastal Water Project (CWP) in compliance with the California Environmental Quality Act (CEQA) and the CEQA Guidelines. The EIR is a public document for use by the CPUC, other governmental agencies, and the public in identifying and evaluating the potential environmental consequences of the CWP, identifying mitigation measures to lessen or eliminate adverse impacts, and examining feasible alternatives to the CWP. The CEQA Guidelines (Section 15132) specify the following:

A Final EIR shall consist of:

(a) The Draft Environmental Impact Report (Draft EIR or DEIR) or a revision of the draft;

(b) Comments and recommendations received on the Draft EIR, either verbatim or in summary;

(c) A list of persons, organizations, and public agencies commenting on the Draft EIR;

(d) The responses of the Lead Agency to significant environmental points raised in the review and consultation process; and

(e) Any other information added by the Lead Agency.

The Draft EIR, published on January 30, 2009, assessed the potential impacts of the CWP and alternatives. This document, the Final EIR, consists of the revised EIR (Volumes 1 through 3: Executive Summary, Chapters 1 through 10, and appendices), as well as a response-to-comments document (Volumes 4 and 5: Chapters 11 through 14).

Volumes 1 through 3 consist of the revised EIR, including the full text of the Draft EIR as modified in response to comments received. To assist the reader in identifying the revisions incorporated into the EIR, text changes use the following conventions:

- Text deleted from the EIR is shown in ~~strikethrough text~~.
- Text added to the EIR is shown in underline text.

Numerous revisions to the Draft EIR were made in response to the comments contained in Chapter 12 of this Final EIR and are explained and set forth in the responses to those comments in Chapters 13 and 14 of this Final EIR, as well as being reflected in the revised EIR (Volumes 1 through 3). Revisions have also been made to the EIR (primarily affecting Chapters 5 and 6 of the EIR) to reflect changes in the Regional Project alternative based upon a collaborative effort of CalAm, the Marina Coast Water District, and the Monterey County Water Resources Agency to further refine and develop this option. (Master Response 13.4, contained in Chapter 13 of this Final EIR, contains details on the changes to the Regional Project.) Additional revisions correct typographical errors discovered in the text of the EIR since publication or refine discussions and resolve internal inconsistencies. None of these additional, staff-initiated text changes alter or affect the conclusions reached by the Draft EIR as to the significance of environmental impacts. Furthermore, none of the revisions to the Draft EIR indicate that there are new or more severe environmental impacts than were evaluated and discussed in the Draft EIR, nor do they raise considerably different feasible mitigation measures or alternatives that are not expected to be embraced by the project proponent. The Draft EIR was a thorough and adequate document in the first instance; the revisions merely clarify or amplify the contents of the Draft EIR and make the document more readily applicable to the Regional Project as currently contemplated to be considered.

At this stage, as noted above, Volumes 1 through 3 are published with strike-through and underlined text so that readers can view the changes that have been made to the Draft EIR. However, given that the Final EIR is expected to be consulted and applied by numerous agencies in the future, once the Final EIR is certified Volumes 1 though 3 may be published without strike-through and underlined text so as to include only the final, adopted text of the document. Thereafter, the complete Final EIR (Volumes 1 through 5) would be simpler to consult and apply in a user-friendly manner.

Readers should be aware that the revised EIR does not retain the same pagination as was used in the Draft EIR. Efforts have been made, however, to retain the same section and subsection numbering whenever possible.

Volumes 4 and 5 consist of the response-to-comments document. They contain the comments received on the Draft EIR and the responses to those comments by CPUC staff and consultants. Volumes 4 and 5 are structured to be a continuation of the revised Draft EIR set forth in volumes 1 through 3, such that Volumes 1 through 5 comprise the Final EIR in its entirety. Volumes 4 and 5 contain the new Chapters 11 through 14, which include the following:

Chapter 11, Introduction to Response-to-Comments Document, describes the purpose and organization of the response-to-comments document.

Chapter 12, Comments, includes all comments submitted during the public review period. Comments are organized into the following categories:

- Federal government agency (F)
- State government agency (S)
- Local agency (L)
- Tribe (T)
- Affiliated group (G)

- Non-affiliated individual (NA)
- Form letter (Fo)
- Public meeting (PubMtg)

Each comment is assigned an alpha-numeric code (explained in detail in Chapter 12), which is shown in the margin next to the comment. Please see the table of contents for Chapter 12 for a list of the persons and organizations who submitted comments on the Draft EIR.

Chapter 13, Master Responses, includes sixteen long-format responses on important topics brought up during the public review period. These Master Responses are referred to as appropriate within the responses to individual comments set forth in Chapter 14.

Chapter 14, Individual Responses, includes the detailed responses to the comments set forth in Chapter 12. Individual responses are organized into the same categories as in Chapter 12. Each individual response is headed with the alpha-numeric code number of the comment to which it responds. Please see the table of contents for Chapter 14 for a list of the persons whose comments were responded to in this Final EIR.

The information contained in this FEIR will be reviewed, certified, and considered by the CPUC Commissioners prior to the ultimate decision to approve, deny, or modify the proposed project. It will also be used by other agencies as appropriate in considering aspects of the project within their jurisdictions.

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Coastal Water Project – List of Acronyms

AF	Acre feet
Afy or AFY	Acre-feet per year
ALJ	Administrative Law Judge
AMBAG	Association of Monterey Bay Area Governments
amsl	Above mean sea level
ASBS	Area of Special Biological Significance
ASR	Aquifer storage and recovery
AWTP	Advanced water treatment plant
BIRP	Begonia Iron Removal Plant
BLM	Bureau of Land Management
BMP	Best management practices
CAAQS	California Ambient Air Quality Standards
CAD	Computer Automated Design
Cal OSHA	California Division of Occupational Safety and Health
CalAm	California American Water Company (distribution center)
CalTrans	California Department of Transportation
CAWD	Carmel Area Wastewater District
CARB	California Air Resources Board
CCAA	California Clean Air Act
CCAMP	Central Coast Ambient Monitoring Program
CCC	California Coastal Commission
CCLEAN	Central Coast Long-term Environmental Assessment Network
CCoWS	Central Coast Watershed Studies
CCRWQCB	Central Coast Regional Water Quality Control Board
CCSD	Castroville Community Services District
CDFG	California Department of Fish and Game
CDO	Cease and Desist Order
CDHS	California Department of Health Services
CDPH	California Department of Public Health
CDPR	California Department of Parks and Recreation
CEC	California Energy Commission
CEQA	California Environmental Quality Act
cfs	Cubic feet per second
CGS	California Geological Survey
CHP	California Highway Patrol
CIP	Clean in place (for a membrane system)
CIWR	Center for Integrated Water Research
CNPS	California Native Plant Society
COCs	Contaminants of concern
Corps	United States Army Corps of Engineers (or USACE)
CPCN	Certificate of Public Convenience and Necessity
CPUC	California Public Utilities Commission
CRDRP	Carmel River Dam and Reservoir Project
CSIP	Castroville Seawater Intrusion Project
CSU	California State University
CTR	California Toxics Rule
CVFP	Carmel Valley Filter Plant
CWA	Clean Water Act

CWP	Coastal Water Project
dB	Decibels
dBA	A-weighted decibels
DBP	disinfection by-products
DEIR	Draft Environmental Impact Report
DRA	Division of Ratepayer Advocates
DTSC	California Department of Toxic Substances Control
DWPS	Desalinated Water Pump Station
DWR	Department of Water Resources
EDR	Environmental Data Resources
EFM	Enhanced flux maintenance
EIR	Environmental Impact Report
ESA	Endangered Species Act
ESF	Elkhorn Slough Foundation
ESNERR	Elkhorn Slough National Estuarine Research Reserve
ETo	Evapotranspiration
FEIR	Final Environmental Impact Report
FEMA	Federal Emergency Management Agency
FLEWR	Filter Loading Evaluation for Water Reuse
FOR A	Fort Ord Reuse Authority
ft	Feet
GAC	Granular Activated Carbon
GHG	Greenhouse gases
gpm	Gallons per minute
GRRP	Groundwater Recharge Reuse Project
GWUDI	Groundwater under the direct influence of surface water
HAA	haloacetic acid
HDD	Horizontal directional drilling
HDPE	High-density polyethylene
HP	Horsepower
Hwy 218	Canyon Del Rey Boulevard
ID	Internal diameter
KOP	Key Observation Point
kW	Kilowatt
kWh	Kilowatt-hour
lbs/yr	Pounds per year
LF	Linear feet
LOS	Level of Service
LSI	Langlier Saturation Index
LUP/LCP	Land Use Plan/Local Coastal Program
LUST	Leaking underground storage tank
MBNMS	Monterey Bay National Marine Sanctuary
MBUAPCD	Monterey Bay Unified Air Pollution Control District
MCEHD	Monterey County Health Department, Environmental Health Division
MCWD	Marina Coast Water District
MCWRA	Monterey County Water Resources Agency
MEC	Munitions and explosives of concern
MF	Microfiltration
MG	Million gallons
mg/L	Milligrams per liter
mgd	Million gallons per day

MLCSP	Mortar Lined and Course Steel Pipe
MLLW	Mean lower low water
MLML	Moss Landing Marine Laboratories
MLPP	Moss Landing Power Plant
MPWMD	Monterey Peninsula Water Management District
MRSWMP	Monterey Regional Stormwater Management Program
MRWMD	Monterey Regional Waste Management District
MRWPCA	Monterey Regional Water Pollution Control Agency
MSDS	Material Safety Data Sheet
msl	Mean sea level
MST	Monterey-Salinas Transit
MURP	Modern Urban Runoff Program
MW	Megawatts
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Protection Act
NLP	New Los Padres Dam and Reservoir
NOAA	National Oceanic and Atmospheric Association
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRMCP	National Refractories and Minerals Corporation Plant
NTU	Nephelometric turbidity unit
O_3	Ozone
OTC	Once-through cooling
PBCSD	Pebble Beach Community Services District
PEA	Proponent’s Environmental Assessment
PG&E	Pacific Gas and Electric
ppt	Parts per thousand
PPV	Peak Particle Velocity
psi	Pounds per square inch
PSMCSD	Pajaro/Sunny Mesa Community Services District
REPOG	Regional Plenary Oversight Group
RO	Reverse osmosis
ROW	Right-of-way
RTP	Regional Treatment Plant
RUWAP	Regional Urban Water Augmentation Project
RWQCB	Regional Water Quality Control Board
SBD	Ship-based desalination
SCV	Seawater conversion vessel
SEA	Monterey Regional Storm Water & Education Alliance
SEIR	Supplemental environmental impact report
SGB	Seaside Groundwater Basin
SHPO	California State Historic Preservation Office
SRDF	Salinas River Diversion Facility
SVA	Salinas Valley Aquitard
SVGB	Salinas Valley Groundwater Basin
SVIGSM	Salinas Valley Integrated Groundwater Surface Model
SVRP	Salinas Valley Reclamation Plant
SVWP	Salinas Valley Water Project
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	California State Water Resources Control Board

SWTP	Surface water treatment plant
TAMC	Transportation Agency of Monterey County
TDS	Total dissolved solids
~~thd~~ tdh	Total ~~daily~~ dynamic head
THM	Trihalomethane
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbons
TPH	Total Petroleum Hydrocarbons
UC	University of California
UCSC	University of California, Santa Cruz
UPRR	Union Pacific Railroad
USACE	United States Army Corps of Engineers (or Corps)
USEPA	United State Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
UV	Ultraviolet light
VGPS	Valley Greens Pumps Station
VOC	Volatile Organic Compounds
WFMCC	Water for Monterey County Coalition
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant
WY	Water Year

EXECUTIVE SUMMARY

This chapter contains the following sections:

S.1 Introduction
S.2 Project Background and Objectives
S.3 Project Description and Alternatives
S.4 Summary of Impacts
S.5 Analysis of Alternatives
S.6 Issues to be Resolved
S.7 Organization of This EIR

ES.1 Introduction

This Environmental Impact Report (EIR) has been prepared by the California Public Utilities Commission (CPUC) pursuant to the California Environmental Quality Act (CEQA) to analyze the potential environmental impacts of a proposed new water supply project for the Monterey Peninsula. The proposed project is called the Coastal Water Project (CWP) and is being proposed by the California American Water Company (CalAm). The water supply is needed to replace existing supplies that are constrained by ~~recent~~ legal decisions affecting the Carmel River and Seaside Groundwater Basin water resources, as described in more detail in Chapter 2. The CWP would produce desalinated water, convey it to the existing CalAm distribution system, and increase the system's use of storage capacity in the Seaside Groundwater Basin. The CWP would consist of several distinct components: a seawater intake system; a desalination plant; a brine discharge system; product water conveyance pipelines and storage facilities; and an aquifer storage and recovery (ASR) system. This Draft Environmental Impact Report (EIR) assesses the potential impacts of the Coastal Water Project.

This document has been prepared in accordance with the California Environmental Quality Act statutes and guidelines. CPUC is the lead agency for this CEQA process. Inquiries about the project should be directed to:

Andrew Barnsdale
c/o Environmental Science Associates
225 Bush Street
San Francisco, CA 94104
(www.cwp-eir.com/notify.html)

ES.2 Project Background and Objectives

The California American Water Company has served the Monterey Peninsula since it acquired properties from California Water and Telephone Company in 1966. CalAm's Monterey District service area is located in the semi-arid central California coastal area that is entirely dependent on local rainfall for its water supply; imported water is not an available option. By reason of its geography and rainfall patterns, the area is prone to severe droughts. Wells located along the Carmel River that draw water from the Carmel River Aquifer are the primary source of water for CalAm. An additional source of water for CalAm is a network of eight wells located in the Seaside Basin, which CalAm shares with a number of users and purveyors.

The CalAm Monterey Service Area, also known as the Monterey District, includes six incorporated cities, the Monterey Airport District, the unincorporated areas of Carmel Highlands, Carmel Valley, and Pebble Beach, and other unincorporated county areas. Moss Landing, an unincorporated ~~"census-designated place"~~ community of Monterey County classified by the U.S Census Bureau as a "census designated place", is located approximately 19 miles north of the CalAm service area. The City of Marina, unincorporated Castroville, and other areas of unincorporated Monterey County lie between Moss Landing and the CalAm service area.

The proposed water supply is needed to replace existing supplies that are constrained by ~~recent~~ legal decisions affecting the Carmel River and Seaside Groundwater Basin water resources: State Water Resources Control Board (SWRCB) Order No. WR 95-10 (Order 95-10); and, the Monterey County Superior Court adjudication of water rights in the Seaside Groundwater Basin. Both rulings reduce CalAm's use of its two primary sources of supply for the Monterey District and provide the most immediate impetus for the CWP.

As proposed by CalAm, the CWP would produce desalinated water, convey it to the existing CalAm distribution system, and increase the system's use of storage capacity in the Seaside Groundwater Basin. The CWP would consist of several distinct components: a seawater intake system; a desalination plant; a brine discharge system; product water conveyance pipelines and storage facilities; and an aquifer storage and recovery (ASR) system.

The CWP is the result of a multi-year planning effort that has entailed thorough consideration of many alternatives in the context of several different proposed projects and various related documents. Since 1989, several options have been proposed that proponents have hoped would meet the water supply needs of the Monterey Peninsula and address the impacts on the Carmel River underlying SWRCB Order 95-10. The objectives that were considered during development of CWP projects are as follows:

- Satisfy CalAm's obligations to meet the requirements of SWRCB Order 95-10;
- Diversify and create a reliable drought-proof water supply;
- Protect the Seaside Basin for long-term reliability;
- Protect listed species in the riparian and aquatic habitat below San Clemente Dam;
- Protect the local economy from the effects of an uncertain water supply;

- Minimize water rate increases by creating a diversified water supply portfolio;
- Minimize energy requirements and greenhouse gas (GHG) emissions per unit of water delivered to the extent possible;
- Explore opportunities for regional partnerships, consistent with the Administrative Law Judge Decision (Decision 03-09-022, dated September 4, 2003);
- Avoid duplicative facilities and infrastructure.

The final three objectives listed here were not submitted as part of the original PEA or CalAm's Application for a CPCN. They were developed, rather, by the CPUC during the process of compiling this EIR.

ES.3 Project Description and Alternatives

This EIR analyzes at an equal level of detail three water supply projects that can each satisfy the objectives of the Coastal Water Project. The Proponent's Environmental Assessment (CalAm and RBF Consulting, 2005) described the CWP assuming the proposed desalination plant would be situated at Moss Landing (this is referred to as the Applicant's Proposed Project, or the Moss Landing Project) to take advantage of the existing cooling water intake system at the Moss Landing Power Plant (MLPP) for source water, and the existing MLPP ocean outfall for the disposal of brine. Since that time, two alternative projects have been developed that are also capable of satisfying the objectives of the CWP. The project facilities for the Moss Landing Project, the North Marina Project, and the Regional Project are summarized in **Table ES-1**.

The first alternative, known as the North Marina Project, includes most of the infrastructure improvements proposed for the CWP. The main differences are that the North Marina Project's desalination facility would be constructed at a different site (in North Marina) and the desalination facility's production capacity would be slightly greater than that of the Moss Landing facility. The North Marina Project would also utilize subsurface seawater intakes for the desalination plant source water (slant wells at the end of Reservation Road), and would require fewer miles of product water conveyance pipeline than the Moss Landing Project. The North Marina Project was initially identified in the PEA and subsequently refined by CalAm and the CPUC. The North Marina Project would meet all of the project objectives of the CWP and is analyzed in this EIR at a level of detail equal to that devoted to the Moss Landing Project. ~~the CWP.~~ Both the Moss Landing and North Marina Projects are described in Chapter 3, and both projects are analyzed in Chapter 4 of this EIR. CalAm would be the owner and operator of either of these two projects. The CPUC, as the Lead Agency under CEQA, will use this document to approve one of them to implement the CWP if it decides to approve either of these two projects.

The second alternative project analyzed in this EIR is the Monterey Regional Water Supply Project (Regional Project), which is proposed by Water for Monterey County (formerly known as the Regional Plenary Oversight Group, or REPOG) as a community-developed long-term water supply alternative. The Regional Project, as described in Chapter 5 and analyzed in Chapter 6, was submitted to the CPUC in June 2008, revised in January 2009 (see EIR Appendix N), and further revised in October 2009 (see EIR Appendix Q). In response to additional analyses and to public comments received on the DEIR since its publication in January 2009, Marina Coast

TABLE ES-1
PROJECT FACILITIES

	Moss Landing Project	North Marina Project	Phase 1 Regional Project	Full Regional Project
Desalination Plant	10 MGD at Moss Landing	11 MGD at North Marina	10 MGD at North Marina	13 MGD (total) at North Marina
Source Water	Existing cooling water system at the MLPP	6 new subsurface intakes (slant wells)	~~5~~ 6 new subsurface intakes (vertical wells)	~~10~~8 (total) new subsurface intakes (vertical wells)
Brine Disposal	Existing MLPP Outfall	Existing Outfall at MRWPCA		
Product Water Conveyance	Transmission Main North			
	Transmission Main South			
Seaside Groundwater ASR	2 existing and 2 new injection/extraction wells			
			~~3 additional injection wells~~	3 additional injection wells
				2 additional injection wells
Surface Water Treatment			~~Existing Salinas River Diversion Facility and new 14 MGD Plant at North Marina~~	Existing Salinas River Diversion Facility and new 14 MGD SWTP at North Marina
				Expansion of Salinas River Diversion Facility and 14 MGD SWTP at North Marina
Salinas Basin Groundwater for North Monterey County				Expansion of the Castroville Seawater Intrusion Project, Perched water storage at the Armstrong Ranch, additional distribution pipelines
Seaside Groundwater Basin Replenishment Project				Reverse Osmosis treatment of recycled water from MRWPCA treatment plant at an Advanced Water Treatment Plant and injection of treated water for groundwater recharge

Water District (MCWD), California American Water (CalAm), and Monterey County Water Resources Agency (MCWRA) have been working together to clarify and refine the components of Phase 1 of the Regional Project. This chapter has been updated to reflect the changes to the project components and phasing. References to the “Regional Project” herein and in all chapters of this EIR refer to the Monterey Regional Water Supply Program as described in the DEIR and as revised in the Final Technical Memorandum prepared by MCWD, CalAm, and MCWRA on October 15, 2009 (Appendix Q) and its supporting documents (see Master Response Changes to Desalination Facility and Regional Project Description).

The Regional Project~~, which is described separately in Chapter 5 and analyzed in Chapter 6,~~ would integrate the development and allocation of several water supply sources, including desalination, to address existing and projected future demands within the CalAm service area, as well as existing and future demands in other areas of northern Monterey County. The Regional Project as proposed would be implemented in phases and would incorporate most of the components of the North Marina Project. Specifically, the Regional Project would also utilize the existing Salinas River Diversion Facility (SRDF), and would include a new surface water treatment plant. However, instead of employing slant wells for desalination source water as would the North Marina Project, the Regional Project would employ vertical wells to draw water from beneath the inland side of the beach dunes, and would add capacity to store additional water in the Seaside Groundwater Basin. As proposed in the Regional Project alternative, the Marina Coast Water District (MCWD) would be the owner of the regional desalination facility and the surface water treatment plant. To be implemented, it is assumed the MCWD would use this EIR in considering approval of some of the Regional Project facilities.

ES.3.1 Project and Program Evaluations

The analytical and organizational approach to the analysis of environmental impacts is intended to enable the public and decision-makers to meaningfully compare the impacts of the Moss Landing Project and the North Marina Project, both of which have been analyzed in Chapter 4, with those of the Regional Project, analyzed in Chapter 6.

As described in Chapter 4, two alternative projects, the Moss Landing Project (referred to as the Applicant’s Proposed Project) and the North Marina Project (the first alternative project), have been developed that are capable of satisfying the objectives of the CWP. Many of the infrastructure improvements proposed for the Moss Landing Project are the same as those proposed for the North Marina Project. The main differences between the Moss Landing and North Marina Projects are that the North Marina Project’s desalination facility would be constructed at a different site (in North Marina) and the desalination facility’s production capacity would be slightly greater than that of the Moss Landing Project’s facility. The components of the Moss Landing and North Marina Projects are sufficiently defined so as to lend themselves to relatively near-term implementation and analysis at a project level of detail. This project level analysis is provided in Chapter 4.

As described in Chapter 5, the Regional Project (the second alternative project) includes two separate but related phases. The Phase 1 elements taken together would satisfy the replacement demand function of the CWP (in the same manner as the Moss Landing Project or the North Marina Project) and could also satisfy broader regional objectives to coordinate water supply for both CalAm and Marina Coast Water District customers. The components of Phase 1 are either already approved (with some being currently implemented) or are sufficiently defined so as to lend themselves to relatively near-term implementation and analysis at a project level of detail. This project level analysis is provided in Chapter 6.

On the other hand, the components within Phase 2 represent a set of actions that could be taken to satisfy longer term regional water demand, including water for approved growth, but may also require more detailed CEQA review at the appropriate time if and when they are formally considered for approval. The Phase 2 components are included in the Regional Project for informational purposes since they would not function as an alternative to strictly meeting the objectives of the CWP and none of them would be subject to CPUC approval at this juncture. As such, the Phase 2 components are studied at a more general, programmatic level, consistent with the available information and level of detail associated with those elements.

When subsequent environmental review for facilities evaluated at a program level of detail is undertaken, the information contained in this EIR will be revisited to determine the accuracy and the adequacy of these evaluations.

ES.3.2 Schedule

The ~~S~~schedule representing permitting, design, and implementation ~~to~~ of the Coastal Water Project is shown ~~on pages ES-7 to ES-9~~ in **Figures ES-1a, ES-1b and ES-1c**.

ES.4 Summary of Impacts

Tables ES-2 and **ES-3**, at the end of this chapter, present a summary of the environmental impacts associated with each of the proposed components of the Moss Landing Project, the North Marina Project, the Phase 1 Regional Project, and the Phase 2 Regional Project. Also provided on the summary tables are collective impact summaries stating the overall environmental impacts for each of the projects.

The level of significance for each impact was determined using significance criteria (thresholds) developed for each category of impacts. The significance criteria are presented in the appropriate sections of Chapter 4 and 6. Significant impacts are those adverse environmental impacts that would meet or exceed the significance thresholds; less-than-significant impacts would not exceed the thresholds.

ES.4.1 Significant and Unavoidable Impacts

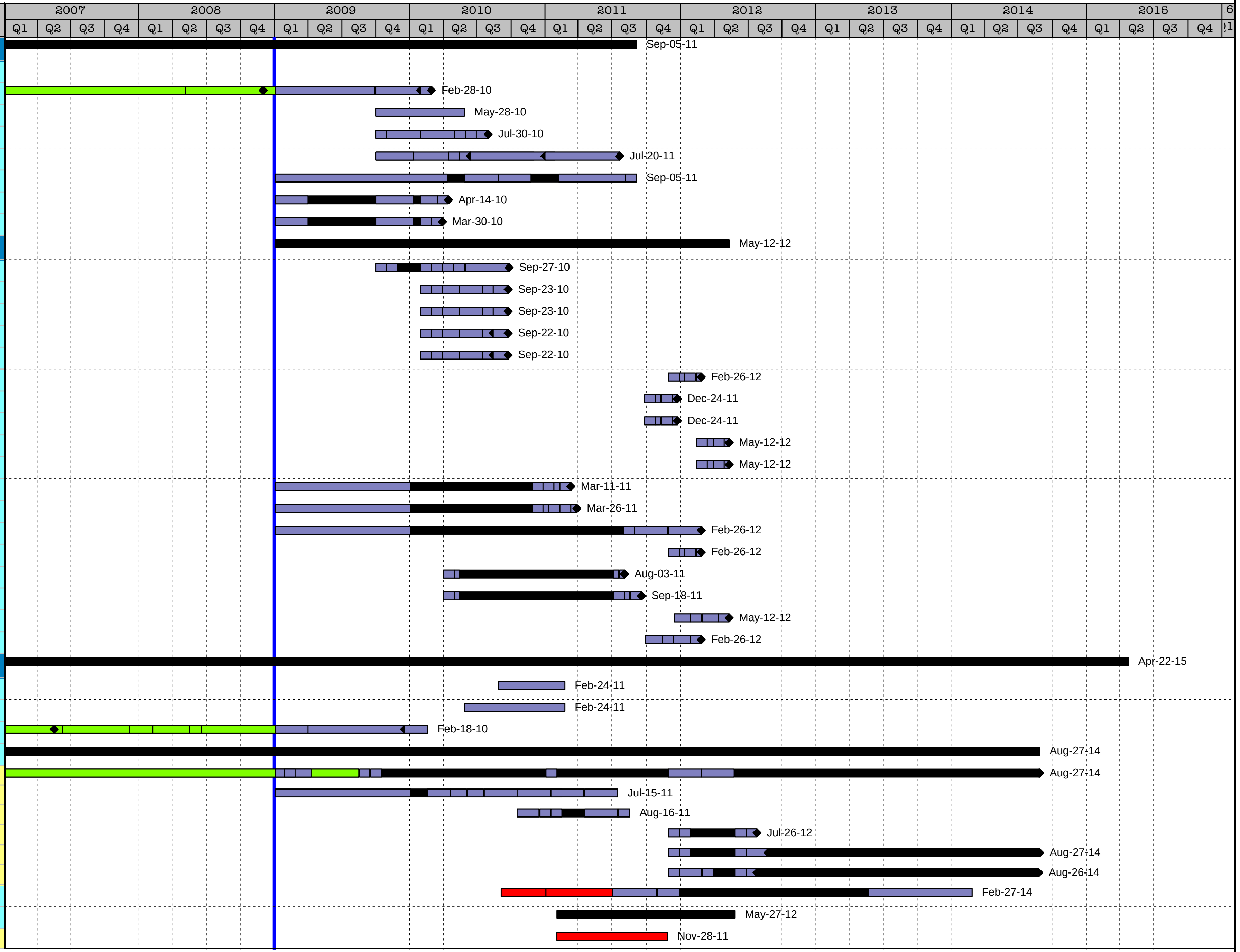
There are several impacts discussed in this EIR that are considered significant and unavoidable. These impacts have been identified for some projects in the areas of geology, soils, and seismicity; and air quality~~; and, noise~~. In addition, some of the indirect effects of growth resulting from implementation of the CWP as a whole (see Chapter 8) are considered significant and unavoidable for Phase 2 of the Regional Project. These impacts are discussed by resource area below.

ES.4.1.1 Greenhouse Gas (GHG) Emissions

The total estimated GHG emissions amounts that would be associated with the operations of the proposed Moss Landing Project or the North Marina Project would exceed the amount of CARB's preliminary draft significance threshold. Implementation of Mitigation Measures ~~(detailed in Chapter 4, Section 4.8)~~ would reduce short-term construction and long-term operations emissions of GHG Additionally, implementation of Mitigation Measures 4.8-5c:

Coastal Water Project

Activity ID	Activity Name	Original Duration	Start	Finish
	Programmatic Permits	2696	Apr-01-04 A	Sep-05-11
	CPUC - Proponents Environmental Assessment	1055	Apr-01-04 A	Jul-06-05 A
	CPUC - Environmental Impact Report (CEQA)	1087	Jun-01-06 A	Feb-28-10
	CPUC - Certificate of Public Convenience and Ne...	240	Oct-01-09	May-28-10
	USACE Wetlands Delineation (Includes NEPA Co...	304	Sep-30-09	Jul-30-10
	USACE 404 / Section 10 Permit (Includes NEPA C...	659	Sep-30-09	Jul-20-11
	CCC Coastal Development Permit	966	Jan-02-09 A	Sep-05-11
	RWQCB - 401 Certification	457	Jan-02-09	Apr-14-10
	CDFG 1602 Certification	442	Jan-02-09	Mar-30-10
	Facility Permits	1216	Jan-02-09	May-12-12
	Monterey County Coastal Development Permit	362	Oct-01-09	Sep-27-10
	City of Sand City Coastal Development Permit	237	Jan-30-10	Sep-23-10
	City of Seaside Coastal Development Permit	237	Jan-30-10	Sep-23-10
	City of Pacific Grove Coastal Development Permit	236	Jan-30-10	Sep-22-10
	City of Monterey Coastal Development Permit	236	Jan-30-10	Sep-22-10
	Monterey County Encroachment Permit	90	Nov-29-11	Feb-26-12
	City of Sand City Encroachment Permit	90	Sep-26-11	Dec-24-11
	City of Seaside Encroachment Permit	90	Sep-26-11	Dec-24-11
	City of Monterey Encroachment Permit	90	Feb-13-12	May-12-12
	City of Pacific Grove Encroachment Permit	90	Feb-13-12	May-12-12
	CALTRANS Encroachment Permit	788	Jan-02-09	Mar-11-11
	TAMC Utility Encroachment Permit	803	Jan-02-09	Mar-26-11
	US Army Right-of-Entry	1140	Jan-02-09	Feb-26-12
	Monterey County Erosion Control Permit	90	Nov-29-11	Feb-26-12
	City of Seaside Land Use Permit	490	Apr-01-10	Aug-03-11
	City of Seaside Ordnance Remediation Permit	536	Apr-01-10	Sep-18-11
	MPWMD Water System Distribution Permit Amdmt.	150	Dec-15-11	May-12-12
	Seaside Groundwater Basin Watermaster Injecti...	150	Sep-30-11	Feb-26-12
	Desalination Plant	4021	Apr-01-04 A	Apr-22-15
	Utility Service Agreements	181	Aug-28-10	Feb-24-11
	ROW / Land Acquisition	272	May-29-10	Feb-24-11
	Demonstration - Pilot Program	2132	Apr-01-04 A	Feb-18-10
	Facility Permits	2789	Dec-19-06 A	Aug-27-14
	CDHS Domestic Water Supply Permit	2789	Dec-19-06 A	Aug-27-14
	RWQCB Waste Discharge Requirements	914	Jan-02-09	Jul-15-11
	NPDES Permit	303	Oct-18-10	Aug-16-11
	Monterey County Building Permit	240	Nov-30-11	Jul-26-12
	MBUAPC - Permit to Construct and Operate	1002	Nov-29-11	Aug-27-14
	Monterey County Envir Health Permit to Construct	1001	Nov-29-11	Aug-26-14
	Material / Equipment Procurement	1272	Sep-04-10	Feb-27-14
	D/B Construction Contract Procurement	481	Feb-02-11	May-27-12
	D/B Basis of Design	300	Feb-02-11	Nov-28-11



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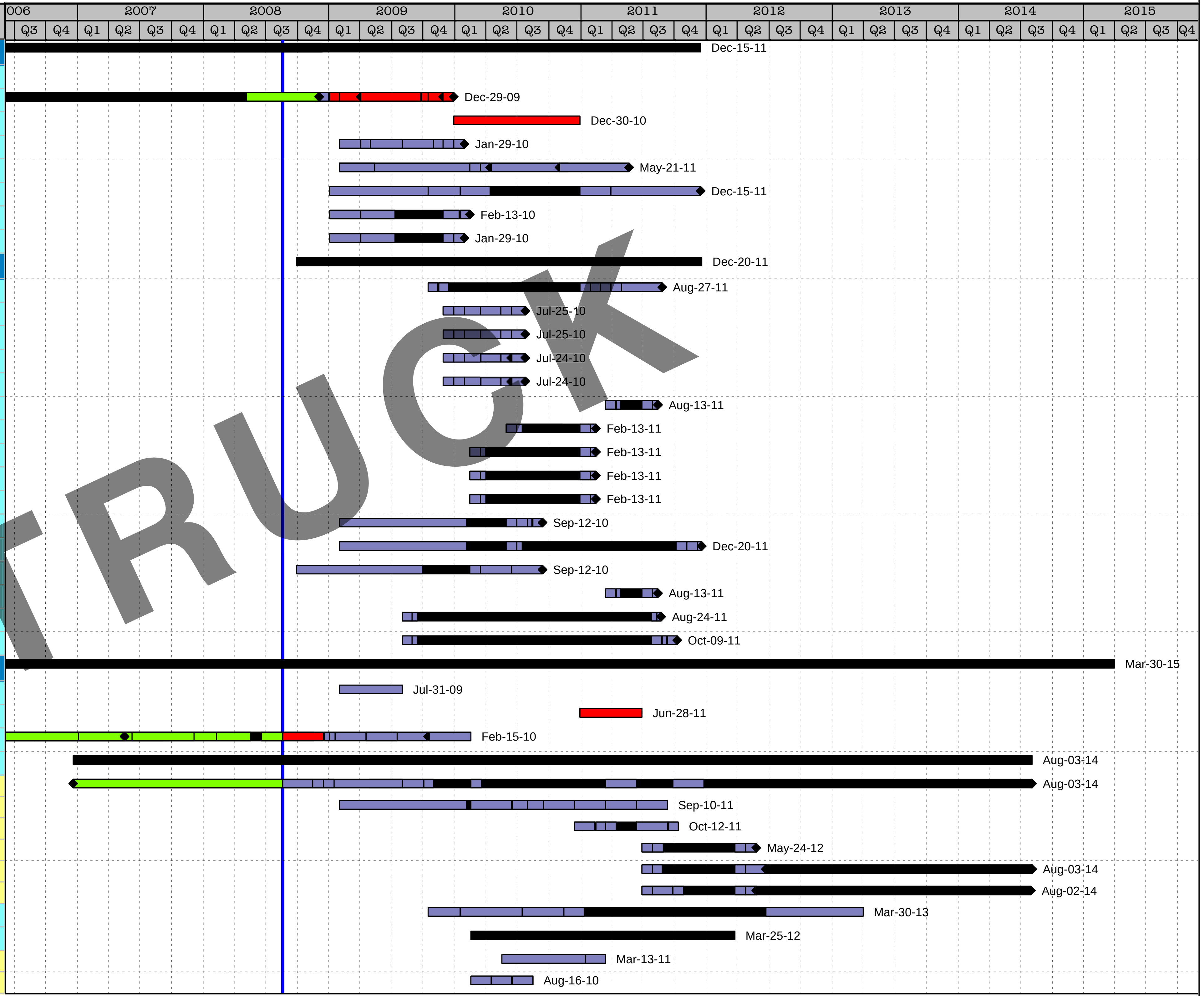
SOURCE: RBF Consulting, 2009

CalAm Coastal Water Project . 205335
Revised Figure ES-1a
Anticipated Project Schedule

Coastal Water Project

Activity ID	Activity Name	Original Duration	Start	Finish
	Programmatic Permits	2011	Apr-01-04 A	Dec-15-11
	CPUC - Proponents Environmental Assessment	753	Apr-01-04 A	Jul-06-05 A
	CPUC - Environmental Impact Report (CEQA)	746	Jun-01-06 A	Dec-29-09
	CPUC - Certificate of Public Convenience and Necessity	262	Dec-30-09	Dec-30-10
	USACE Wetlands Delineation (Includes NEPA Complia...	260	Jan-31-09	Jan-29-10
	USACE 404 / Section 10 Permit (Includes NEPA Compli...	600	Jan-31-09	May-21-11
	CCC Coastal Development Permit	770	Jan-02-09	Dec-15-11
	RWQCB - 401 Certification	291	Jan-02-09	Feb-13-10
	CDFG 1602 Certification	281	Jan-02-09	Jan-29-10
	Facility Permits	842	Sep-27-08	Dec-20-11
	Monterey County Coastal Development Permit	487	Oct-15-09	Aug-27-11
	City of Marina Coastal Development Permit	170	Nov-29-09	Jul-25-10
	City of Seaside Coastal Development Permit	170	Nov-29-09	Jul-25-10
	City of Pacific Grove Coastal Development Permit	170	Nov-29-09	Jul-24-10
	City of Monterey Coastal Development Permit	170	Nov-29-09	Jul-24-10
	Monterey County Encroachment Permit	110	Mar-14-11	Aug-13-11
	City of Marina Encroachment Permit	185	May-30-10	Feb-13-11
	City of Seaside Encroachment Permit	260	Feb-14-10	Feb-13-11
	City of Monterey Encroachment Permit	260	Feb-14-10	Feb-13-11
	City of Pacific Grove Encroachment Permit	260	Feb-14-10	Feb-13-11
	CALTRANS Encroachment Permit	420	Feb-01-09	Sep-12-10
	TAMC Utility Encroachment Permit	752	Feb-01-09	Dec-20-11
	US Army Right-of-Entry	510	Sep-27-08	Sep-12-10
	Monterey County Erosion Control Permit	110	Mar-14-11	Aug-13-11
	City of Seaside Land Use Permit	538	Aug-01-09	Aug-24-11
	City of Seaside Ordnance Remediation Permit	570	Aug-01-09	Oct-09-11
	Desalination Plant	2868	Apr-01-04 A	Mar-30-15
	Utility Service Agreements	130	Feb-01-09	Jul-31-09
	ROW / Land Acquisition	128	Dec-30-10	Jun-28-11
	Demonstration - Pilot Program	1533	Apr-01-04 A	Feb-15-10
	Facility Permits	1988	Dec-19-06 A	Aug-03-14
	CDHS Domestic Water Supply Permit	1988	Dec-19-06 A	Aug-03-14
	RWQCB Waste Discharge Requirements	680	Feb-01-09	Sep-10-11
	NPDES Permit	217	Dec-14-10	Oct-12-11
	Monterey County Building Permit	236	Jun-29-11	May-24-12
	MBUAPC - Permit to Construct and Operate	808	Jun-28-11	Aug-03-14
	Monterey County Envir Health Permit to Construct	808	Jun-28-11	Aug-02-14
	Material / Equipment Procurement	901	Oct-16-09	Mar-30-13
	D/B Construction Contract Procurement	549	Feb-16-10	Mar-25-12
	D/B Basis of Design	215	May-16-10	Mar-13-11
	D/B Construction RFQ	130	Feb-16-10	Aug-16-10



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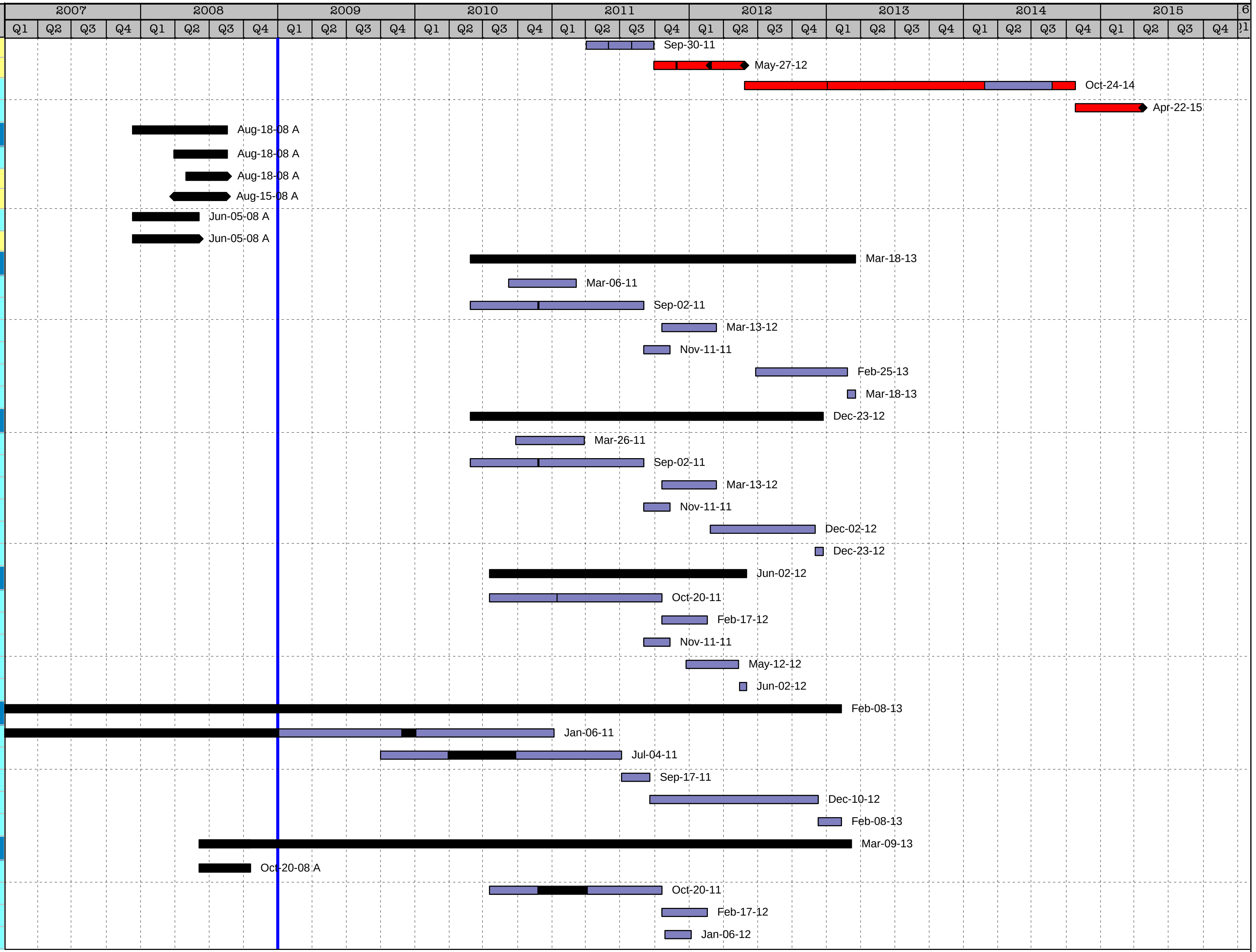
Coastal Water Project

Activity ID	Activity Name	Original Duration	Start	Finish
	D/B Construction RFQ	181	Apr-02-11	Sep-30-11
	D/B Construction RFP	241	Sep-30-11	May-27-12
	Design/ Construction / Installation	880	May-28-12	Oct-24-14
	Start-Up	180	Oct-25-14	Apr-22-15
	North Marina Desalination Plant Investigation	292	Dec-10-07 A	Aug-18-08 A
	CPUC EIR Reporting	143	Mar-28-08 A	Aug-18-08 A
	EIR DR 2.4 Update North Marina Subsurface Intakes Project ...	110	May-01-08 A	Aug-18-08 A
	EIR DR 2.6 Brine Discharge Modeling	140	Mar-28-08 A	Aug-15-08 A
	Hydrogeological Investigation	218	Dec-10-07 A	Jun-05-08 A
	Groundwater Modeling	218	Dec-10-07 A	Jun-05-08 A
	DWCS Pipeline North	1025	May-29-10	Mar-18-13
	ROW / Land Acquisition	181	Sep-07-10	Mar-06-11
	Design	462	May-29-10	Sep-02-11
	Material / Equipment Procurement	145	Oct-21-11	Mar-13-12
	Construction Contract Procurement	70	Sep-03-11	Nov-11-11
	Construction / Installation	245	Jun-26-12	Feb-25-13
	Start-Up	21	Feb-26-13	Mar-18-13
	DWCS Pipeline Middle	940	May-29-10	Dec-23-12
	ROW / Land Acquisition	181	Sep-27-10	Mar-26-11
	Design	462	May-29-10	Sep-02-11
	Material / Equipment Procurement	145	Oct-21-11	Mar-13-12
	Construction Contract Procurement	70	Sep-03-11	Nov-11-11
	Construction / Installation	280	Feb-27-12	Dec-02-12
	Start-Up	21	Dec-03-12	Dec-23-12
	DWCS Pipeline South	687	Jul-17-10	Jun-02-12
	Design	461	Jul-17-10	Oct-20-11
	Material / Equipment Procurement	120	Oct-21-11	Feb-17-12
	Construction Contract Procurement	70	Sep-03-11	Nov-11-11
	Construction / Installation	140	Dec-25-11	May-12-12
	Start-Up	21	May-13-12	Jun-02-12
	Terminal Reservoir / ASR PS	1618	Jun-01-06 A	Feb-08-13
	ROW / Land Acquisition	889	Jun-01-06 A	Jan-06-11
	Design	642	Oct-01-09	Jul-04-11
	Construction Contract Procurement	75	Jul-05-11	Sep-17-11
	Construction / Installation	450	Sep-18-11	Dec-10-12
	Start-Up	60	Dec-11-12	Feb-08-13
	Monterey Pipeline	1721	Jun-05-08 A	Mar-09-13
	Facility Planning	114	Jun-05-08 A	Oct-20-08 A
	Design	459	Jul-19-10	Oct-20-11
	Material / Equipment Procurement	120	Oct-21-11	Feb-17-12
	Construction Contract Procurement	70	Oct-29-11	Jan-06-12



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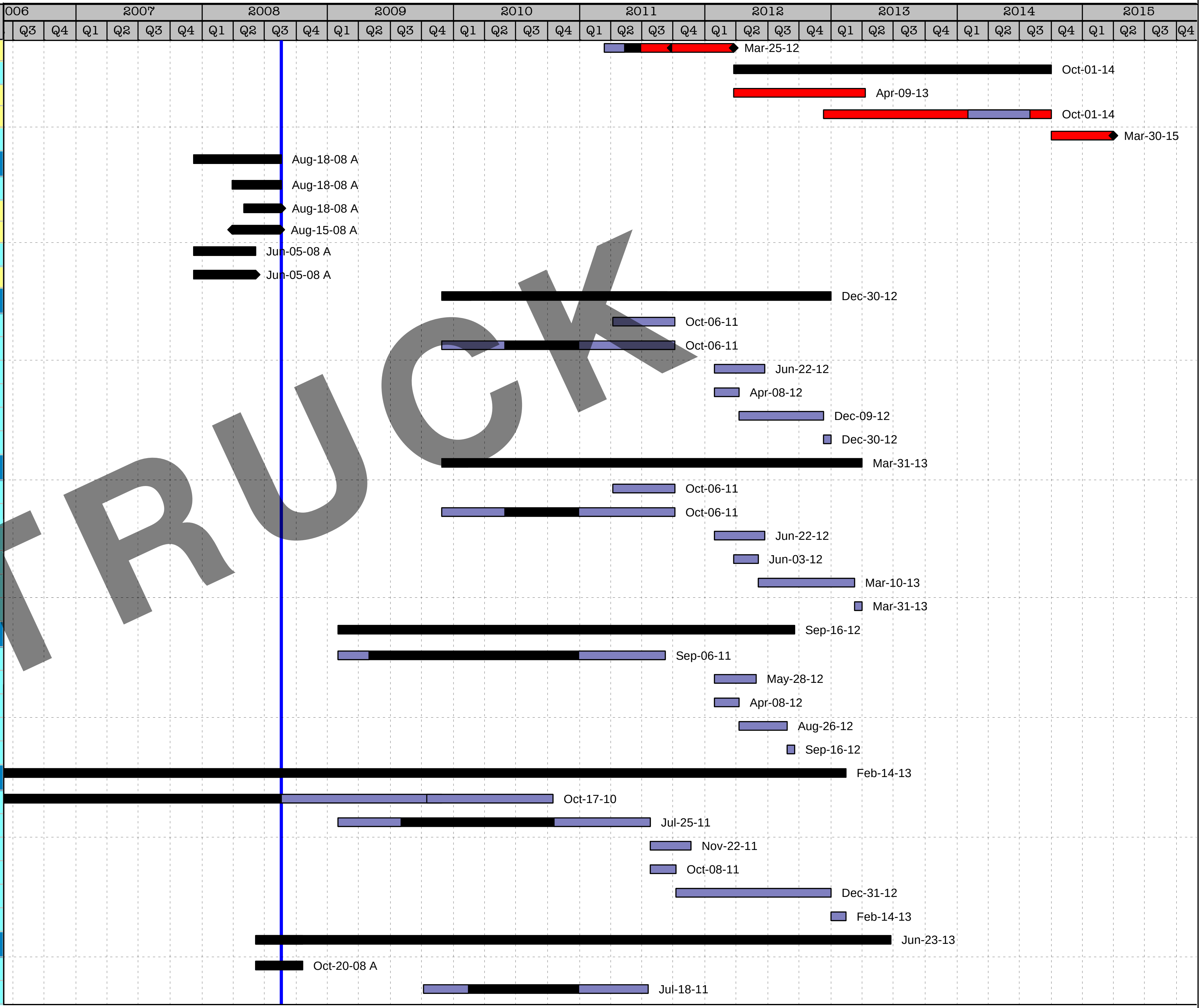
SOURCE: RBF Consulting, 2009

CalAm Coastal Water Project . 205335
Revised Figure ES-1b
Anticipated Project Schedule

Coastal Water Project

Activity ID	Activity Name	Original Duration	Start	Finish
	D/B Construction RFP	270	Mar-14-11	Mar-25-12
	Design/ Construction / Installation	658	Mar-25-12	Oct-01-14
	Final Design	272	Mar-25-12	Apr-09-13
	Construction/ Installation	472	Dec-10-12	Oct-01-14
	Start-Up	128	Oct-01-14	Mar-30-15
	North Marina Desalination Plant Investigation	208	Dec-10-07 A	Aug-18-08 A
	CPUC EIR Reporting	101	Mar-28-08 A	Aug-18-08 A
	EIR DR 2.4 Update North Marina Subsurface Intakes Project Desc...	78	May-01-08 A	Aug-18-08 A
	EIR DR 2.6 Brine Discharge Modeling	100	Mar-28-08 A	Aug-15-08 A
	Hydrogeological Investigation	156	Dec-10-07 A	Jun-05-08 A
	Groundwater Modeling	156	Dec-10-07 A	Jun-05-08 A
	DWCS Pipeline North	805	Nov-29-09	Dec-30-12
	ROW / Land Acquisition	129	Apr-09-11	Oct-06-11
	Design	484	Nov-29-09	Oct-06-11
	Material / Equipment Procurement	105	Jan-29-12	Jun-22-12
	Construction Contract Procurement	50	Jan-29-12	Apr-08-12
	Construction / Installation	175	Apr-08-12	Dec-09-12
	Start-Up	15	Dec-09-12	Dec-30-12
	DWCS Pipeline Middle	870	Nov-29-09	Mar-31-13
	ROW / Land Acquisition	129	Apr-09-11	Oct-06-11
	Design	484	Nov-29-09	Oct-06-11
	Material / Equipment Procurement	105	Jan-29-12	Jun-22-12
	Construction Contract Procurement	50	Mar-25-12	Jun-03-12
	Construction / Installation	200	Jun-03-12	Mar-10-13
	Start-Up	15	Mar-10-13	Mar-31-13
	DWCS Pipeline South	945	Feb-01-09	Sep-16-12
	Design	677	Feb-01-09	Sep-06-11
	Material / Equipment Procurement	86	Jan-29-12	May-28-12
	Construction Contract Procurement	50	Jan-29-12	Apr-08-12
	Construction / Installation	100	Apr-08-12	Aug-26-12
	Start-Up	15	Aug-26-12	Sep-16-12
	Terminal Reservoir / ASR PS	1174	Jun-01-06 A	Feb-14-13
	ROW / Land Acquisition	649	Jun-01-06 A	Oct-17-10
	Design	646	Feb-01-09	Jul-25-11
	Material / Equipment Procurement	86	Jul-26-11	Nov-22-11
	Construction Contract Procurement	54	Jul-26-11	Oct-08-11
	Construction / Installation	321	Oct-09-11	Dec-31-12
	Start-Up	33	Jan-01-13	Feb-14-13
	Monterey Pipeline	1317	Jun-05-08 A	Jun-23-13
	Facility Planning	82	Jun-05-08 A	Oct-20-08 A
	Design	466	Oct-05-09	Jul-18-11



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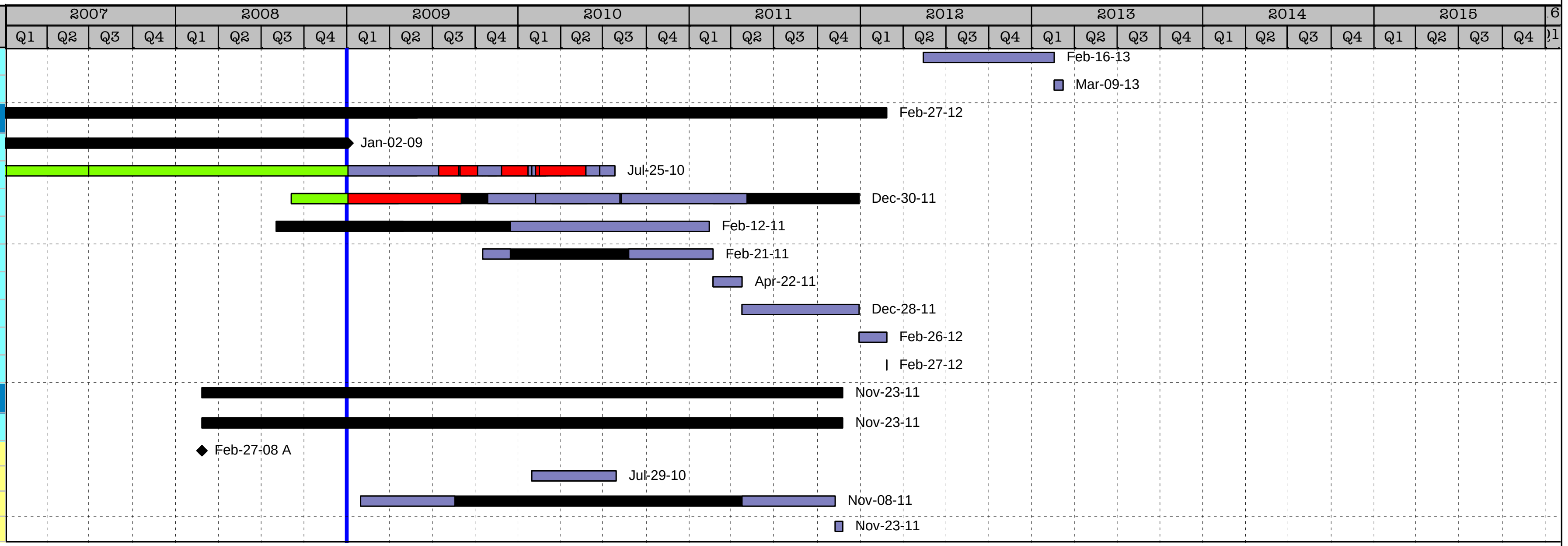
Coastal Water Project

Activity ID	Activity Name	Original Duration	Start	Finish
	Construction / Installation	280	May-13-12	Feb-16-13
	Start-Up	21	Feb-17-13	Mar-09-13
	CWP ASR Wells	1957	Oct-02-06 A	Feb-27-12
	Facility Planning	654	Oct-02-06 A	Jan-02-09
	Test / Monitoring Program	1375	Oct-02-06 A	Jul-25-10
	Facility Permits	1195	Sep-04-08 A	Dec-30-11
	Lease Acquisition	891	Aug-04-08 A	Feb-12-11
	Design	493	Oct-17-09	Feb-21-11
	Construction Contract Procurement	60	Feb-22-11	Apr-22-11
	Construction / Installation	250	Apr-23-11	Dec-28-11
	Start-Up	60	Dec-29-11	Feb-26-12
	Operation	1	Feb-27-12	Feb-27-12
	ASR Pipelines	1348	Feb-27-08 A	Nov-23-11
	CWP ASR Pipelines	1348	Feb-27-08 A	Nov-23-11
	Facility Planning	0	Feb-27-08 A	Feb-27-08 A
	Design	181	Jan-30-10	Jul-29-10
	Construction / Installation	1002	Jan-30-09	Nov-08-11
	Start-Up	15	Nov-09-11	Nov-23-11



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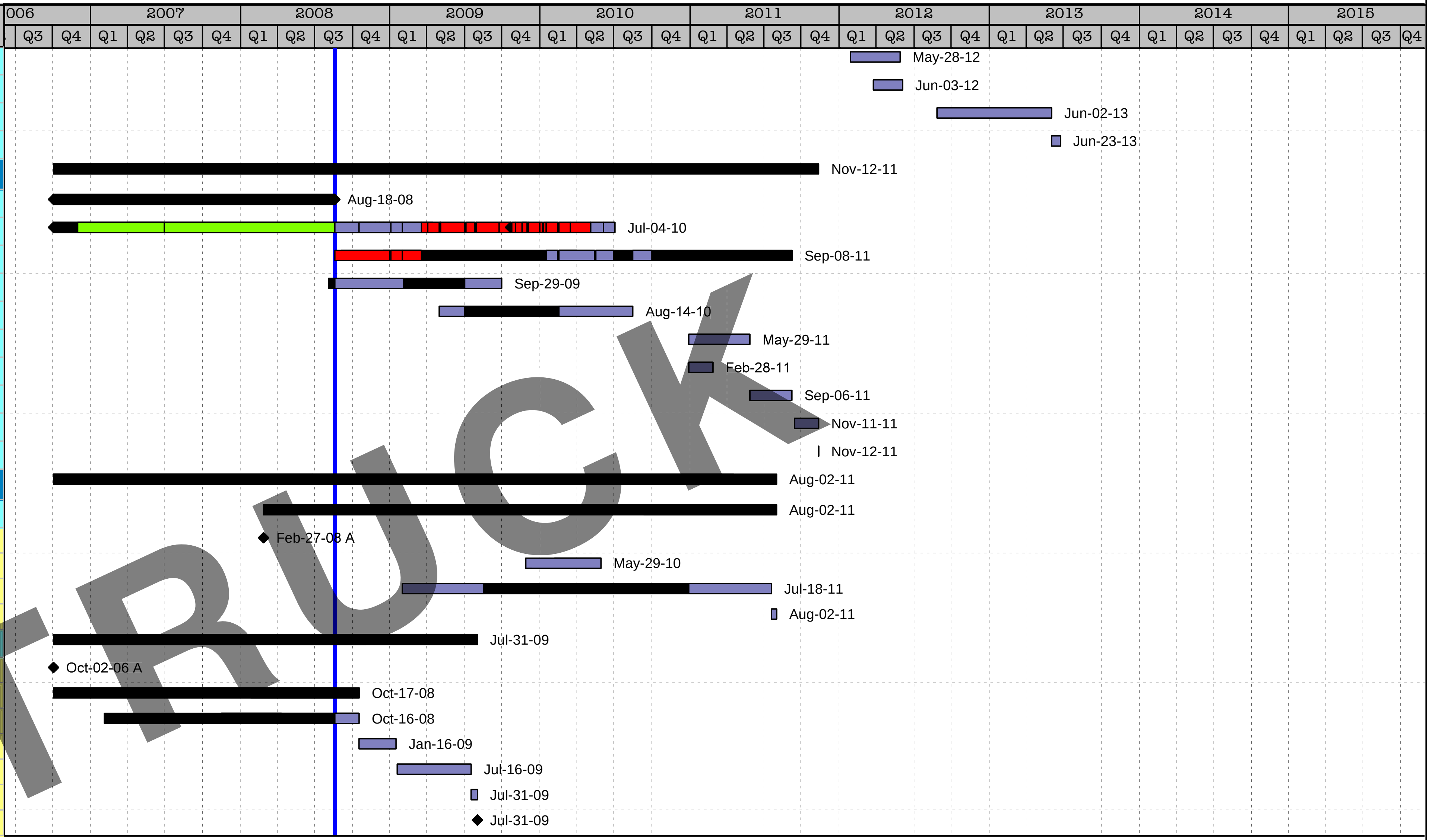
SOURCE: RBF Consulting, 2009

Revised Figure ES-1c

Anticipated Project Schedule

Coastal Water Project

Activity ID	Activity Name	Original Duration	Start	Finish
	Material / Equipment Procurement	86	Jan-29-12	May-28-12
	Construction Contract Procurement	50	Mar-25-12	Jun-03-12
	Construction / Installation	200	Aug-26-12	Jun-02-13
	Start-Up	15	Jun-02-13	Jun-23-13
	CWP ASR Wells	1335	Oct-02-06 A	Nov-12-11
	Facility Planning	374	Oct-02-06 A	Aug-18-08
	Test / Monitoring Program	980	Oct-02-06 A	Jul-04-10
	Facility Permits	786	Sep-04-08 A	Sep-08-11
	ROW / Land Acquisition	292	Aug-04-08 A	Sep-29-09
	Design	335	May-02-09	Aug-14-10
	Material / Equipment Procurement	106	Dec-30-10	May-29-11
	Construction Contract Procurement	42	Dec-30-10	Feb-28-11
	Construction / Installation	72	May-29-11	Sep-06-11
	Start-Up	44	Sep-13-11	Nov-11-11
	Operation	0	Nov-12-11	Nov-12-11
	ASR Pipelines	1157	Oct-02-06 A	Aug-02-11
	CWP ASR Pipeline	895	Feb-27-08 A	Aug-02-11
	Facility Planning	0	Feb-27-08 A	Feb-27-08 A
	Design	130	Nov-29-09	May-29-10
	Construction / Installation	642	Jan-30-09	Jul-18-11
	Start-Up	11	Jul-18-11	Aug-02-11
	ASR Extension Pipeline (Hwy 218 Connection)	635	Oct-02-06 A	Jul-31-09
	Facility Planning	0	Oct-02-06 A	Oct-02-06 A
	Facility Permits	33	Oct-02-06 A	Oct-17-08
	Design	429	Feb-05-07 A	Oct-16-08
	Material / Equipment Procurement	66	Oct-17-08	Jan-16-09
	Construction / Installation	129	Jan-17-09	Jul-16-09
	Start-Up	11	Jul-17-09	Jul-31-09
	Operation	0	Jul-31-09	Jul-31-09



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Energy Minimization and GHG Reduction Plan~~; however, there appear to be no feasible mitigation measures that c~~would ensure that annual project ~~reduce~~ GHG emissions levels ~~to~~would be below 7,000 metric tons~~ without fundamentally changing the project~~. Therefore, impacts would be mitigated to less than significant. ~~are considered to be significant and unavoidable~~. (See also ES 6.1 Unresolved Issues, for details of Implementation of Mitigation Measures).

The Draft EIR impact discussion for the Regional Project (see Draft EIR Impact 6.8-5 discussion in Section 6.8.4.2) also disclosed a significant and unavoidable impact related to GHG emissions. However, Mitigation Measure 4.8-5c has been determined to be a feasible mitigation measure that can and should be adopted by the CPUC and the relevant agencies (i.e., Marina Coast Water District [MCWD] and the Monterey County Water Resources Agency [MCWRA]) that would be associated with the Regional Project. If adopted and applied to the Regional Project as a whole, the GHG construction and operations mitigation measures, including Mitigation Measure 4.8-5c, would reduce GHG construction and operational impacts to less than significant levels. However, because several components of the Regional Project would occur under the jurisdiction of the other agencies, there is no way for the CPUC to guarantee that the mitigation measures would be implemented by those other agencies such that GHG emissions could continue to exceed the applicable significance thresholds. Therefore, for the purposes of this EIR, GHG impacts associated with the Regional Project continue to be classified as significant and unavoidable. ~~The total estimated GHG emission amounts that would be associated with the operations of Phase 1 and Phase 2 of the Regional Project would exceed the amount of CARB's preliminary draft significance threshold. Implementation of Mitigation Measures (detailed in Chapter 4, Section 4.8) would reduce short-term construction and long-term operations emissions of GHG; however, there appear to be no feasible mitigation measures that could reduce GHG emissions levels to below 7,000 metric tons without fundamentally changing the project. Therefore, impacts are considered to be significant and unavoidable.~~

ES.4.1.2 Air Quality

Emissions from construction of the Regional Project components have been assumed to occur simultaneously as a "worst-case" scenario for daily emissions. The worst-case day emissions would occur when construction of most of the components would overlap. It is anticipated that emissions associated with construction of Phase 1 and Phase 2 of the Regional Project would exceed the MBUAPCD's significance threshold of 82 pounds per day of PM_{10}.~~, resulting in a potentially significant impact~~. ~~While Mitigation Measures (detailed in Chapter 4, Section 4.8) would reduce emissions of PM10 during construction, there would be no guarantee that the measures would reduce the total estimated emissions of the Regional Project to below the MBUAPCD's significance threshold.~~

Mitigation Measure 6.8-1a, if implemented, would reduce construction emissions to a level below the threshold of significance. However, there is no guarantee that all relevant agencies would impose these measures as conditions of approval on the portion of the Regional Project under their jurisdiction to ensure that total emissions would not exceed the MBUAPCD's significance threshold for PM_{10}. Further, due to the timely need to provide replacement water supplies so that

CalAm may continue to provide safe, reliable drinking water to residents of the Monterey peninsula and due to MCWD’s need for water supply and in light of economies of scale, etc., it may be deemed infeasible (from an economic, social, and/or technological standpoint) to phase (i.e., delay) certain Regional Project construction activities in accordance with Mitigation Measure 6.8-1a. Therefore, impacts to regional air quality that would result from construction of the Regional Project are considered to be significant and unavoidable.

~~ES.4.1.3 Noise~~

~~Construction activities associated with several project components – at least one component in each of the three projects (Moss Landing, North Marina, and Regional Projects) analyzed in this EIR – would result in significant and unavoidable noise impacts due to their proximity to sensitive receptors. For all three projects, construction of the ASR facilities would result in significant and unavoidable noise impacts. For the North Marina Project, construction of the slant wells as the source water intake would result in additional significant and unavoidable noise impacts. For the Regional Project, nighttime well drilling activities that would be associated with the Phase 1 and Phase 2 projects would be significant and unavoidable depending on the sites’ proximities to existing sensitive receptors.~~

ES.4.1.3~~4.1.~~4 Liquefaction

The proposed storage of 7,000 AF of recycled water in the shallow unconfined aquifer underlying Armstrong Ranch as part of the Phase 2 Regional Project could result in an increased risk of project induced liquefaction and related ground failure from a major earthquake. The 7,000 acre feet of recycled water would be stored within an 80-foot thickness of dune sand underlying the 220-acre parcel that is the proposed site for construction of Regional Project Phase 1 facilities (a desalination plant~~ and a surface water treatment plant~~). Saturating this 80-foot dune sand unit with recycled water could result in a condition that is susceptible to liquefaction during an earthquake resulting in an increased risk of Project induced liquefaction and related ground failure from a major earthquake resulting in structural damage to Phase 1 Regional Project facilities. A detailed geotechnical engineering evaluation is necessary to further assess the liquefaction risk before mitigation strategies to offset the effects of liquefaction can be considered or designed. The potential for a project-induced liquefaction condition is considered a significant and unavoidable impact (see discussion of Impact 6.5-5 in Chapter 6, Section 6.5 for more explanation).

The proposed Phase 2 sub-surface slurry cut-off wall installed for containment of recycled water in the shallow unconfined aquifer underlying Armstrong Ranch could be structurally damaged from a major earthquake resulting in loss of containment of perched groundwater. The final design of the slurry cut-off wall (groundwater dam) is not complete and would require additional geotechnical and structural design input and considerations. Until the final design of the wall is complete and there is ample evidence to clearly demonstrate that a cut-off wall or groundwater dam can effectively contain water in the Armstrong Ranch dune sand sediments without the risk of failure, it is assumed that the cutoff wall would have a potential to fail. The most probable failure mechanism would be deformation from strong earthquake ground motion leading to cracking or complete failure of weakened sections. Failure of the slurry wall or groundwater dam could cause the release of recycled water from the saturated dune sands. The impacts to the environment from failure of the slurry cut-off wall could include 1) groundwater degradation of native groundwater by recycled water, 2) possible inundation of the down gradient and adjacent landfill, 3) alterations to groundwater conditions (flow gradients, vertical pressure heads, groundwater mounding) under the lands adjacent to the Armstrong Ranch, and 5) geotechnical effects such as surface settlement resulting in ground collapse (sink holes). Additional geotechnical testing and design would be necessary to adequately ensure that failure could be avoided, controlled, or the results of a failure could be mitigated. Until additional design and testing is complete, slurry cut-off wall failure is considered a significant and unavoidable impact of the project (see discussion of Impact 6.5-5 in Chapter 6, Section 6.5 for more explanation).

ES.4.1.4~~4.1.5~~ Growth

Although the water supply provided by the Phase 2 Regional Project appears to be largely consistent with the growth assumptions for the general plans within the CalAm service area, and the impacts of such growth have been analyzed and addressed in environmental documents prepared for those plans, the Phase 2 Project would also provide for growth outside CalAm's service area. For all topical areas, the Phase 2 Project would remove an obstacle to growth (by providing a reliable water supply). As such, the Phase 2 project would have a significant growth inducing impact. Since there are no feasible mitigation measures that would lessen the impact, the impact would be considered significant and unavoidable.

ES.4.2 Cumulative Impacts

Due to the breadth and extent of the CWP projects, this EIR provides an analysis both of the collective impacts of all project-level and program-level projects included in the CWP as well as the potential for overlap with other pertinent projects proposed and/or planned in the region. The collective impact discussion provides a synthesis of both project- and program-level impacts for all proposed CWP facilities discussed in Chapters 4 and 6, and indicates the potential for overlapping impacts associated with multiple projects proposed for construction within the same time frame and same geographic area. The most noteworthy of these cumulative impacts are to air quality, surface water~~, noise,~~ and seismic hazards (project induced liquefaction), summarized below. ~~These and all~~All other cumulative impacts are ~~summarized below and~~ discussed more fully in Chapter 9.

ES.4.2.1 Construction Related Impacts

Construction-related cumulative impacts resulting from the projects discussed in Chapter 9 are summarized below for air quality~~each~~ some of the ~~resource areas~~ ~~where the overall cumulative impact is determined to be significant~~. Section 9.4.1 provides discussion of cumulative impacts for all ~~project facilities~~resource areas.

Air Quality

Concurrent construction of the projects listed in Table 9-1 would generate greater emissions of criteria pollutants, including fugitive dust and equipment exhaust particulate matter and could cause a significant cumulative impact. The regional air basin is non-attainment for ozone and particulate matter, which is treated as a significant cumulative impact for purposes of this analysis. However, implementation of the mitigation measures, as discussed in Chapter 4, Section 4.8, such as implementing a fugitive dust control plan, stabilizing dust on access roads, and imposing vehicle idling restrictions, would reduce particulate matter emissions from the Moss Landing ~~Project~~ and North Marina Projects to a less than cumulatively considerable level. As noted in Section 6.8, several components of the Phase 1 Regional Project would occur under the jurisdiction of agencies other than the CPUC (i.e., MCWD, MCWRA, and MRWPCA). For this reason, the mitigation measures designed to alleviate the construction impacts would require coordinated planning and implementation of mitigation efforts by the various agencies to ensure the outcome would be less than significant. If the agencies coordinate efforts and impose requirements and comply with the mitigation measures for PM10 emissions, then the PM10 emissions could be reduced to a less than cumulatively considerable level. ~~Ozone producing emissions associated with construction activities from the Moss Landing Project would also not be substantial and therefore, would be less than cumulatively considerable.~~ However, as discussed in Chapter 6, Section 6.8, Phase 1 and Phase 2 Projects under the Regional Project could result in a significant and unavoidable impact and would have a cumulatively considerable contribution toward cumulative impacts.

~~*Noise*~~

~~Concurrent construction of the projects listed in Table 9-1 could increase noise levels temporarily and violate the noise standards established in the local general plans or noise ordinances. The increased noise levels as well as the temporary vibration from construction equipment could have an adverse effect on nearby sensitive receptors, mostly in the case of projects located in the same neighborhoods or in close vicinity of sensitive receptors (such as development projects in Marina, Seaside and Monterey). As discussed in Chapter 4, Section 4.9, Noise, the impacts from the Moss Landing and North Marina Projects would be minimized to less than significant levels with despite mitigation such as scheduling construction activities during specific hours of the day, notifying residents in the construction area, using equipment with sound control devices, and implementation of a Vibration Mitigation Plan. Concurrent construction activities would result in a significant cumulative impact.~~

~~As discussed in Chapter 4, Section 4.9, the noise impact from the construction of Moss Landing Project would be significant and unavoidable due to the increased noise levels from the ASR facilities. The project contribution would be cumulatively considerable.~~

~~As discussed in Chapter 6, Section 6.9, the noise impacts from the construction of the ASR facilities as part of Phase 1 and Phase 2 of the Regional Project would be less than significant with mitigationand unavoidable, and therefore the Regional Project would have a cumulatively considerable contribution toward cumulative impacts.~~

ES.4.2.2 Operational Impacts

Operational cumulative impacts resulting from the projects discussed in Chapter 9 are summarized below for ~~each~~some of the resource areas ~~where the overall cumulative impact is determined to be significant~~. Chapter 9, Section 9.4.1 provides discussion of cumulative impacts for all of the resource areas~~project facilities~~.

Surface Water

Under Phase 2 of the Regional Project, recycled water would be distributed for summertime irrigation in Fort Ord, Marina, and Seaside areas through the Regional Urban Water Augmentation Project pipeline. The pipeline would be used for conveying advanced treated water for storage in the Seaside Groundwater Basin in winter. As further explained in Chapter 6, Section 6.1, the water quality of the advanced treated water for ASR could be adversely affected. The impact is therefore considered to be significant and unavoidable. The contribution of Phase 2 projects to cumulative hydrology and water quality impacts would therefore be cumulatively considerable.

Air Quality

As described in Chapter 4, Section 4.8, Air Quality, long-term greenhouse gas (GHG) emissions associated with the substation for the Moss Landing and North Marina Projects would be approximately 3.3 metric tons CO2e[1] per year and electricity use associated with the Moss Landing Project and the North Marina Project would result in approximately 7,910~~11,279~~ and ~~12,637~~9,032 metric tons of CO2e each year, respectively. The total estimated GHG emissions that would be associated with the operations of the proposed Moss Landing Project or the North Marina Project would exceed ~~be at least twice~~ the amount of California Air Resources Board's (CARB) preliminary draft significance threshold ~~for industrial uses, which is based on cumulative emissions generated in California~~. Mitigation measures have been imposed on the project to avoid or substantially reduce, to the extent feasible, its GHG emissions. ~~Nonetheless the project would still exceed the preliminary draft significance threshold established by CARB.~~ As discussed in Section 4.8, implementation of the mitigation measures, including an energy minimizing and GHG reduction plan would minimize the project impact to less than significant; therefore the project's contribution would not be cumulatively considerable. However, for the Regional Project, coordination among various agencies would be required to implement mitigation as noted in Section 6.8, and there is no guarantee that the measures would reduce the total estimated emissions to below the significance thresholds. Therefore, impact from GHG emissions from the Regional Project is considered significant and unavoidable and could have cumulative considerable contribution toward the cumulative impact.

~~As such, the project would have a significant and unavoidable cumulative impact to GHG emissions, as further explained in Chapter 4, Section 4.8.~~

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[1] Carbon dioxide equivalents (see Section 4.8, Air Quality, for further details).

Liquefaction

As described in Chapter 6, Section 6.5, Geology, Soils, and Seismicity, potential adverse effects of project-induced liquefaction occurring in the saturated dune sands behind the proposed subsurface slurry cut-off wall (groundwater dam) under the Phase 2 of the Regional Project could be significant. The impact would depend upon the situation of the project facilities within the project induced liquefaction hazard zone, the amount of water stored in the sediments and the length of the slurry wall. The impact would remain significant and unavoidable until such time as further studies are conducted to demonstrate that effects of liquefaction would not cause an adverse impact on the environment. The cumulative effects would therefore be significant and Phase 2 of the Regional Project would have a cumulatively considerable contribution.

ES.5 Analysis of Alternatives

In addition to the Applicant’s Proposed project (the Moss landing Project), this EIR evaluates 2 other alternatives (the North Marina and Phase 1 Regional Projects) at an equal level of detail; the Phase 2 Regional Project is evaluated more generally. Chapter 7 of this EIR also evaluates alternative components for each of the projects (e.g. intakes, outfalls, pipeline routes, plant locations), as well as a Ship-Based Desalination project; the Phase 1 Regional Project Plus Seaside Groundwater Basin Replenishment Project; and a CalAm Growth Project in addition to the required No Project alternative.

ES.6 Issues to be Resolved and Areas of Controversy

ES.6.1 Unresolved Issues

Relationships and working agreements between agencies involved in the Regional Project need to be developed and formalized: In order to implement the Regional Project, MCWD will assume the role of Project Sponsor of the desalination facility and the surface water treatment plant; MRWPCA will continue to be the owner and operator of the outfall, and; CalAm will be a water purchaser and could be the desalination project operator. MCWRA will likely be responsible for drilling and operating the groundwater extraction wells and will have oversight of project implementation as a result of their broad legislative authority. To date, several Memorandums of Understanding on the Regional Project have been developed between the local agencies, including MCWRA, MCWD, MRWPCA and CalAm.

The Future of Once Through Cooling (OTC) at Moss Landing is uncertain: Because OTC has been under increasing scrutiny due to entrainment and impingement of marine organisms at the sea water intakes (see Chapter 4, Section 4.3, Marine Biological Resources), there is a possibility that the MLPP OTC system may not be re-permitted in the future. In the absence of the OTC system, the desalination facility would require a new intake facility or it would have to utilize the existing intake to draw 24~~22.2~~ mgd of source water from the Moss Landing Harbor.

Implementation of Mitigation Measures to address Criteria Air Pollutant, PM_{10}. Estimated construction emissions of criteria air pollutant, PM_{10}, would result in a significant impact for the

Moss Landing, North Marina, or Regional Projects. Mitigation measures designed to alleviate the PM_{10} construction impact from the Phase 1 Regional Project would require coordinated planning and implementation of mitigation efforts by the various agencies to ensure that the outcome would be less than significant. If the agencies do not coordinate efforts and do not impose and comply with the mitigation measures for PM_{10} emissions, then the PM_{10} emissions could continue to exceed the applicable significance thresholds. Given the October 20, 2009, issuance of the Cease and Desist Order by the SWRCB (Order WR 2009-0060), time is of the essence in developing a replacement water supply to cease unauthorized withdrawal of water from the Carmel River. The potential need to accelerate the construction schedule may make it unrealistic for any of the proposed projects—including the North Marina Project—to comply with the PM_{10} mitigation measure. If the mitigation measures are indeed deemed infeasible at the project decision-making level, then North Marina and Phase 1 would be equal in terms of impacts stemming from PM_{10} emissions during construction.

ES.6.2 Areas of Controversy

Use of the Salinas Valley groundwater for use on the Monterey Peninsula: The North Marina Project will utilize subsurface intakes as a desalination source water supply, as will Phase 1 of the Regional Project. The projects have~~has~~ been defined in such a way as to ensure that water drawn from the Salinas Valley groundwater basin remains in the basin. But the concept may be controversial.

Appropriate use of recycled water and recycled water infrastructure: There are multiple ways to utilize the unassigned balance of the recycled water that is produced at the Salinas Valley Reclamation Project, which is operated by the MRWPCA. Some support agriculture and some support urban irrigation uses. How the recycled water is used, who has rights to use or deliver it, and what facilities are used for its delivery, are controversial issues that are not completely resolved.

Public versus Private ownership of a desalination facility in Monterey County: By Monterey County ordinance, private companies cannot own a desalination project. CalAm is a private, investor owned utility.

Provision of replacement water (or water for existing uses only) versus water for approved growth: The Applicant's Proposed Project at Moss Landing, the North Marina Project and Phase 1 of the Regional Project, all provide water for existing uses ~~only~~. In addition, Phase 1 of the Regional Project also includes replenishment water for a previously-approved supply for portions of Fort Ord within the MCWD service area. The Phase 2 Regional Project includes supplies to meet the needs of approved growth. While any water supply project in Monterey County is controversial, a project that includes water for growth, may be very controversial.

ES.7 Organization of This EIR

This Draft EIR has been organized into the following sections:

The **Summary** contains an overview of the project, including project description, impacts, and various conclusions.

Chapter 1 is an introduction to the CEQA process and the organization of the EIR.

Chapter 2 describes current and future water demands in both the California American Water (CalAm) Monterey District service area and the broader region of northern Monterey County that would be served under a regional project alternative, and the supplies available to meet this demand.

Chapter 3 contains a description of two projects: Moss Landing Project (the Applicant Proposed Project) and North Marina Project.

Chapter 4 includes 14 sections that address the impacts of the Moss Landing Project and North Marina Project on various resource areas.

Chapter 5 contains a description of the Regional Project.

Chapter 6 includes 14 sections that address the impacts of the Regional Project on various resource areas.

Chapter 7 presents a comparison of alternatives that have been considered during the process of compiling this EIR.

Chapter 8 discusses the potential of the CWP to cause “growth-inducing” impacts.

Chapter 9 discusses the potential for the CWP to cause cumulative impacts.

Chapter 10 is a list of preparers of the document.

Chapter 11 is an introduction and guide to the response to comments portion of the EIR (Volumes 4 through 5).

Chapter 12 includes all comments submitted during the public review period.

Chapter 13 includes sixteen long-format Master Responses on important topics brought up during the public review period.

Chapter 14 includes the responses to the comments presented in Chapter 12.

TABLE ES-2
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF MOSS LANDING AND NORTH MARINA PROJECT SITES

		Moss Landing Facilities				**North Marina Facilities**			**Facilities Common to Both Projects**					**Collective Impact**	
	Impact	**Plant: Moss Landing Desalination Site**	**Intake: Moss Landing Desalination Site**	**Outfall: Moss Landing Desalination Site**	**Transmission Main North**	**Plant: North Marina Desalination Site**	**Intake: North Marina Desalination Site**	**Outfall: North Marina Desalination Site**	**Transmission Main South**	**Terminal Reservoir Site**	**Valley Greens Pump Station**	**Aquifer Storage and Recovery Facilities**	**Monterey Pipeline**	**MOSS LANDING PROJECT**	**NORTH MARINA PROJECT**
Surface Water Resources	**4.1-1**: Project construction activities could cause erosion and increase stormwater runoff resulting in an adverse water quality impact.	SM	SM	--	SM	SM	SM	--	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.1-1: Additional Erosion Control Measures and Monitoring Program	X	X		X	X	X		X	X	X	X	X	X	X
	4.1-2: Excavation during construction could require dewatering of shallow groundwater. The water discharge, if contaminated, could adversely affect surface water.	SM	SM	--	SM	SM	SM	--	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.1-2: Extracted Groundwater Measures	X	X		X	X	X		X	X	X	X	X	X	X
	4.1-3: The product water generated at the desalination facilities would be used as potable water that would be compliant with the drinking water standards.	--	--	LTS	--	--	--	LTS	--	--	--	--	--	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	4.1-4: The project discharge from the desalination facility could degrade the marine water quality in Monterey Bay.	--	--	SM	--	--	--	SM	--	--	--	--	--	SM	SM
	EIR Mitigation Measures														
	4.1-4a: Moss Landing Monitoring Program			X										X	
	4.1-4b: Water Sampling Measures			X										X	
	4.1-4c: Develop an Aeration System							X						X	
	4.1-5: The proposed project would add impervious surfaces that could alter the drainage pattern and increase storm runoff that could exceed the storm drainage system. The increased runoff flow could cause downstream erosion, siltation, and/or flooding.	LTS	LTS	--	--	LTS	LTS	--	--	LTS	LTS	LTS	--	LTS	LTS
	None required.														

TABLE ES-2 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF MOSS LANDING AND NORTH MARINA PROJECT SITES

		Moss Landing Facilities				North Marina Facilities			Facilities Common to Both Projects					Collective Impact	
	Impact	**Plant: Moss Landing Desalination Site**	**Intake: Moss Landing Desalination Site**	**Outfall: Moss Landing Desalination Site**	**Transmission Main North**	**Plant: North Marina Desalination Site**	**Intake: North Marina Desalination Site**	**Outfall: North Marina Desalination Site**	**Transmission Main South**	**Terminal Reservoir Site**	**Valley Greens Pump Station**	**Aquifer Storage and Recovery Facilities**	**Monterey Pipeline**	**MOSS LANDING PROJECT**	**NORTH MARINA PROJECT**
Surface Water Resources	**4.1-6:** Project operation would result in reduced pumping of the Carmel River water resulting in a relatively minor increase in the flows in Carmel River. *(Impact is to Carmel River, which is not included on this table. Refer to Section 4.4.1, Surface Water Resources)*	--	--	--	--	--	--	--	--	--	--	--	--	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	4.1-7: Portions of the proposed project would be located within a 100-year flood hazard area and could impede or redirect flood flows.	LTS	LTS	--	LTS	--	--	--	--	--	--	--	--	LTS	--
	EIR Mitigation Measures														
	None required.														
	4.1-8: The proposed project could expose people or structures to risk from flooding resulting from failure of a dam or levee.	LTS	LTS	--	LTS	--	--	--	--	--	--	--	--	LTS	--
	EIR Mitigation Measures														
	None required.														
	4.1-9: The proposed project facilities could expose people or structures to risk from flooding due to a tsunami.	SM	SM	--	LTS	--	--	--	--	--	--	--	--	SM	LTS
	EIR Mitigation Measures														
	4.1-9: Tsunami Run-up Study	X	X											X	
	4.1-10: The proposed project facilities could be subject to flooding due to the sea level rise from global warming.	LTS	LTS	--	LTS	--	--	--	--	--	--	--	--	LTS	LTS
	EIR Mitigation Measures														
	None required.														

TABLE ES-2 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF MOSS LANDING AND NORTH MARINA PROJECT SITES

		Moss Landing Facilities				North Marina Facilities			Facilities Common to Both Projects					Collective Impact	
	Impact	**Plant: Moss Landing Desalination Site**	**Intake: Moss Landing Desalination Site**	**Outfall: Moss Landing Desalination Site**	**Transmission Main North**	**Plant: North Marina Desalination Site**	**Intake: North Marina Desalination Site**	**Outfall: North Marina Desalination Site**	**Transmission Main South**	**Terminal Reservoir Site**	**Valley Greens Pump Station**	**Aquifer Storage and Recovery Facilities**	**Monterey Pipeline**	**MOSS LANDING PROJECT**	**NORTH MARINA PROJECT**
Groundwater Resources	**4.2-1:** The construction and development of ASR injection / extraction wells or desalination water supply wells may cause short-term changes in groundwater quality or violate waste discharge requirements.	--	--	--	--	--	--	--	--	--	--	SM	--	SM	SM
	EIR Mitigation Measures														
	4.2-1: Prepare Report of Waste Discharge/NPDES permit											X		X	X
	4.2-2: The injection and storage of Carmel River and/or desalinated water into the SGB ASR program may violate water quality standards or waste discharge requirements.	--	--	--	--	--	--	--	--	--	--	LTS	--	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	4.2-3: The storage of Carmel River or desalinated water in the ASR program would increase groundwater storage and water levels in the SGB.	--	--	--	--	--	--	--	--	--	--	B	--	B	B
	EIR Mitigation Measures														
	None required.														
	4.2-4: Operation of the proposed slant wells for the NMA desalination water supply could lower groundwater levels and damage neighboring water supply wells within the vicinity of the proposed project.	--	--	--	--	--	LTS	--	--	--	--	--	--	--	LTS
	EIR Mitigation Measures														
	None required.														
	4.2-5: Operation of the proposed slant wells for the NMA desalination water supply could deplete groundwater resources within the Salinas Valley and export groundwater from the SVGB.	--	--	--	--	--	LTS	--	--	--	--	--	--	--	LTS
	EIR Mitigation Measures														
	None required.														

TABLE ES-2 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF MOSS LANDING AND NORTH MARINA PROJECT SITES

		Moss Landing Facilities				North Marina Facilities			Facilities Common to Both Projects					Collective Impact	
	Impact	**Plant: Moss Landing Desalination Site**	**Intake: Moss Landing Desalination Site**	**Outfall: Moss Landing Desalination Site**	**Transmission Main North**	**Plant: North Marina Desalination Site**	**Intake: North Marina Desalination Site**	**Outfall: North Marina Desalination Site**	**Transmission Main South**	**Terminal Reservoir Site**	**Valley Greens Pump Station**	**Aquifer Storage and Recovery Facilities**	**Monterey Pipeline**	**MOSS LANDING PROJECT**	**NORTH MARINA PROJECT**
Groundwater Resources	**4.2-6:** Operation of the proposed slant wells for the NMA water supply may otherwise degrade water quality by inducing seawater intrusion.	--	--	--	--	--	LTS	--	--	--	--	--	--	--	LTS
	EIR Mitigation Measures														
	None required.														
Marine Biological Resources	**4.3-1:** Intake of source water for the proposed desalination facility could potentially result in nominal additional entrainment of marine and estuarine aquatic organisms.	--	LTS	--	--	--	--	--	--	--	--	--	--	LTS	--
	EIR Mitigation Measures														
	None required.														
	4.3-2: The project discharge from the desalination facility could degrade marine habitat and species.	--	--	SM	--	--	--	SM	--	--	--	--	--	SM	SM
	EIR Mitigation Measures														
	See Measures 4.1-4a and 4.1-4b			X										X	
	4.3-2a: Sampling of Benthic Organisms			X										X	
	4.3-2b: Measure Sediment Size Distribution of Inflow and Backwash Water			X										X	
	See Measure 4.1-4c							X							X
Biological Resources	**4.4-1:** The project may adversely affect species identified as rare, threatened, endangered, candidate, sensitive, or other special status by the California Department of Fish and Game, ~~or~~ U.S. Fish and Wildlife Service, or National Marine Fisheries Service.	SM	-	-	SM	SM	SM	-	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.4-1a: Avoid Harm or Harassment of Special-Status Invertebrates (Smith's Blue Butterfly)				X		X							X	X
	4.4-1b: Avoid Harm or Harassment of Tidewater Gobies and of South-Central California Coast Steelhead, Pacific Lampreys, and River Lampreys				X									X	

TABLE ES-2 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF MOSS LANDING AND NORTH MARINA PROJECT SITES

		Moss Landing Facilities				North Marina Facilities			Facilities Common to Both Projects					Collective Impact	
	Impact	**Plant: Moss Landing Desalination Site**	**Intake: Moss Landing Desalination Site**	**Outfall: Moss Landing Desalination Site**	**Transmission Main North**	**Plant: North Marina Desalination Site**	**Intake: North Marina Desalination Site**	**Outfall: North Marina Desalination Site**	**Transmission Main South**	**Terminal Reservoir Site**	**Valley Greens Pump Station**	**Aquifer Storage and Recovery Facilities**	**Monterey Pipeline**	**MOSS LANDING PROJECT**	**NORTH MARINA PROJECT**
Biological Resources	4.4-1c: Avoid Harm or Harassment of California Red-legged Frogs, California Tiger Salamanders, and Santa Cruz Long-Toed Salamanders	X			X	X	X							X	X
	4.4-1d: Avoid Direct Mortality and/or Disturbance of Special-Status Plant Populations	X				X				X		X	X	X	X
	4.4-1e: Avoid Construction Impacts on Burrowing Owls	X			X	X	X		X			X		X	X
	4.4-1f: Avoid Construction Impacts on Other Special-Status Birds	X			X	X	X		X			X		X	X
	4.4-2: The project may adversely affect riparian habitat or other sensitive natural community identified in local or regional plans, policies regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.	SM	-	-	SM	LTS	LTS	-	SM	SM	LTS	SM	LTS	SM	SM
	EIR Mitigation Measures														
	4.4-2a: Avoid Construction Impacts on Riparian Habitat	X			X									X	
	4.4-2b: Avoid Construction Impacts on Sensitive Upland Habitats								X	X		X		X	X
	4.4-3: The project may adversely affect federally protected wetlands as defined by Section 404 of the Clean Water Act.	SM	-	-	SM	LTS	LTS	-	LTS	LTS	LTS	LTS	LTS	SM	LTS
	EIR Mitigation Measures														
	4.4-3: Wetland Protection Measures	X			X									X	
	4.4-4: The project may adversely affect the movement of native resident or migratory fish or wildlife species or established native resident or migratory wildlife corridors.	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	4.4-5: The project may conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	SM	-	-	SM	SM	-	-	SM	SM	SM	SM	LTS	SM	SM
	EIR Mitigation Measures														
	4.4-5: Tree Survey	X			X	X			X	X	X	X		X	X

TABLE ES-2 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF MOSS LANDING AND NORTH MARINA PROJECT SITES

		Moss Landing Facilities				North Marina Facilities			Facilities Common to Both Projects					Collective Impact	
	Impact	**Plant: Moss Landing Desalination Site**	**Intake: Moss Landing Desalination Site**	**Outfall: Moss Landing Desalination Site**	**Transmission Main North**	**Plant: North Marina Desalination Site**	**Intake: North Marina Desalination Site**	**Outfall: North Marina Desalination Site**	**Transmission Main South**	**Terminal Reservoir Site**	**Valley Greens Pump Station**	**Aquifer Storage and Recovery Facilities**	**Monterey Pipeline**	**MOSS LANDING PROJECT**	**NORTH MARINA PROJECT**
Biological Resources	**4.4-6:** Operation of the project would alter Carmel River flows and may thus indirectly affect federally-listed threatened steelhead and other special-status aquatic species. This would be a beneficial impact. *(Impact is to Carmel River is beneficial, and not included on this table. Refer to Section 4.4.4, Biological Resources)*	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
	EIR Mitigation Measures														
	None required.														
Geology, Soils and Seismicity	**4.5-1:** Large earthquakes would be expected to damage the proposed facilities, impairing and/or disrupting their intended operations if not engineered to withstand such ground shaking.	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.5-1: Conduct Geotechnical Investigation	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.5-2: Proposed pipelines and facilities could incur damage as a result of underlying soil properties (high shrink-swell potential, and corrosivity).	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.5-2: Compliance with Applicable Policies to Reduce Adverse Effects of Expansive Soils and Corrosivity	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.5-3: Continuing coastal erosion could expose sub-surface components of the project which may result in these structures being damaged or destroyed within the project lifetime rendering delivery systems inoperable.	--	--	--	--	--	LTS	--	--	--	--	--	--	~~--~~ LTS	LTS
	EIR Mitigation Measures														
	None required.														
	4.5-4: Potential injury and/or damage resulting from landslides including earthquake induced landslides.	LTS	LTS	LTS	LTS	LTS	LTS	LTS	SM	SM	LTS	LTS	LTS	SM	SM
	EIR Mitigation Measures														
	4.5-4: Perform Site-Specific Geotechnical Evaluations								X	X				X	X

TABLE ES-2 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF MOSS LANDING AND NORTH MARINA PROJECT SITES

		Moss Landing Facilities				North Marina Facilities			Facilities Common to Both Projects					Collective Impact	
	Impact	**Plant: Moss Landing Desalination Site**	**Intake: Moss Landing Desalination Site**	**Outfall: Moss Landing Desalination Site**	**Transmission Main North**	**Plant: North Marina Desalination Site**	**Intake: North Marina Desalination Site**	**Outfall: North Marina Desalination Site**	**Transmission Main South**	**Terminal Reservoir Site**	**Valley Greens Pump Station**	**Aquifer Storage and Recovery Facilities**	**Monterey Pipeline**	**MOSS LANDING PROJECT**	**NORTH MARINA PROJECT**
Geology, Soils & Seismicity	**4.5-5:** Seismically induced ground failure, including liquefaction and settlement	SM	SM	SM	SM	LTS	SM	SM	LTS	LTS	LTS	LTS	SM	SM	SM
	EIR Mitigation Measures														
	4.5-5: Compliance with Applicable Policies to Reduce Adverse Effects of Groundshaking and Liquefaction	X	X	X	X		X	X					X	X	X
Hazards and Hazardous Materials	**4.6-1:** Excavation and grading for the project could expose construction workers, the public, or the environment to hazardous materials that may be present in excavated soil or groundwater.	SM	--	--	SM	SM	SM	--	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.6-1a: Conduct Phase I Environmental Site Assessment	X			X	X	X		X	X	X	X	X	X	X
	4.6-1b: Prepare Project-Specific Health and Safety Plan	X			X	X	X		X	X	X	X	X	X	X
	4.6-1c: Site Health and Safety Supervisor	X			X	X	X		X	X	X	X	X	X	X
	4.6-1d: Compliance with Excavation, Digging, and Development Regulations	X			X	X	X		X	X	X	X	X	X	X
	4.6-1e: Materials Disposal Plan	X			X	X	X		X	X	X	X	X	X	X
	4.6-2: Potential for accidental release of hazardous materials from construction activities.	LTS	--	--	LTS	LTS	LTS	--	LTS	LTS	LTS	LTS	LTS	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	4.6-3: Handling and Use of Hazardous Materials within ¼-mile of a school during construction.	--	--	--	--	--	--	--	LTS	--	--	LTS	--	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	4.6-4: Increased risk of wildland fires during construction in high fire hazard areas.	--	--	--	LTS	--	--	--	LTS	LTS	LTS	LTS	--	LTS	LTS
	EIR Mitigation Measures														
	None required.														

TABLE ES-2 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF MOSS LANDING AND NORTH MARINA PROJECT SITES

		Moss Landing Facilities				North Marina Facilities			Facilities Common to Both Projects					Collective Impact	
	Impact	**Plant: Moss Landing Desalination Site**	**Intake: Moss Landing Desalination Site**	**Outfall: Moss Landing Desalination Site**	**Transmission Main North**	**Plant: North Marina Desalination Site**	**Intake: North Marina Desalination Site**	**Outfall: North Marina Desalination Site**	**Transmission Main South**	**Terminal Reservoir Site**	**Valley Greens Pump Station**	**Aquifer Storage and Recovery Facilities**	**Monterey Pipeline**	**MOSS LANDING PROJECT**	**NORTH MARINA PROJECT**
Hazards and Hazardous Materials	**4.6-5:** Potential for accidental release of chemicals or petroleum products.	LTS	--	--	--	LTS	--	--	--	LTS	LTS	LTS	--	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	4.6-6: Handling of hazardous materials within ¼-mile of a school.	--	--	--	--	--	--	--	LTS	--	--	LTS	--	LTS	LTS
	EIR Mitigation Measures														
	None required.														
Traffic and Circulation	**4.7-1:** Short-term increases in vehicle trips by construction workers and construction vehicles on area roadways.	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.7-1: Road Encroachment Permits and Traffic Control and Safety Assurance Plan	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.7-2: Reduction in the number of, or the available width of, travel lanes on roads where pipeline construction would occur, resulting in short-term traffic delays for vehicles traveling past the construction zones.	--	--	--	SM	--	SM	--	SM	--	--	--	SM	SM	SM
	EIR Mitigation Measures														
	4.7-2: Additional Requirements to be Incorporated into the Traffic Control and Safety Assurance Plan				X		X		X				X	X	X
	See Measure 4.7-1				X		X		X				X	X	X
	4.7-3: Demand for parking spaces to accommodate construction worker vehicles.	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.7-3: Identify Locations for Construction Worker Parking	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	See Measure 4.7-1	X	X	X	X	X	X	X	X	X	X	X	X	X	X

TABLE ES-2 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF MOSS LANDING AND NORTH MARINA PROJECT SITES

		Moss Landing Facilities				North Marina Facilities			Facilities Common to Both Projects					Collective Impact	
	Impact	**Plant: Moss Landing Desalination Site**	**Intake: Moss Landing Desalination Site**	**Outfall: Moss Landing Desalination Site**	**Transmission Main North**	**Plant: North Marina Desalination Site**	**Intake: North Marina Desalination Site**	**Outfall: North Marina Desalination Site**	**Transmission Main South**	**Terminal Reservoir Site**	**Valley Greens Pump Station**	**Aquifer Storage and Recovery Facilities**	**Monterey Pipeline**	**MOSS LANDING PROJECT**	**NORTH MARINA PROJECT**
Traffic and Circulation	**4.7-4:** Potential traffic safety hazards for vehicles, bicyclists, and pedestrians on public roadways.	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.7-4: Roadside Safety Protocols	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	See Measure 4.7-1	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.7-5: Access disruption to adjacent land uses and streets for both general traffic and emergency vehicles.	--	--	--	SM	--	SM	--	SM	--	--	--	SM	SM	SM
	EIR Mitigation Measures														
	4.7-5: Access Safety Measures				X		X		X				X	X	X
	See Measure 4.7-1				X		X		X				X	X	X
	4.7-6: Disruptions to transit and railroad service on pipeline alignment routes.	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.7-6: Coordination with Monterey-Salinas Transit and UPRR	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	See Measure 4.7-1	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.7-7: Increased wear-and-tear on the designated haul routes used by construction vehicles.	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.7-7: Documentation of Road Conditions Prior to Project Construction	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.7-8: Long-Term Project Operations and Maintenance.	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
	EIR Mitigation Measures														
	None required.														

TABLE ES-2 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF MOSS LANDING AND NORTH MARINA PROJECT SITES

		Moss Landing Facilities				**North Marina Facilities**			**Facilities Common to Both Projects**					**Collective Impact**	
	Impact	**Plant: Moss Landing Desalination Site**	**Intake: Moss Landing Desalination Site**	**Outfall: Moss Landing Desalination Site**	**Transmission Main North**	**Plant: North Marina Desalination Site**	**Intake: North Marina Desalination Site**	**Outfall: North Marina Desalination Site**	**Transmission Main South**	**Terminal Reservoir Site**	**Valley Greens Pump Station**	**Aquifer Storage and Recovery Facilities**	**Monterey Pipeline**	**MOSS LANDING PROJECT**	**NORTH MARINA PROJECT**
Air Quality	**4.8-1:** Construction activities would generate emissions of criteria pollutants, including fugitive dust and equipment exhaust particulate matter.	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.8-1a: Construction Fugitive Dust Control Plan	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.8-1b: Stabilize Dust on Access Roads	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.8-1c: Idling Restrictions	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.8-1d: Construction Emissions Control Plan														
	4.8-2: Project operations would result in emissions, including diesel particulates, from testing and emergency use of standby generators, as well as material haul trips and employee trips related to inspections and maintenance.	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	4.8-3: Construction activities would generate a cumulatively considerable net increase of PM10.	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	See Measures 4.8-1a thru 4.8-1d.	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.8-4: ~~Construction~~ Project activities would generate emissions of diesel particulate matter (DPM), potentially exposing local sensitive receptors to pollutant concentrations.	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	4.8-5: Conflict with the State of California's goal of reducing greenhouse gas emissions to 1990 levels by 2020 (AB 32).	~~SU~~ SM	~~SU~~ SM	~~SU~~ SM	~~SU~~ SM	~~SU~~ SM	~~SU~~ SM	~~SU~~ SM	~~SU~~ SM	~~SU~~ SM	~~SU~~ SM	~~SU~~ SM	~~SU~~ SM	~~SU~~ SM	~~SU~~ SM
	EIR Mitigation Measures														
	See Measure 4.8-1c.	X	X	X	X	X	X	X	X	X	X	X	X	X	X

TABLE ES-2 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF MOSS LANDING AND NORTH MARINA PROJECT SITES

		Moss Landing Facilities				North Marina Facilities			Facilities Common to Both Projects					Collective Impact	
	Impact	**Plant: Moss Landing Desalination Site**	**Intake: Moss Landing Desalination Site**	**Outfall: Moss Landing Desalination Site**	**Transmission Main North**	**Plant: North Marina Desalination Site**	**Intake: North Marina Desalination Site**	**Outfall: North Marina Desalination Site**	**Transmission Main South**	**Terminal Reservoir Site**	**Valley Greens Pump Station**	**Aquifer Storage and Recovery Facilities**	**Monterey Pipeline**	**MOSS LANDING PROJECT**	**NORTH MARINA PROJECT**
Air Quality	4.8-5a: Aerodynamic Efficiency for Trucks	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.8-5b: Low SF_6 Leak Rate Circuit Breaker and Monitoring	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.8-6: Project construction and operations would result in odors.	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
	EIR Mitigation Measures														
	None Required.														
Noise and Vibration	**4.9-1**: Construction activity would violate standards established in the local general plans or noise ordinances, and/or would adversely affect nearby sensitive receptors.	SM	--	--	SM	SM	~~SU~~ SM	--	SM	LTS	SM	~~SU~~ SM	SM	~~SU~~ SM	~~SU~~ SM
	EIR Mitigation Measures														
	4.9-1a: Locate Stationary Noise-Generating Equipment	X			X	X	X		X	X	X	X	X	X	X
	4.9-1b: Limit Construction Activity Hours	X			X	X	X		X	X	X	X	X	X	X
	4.9-1c: Sound Control Devices	X			X	X	X		X	X	X	X	X	X	X
	4.9-1d: Notify Nearby Residences and other Sensitive Receptors	X			X	X	X		X	X	X	X	X	X	X
	4.9-1e: Obtain Approval for Night-Time Construction											X		X	X
	4.9-1f: Construction Activities Outside School Hours											X		X	X
	4.9-2: Operation of the proposed desalination plant and other conveyance facilities would potentially increase existing noise levels, which could exceed noise level standards and/or result in nuisance impacts.	SM	--	--	LTS	SM	LTS	--	LTS	LTS	SM	SM	LTS	SM	SM
	EIR Mitigation Measures														
	4.9-2: Noise Enclosures and Setback	X				X					X	X		X	X

TABLE ES-2 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF MOSS LANDING AND NORTH MARINA PROJECT SITES

		Moss Landing Facilities				North Marina Facilities			Facilities Common to Both Projects					Collective Impact	
	Impact	**Plant: Moss Landing Desalination Site**	**Intake: Moss Landing Desalination Site**	**Outfall: Moss Landing Desalination Site**	**Transmission Main North**	**Plant: North Marina Desalination Site**	**Intake: North Marina Desalination Site**	**Outfall: North Marina Desalination Site**	**Transmission Main South**	**Terminal Reservoir Site**	**Valley Greens Pump Station**	**Aquifer Storage and Recovery Facilities**	**Monterey Pipeline**	**MOSS LANDING PROJECT**	**NORTH MARINA PROJECT**
Noise and Vibration	**4.9-3:** Short-term construction within the Project area would result in temporary vibration impacts on nearby sensitive receptors and structures.	LTS	--	--	LTS	LTS	SM	--	LTS	LTS	LTS	LTS	LTS	LTS	SM
	EIR Mitigation Measures														
	See Measures 4.9-1b and 4.9-1d.						X								X
	~~4.9-3: Use Trenchless Technology~~						~~X~~								~~X~~
Land Use, Recreation and Agriculture	**4.10-1:** Components of the Moss Landing Project or North Marina Project may permanently divide or temporarily disrupt an established community.	LTS	--	--	SM	SM	LTS	--	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.10-1a: Develop Construction Detours as Stated in Traffic Control and Safety Assurance Plan (see Measure 4.7-1)				X	X			X	X			X	X	X
	4.10-1b: Safe Access for Pedestrians and Bicyclists as Stated in Traffic Control and Safety Assurance Plan (see Measure 4.7-4)				X	X			X	X			X	X	X
	4.10-1c: Restore Disturbed Areas				X	X						X	X	X	X
	See measures in Section 4.8									X	X			X	X
	See measures in Section 4.9									X	X			X	X
	See measures in Section 4.12										X			X	X
	4.10-2: Components of the project may conflict with applicable land use plans, policies, or regulations of agencies with jurisdiction over the project.	LTS	--	--	SM	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	SM	LTS
	EIR Mitigation Measures														
	4.10-1b: Safe Access for Pedestrians and Bicyclists as Stated in Traffic Control and Safety Assurance Plan (see Measure 4.7-4)				X									X	

TABLE ES-2 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF MOSS LANDING AND NORTH MARINA PROJECT SITES

		Moss Landing Facilities				North Marina Facilities			Facilities Common to Both Projects					Collective Impact	
	Impact	**Plant: Moss Landing Desalination Site**	**Intake: Moss Landing Desalination Site**	**Outfall: Moss Landing Desalination Site**	**Transmission Main North**	**Plant: North Marina Desalination Site**	**Intake: North Marina Desalination Site**	**Outfall: North Marina Desalination Site**	**Transmission Main South**	**Terminal Reservoir Site**	**Valley Greens Pump Station**	**Aquifer Storage and Recovery Facilities**	**Monterey Pipeline**	**MOSS LANDING PROJECT**	**NORTH MARINA PROJECT**
Land Use, Recreation and Agriculture	**4.10-3:** Implementation of the project could result in the permanent conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance from agricultural operation.	LTS	LTS	LTS	SM	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	SM	SM
	EIR Mitigation Measures														
	4.10-3: CalAm shall develop a construction schedule that avoids conflict with growing seasons and rotation patterns of crops.														
	4.10-4: Project facilities could conflict with agricultural zoning or Williamson Act contracts.	--	--	--	LTS	--	--	--	--	--	--	--	--	LTS	--
	EIR Mitigation Measures														
	None required.														
Land Use, Recreation and Agriculture	**4.10-5:** The project could potentially increase the use of existing parks or recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	4.10-6: The project could potentially include recreational facilities or require construction or expansion of recreational facilities that might have an adverse physical effect on the environment.	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	EIR Mitigation Measures														
	None required.														
Public Services and \Utilities	**4.11-1:** Potential damage to or interference with existing public utilities.	SM	--	--	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.11-1a: Verify locations of overhead utilities.	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.11-1b: Verify locations of underground utilities.	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.11-1c: Verify locations of underground utilities.	X	X	X	X	X	X	X	X	X	X	X	X	X	X

TABLE ES-2 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF MOSS LANDING AND NORTH MARINA PROJECT SITES

		Moss Landing Facilities				**North Marina Facilities**			**Facilities Common to Both Projects**					**Collective Impact**	
	Impact	**Plant: Moss Landing Desalination Site**	**Intake: Moss Landing Desalination Site**	**Outfall: Moss Landing Desalination Site**	**Transmission Main North**	**Plant: North Marina Desalination Site**	**Intake: North Marina Desalination Site**	**Outfall: North Marina Desalination Site**	**Transmission Main South**	**Terminal Reservoir Site**	**Valley Greens Pump Station**	**Aquifer Storage and Recovery Facilities**	**Monterey Pipeline**	**MOSS LANDING PROJECT**	**NORTH MARINA PROJECT**
Public Services and Utilities	4.11-1d: Confirm the specific location of all high priority utilities.	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.11-1e: Protect, support, or remove underground utilities as necessary.	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.11-1f: Notify local fire departments any time damage to a gas utility results.	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.11-1g: Contact utility owner if any damage occurs.	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.11-1h: Observe Department of Health Services (DHS) standards.	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.11-2: Potential short-term increase in demand for police, fire, or emergency services. drainage facilities.	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.7-1: Road Encroachment Permits and Traffic Control and Safety Assurance Plan.	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.11-1a through 4.11-1h (as above): Verify Utility Locations	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.11-3: Potential adverse effects on solid waste landfill capacity and/or failure to achieve state-mandated solid waste diversion rates	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.11-3a: Project facility design and construction methods that produce less waste	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.11-3b: Recovering, reusing, and recycling wastes	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.11-3c: Demonstrate that the residuals and solid waste generated by the greensand filtration process are acceptable	--	--	--	X	X	X	X	X	X	X	X	X	X	X
	4.11-4: Potential adverse effects on wastewater treatment facilities.	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.11-4a: Demonstrate that the CIP backwash water meets the standards for acceptance.	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.11-4b: Conduct a study to evaluate the potential effect of brine salinity on the outfall components	X	X	X	X	X	X	X	X	X	X	X	X	X	X

TABLE ES-2 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF MOSS LANDING AND NORTH MARINA PROJECT SITES

		Moss Landing Facilities				**North Marina Facilities**			**Facilities Common to Both Projects**					**Collective Impact**	
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Aesthetic Resources	**4.12-1:** Construction associated with proposed pipelines and facilities could temporarily degrade the existing visual character of a site or surroundings.	LTS	--	--	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	4.12-2: Permanent facilities could have an adverse effect on scenic vistas, damage scenic resources, or degrade the existing visual character or quality of the site and its surroundings.	LTS	--	--	LTS	LTS	LTS	--	LTS	SM	SM	--	--	SM	SM
	EIR Mitigation Measures														
	4.12-2a: Facility Design									X	X			X	X
	4.12-2b: Fencing									X	X			X	X
	4.12-2c: Facility Siting									X	X			X	X
	4.12-3: Exterior lighting associated with proposed facilities would create new sources of light and glare in the surrounding areas.	SM	--	--	--	SM	--	--	--	SM	SM	~~SM~~ --	--	SM	SM
	EIR Mitigation Measures														
	4.12-3a: Shielded Lighting	X				X				X	X			X	X
	4.12-3b: Limited Outdoor Lighting Intensity	X				X				X	X			X	X
Cultural Resources	**4.13-1:** Project Construction Has the Potential to Affect Known Archaeological Resources	SM	--	--	SM	SM	SM	--	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.13-1a: Pre-Construction Survey	X								X		X		X	X
	4.13-1b: Avoidance	X				X	X			X		X	X	X	X
	4.13-1c: Construction Personnel Training	X				X	X			X		X	X	X	X

TABLE ES-2 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF MOSS LANDING AND NORTH MARINA PROJECT SITES

		Moss Landing Facilities				North Marina Facilities			Facilities Common to Both Projects					Collective Impact	
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Cultural Resources	4.13-1d: Evaluation for CRHR	X				X	X			X		X	X	X	X
	~~4.13-1e: Cultural Resources Treatment Plan~~	~~X~~				~~X~~	~~X~~			~~X~~		~~X~~	~~X~~	~~X~~	~~X~~
	~~4.13-1f: Construction Monitoring~~	~~X~~				~~X~~	~~X~~			~~X~~		~~X~~	~~X~~	~~X~~	~~X~~
	See Measures 4.13-2a and 4.13-2b	X			X	X	X		X	X		X	X	X	X
	4.13-2: Unanticipated Archaeological Discoveries May Be Damaged or Destroyed During Project Construction	SM	--	--	SM	SM	SM	--	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.13-2a: Training and Reporting	X			X	X	X		X	X	X	X	X	X	X
	~~4.13-2b: Human Remains~~	~~X~~			~~X~~	~~X~~	~~X~~		~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~
	4.13-3: Potential to uncover human remains	SM	SM	-	SM	SM	SM	-	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.13-3: Human Remains	X			X	X	X		X	X	X	X	X	X	X
Energy	**4.14-1:** Construction of the project could result in the substantial consumption of energy such that existing supplies would be constrained and could result in the wasteful use of energy resources that are not renewable.	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM	SM
	EIR Mitigation Measures														
	4.14-1: Implement Measure 4.8-1a through 4.8-1d	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	4.14-2: Operation of the project could result in the substantial consumption of energy such that existing supplies would be constrained.	LTS	LTS	LTS	SM	SM	SM	SM	SM	SM	SM	SM	SM	LTS	SM
	EIR Mitigation Measures														
	4.14-2: Implement an Energy Conservation Plan				X	X	X	X	X	X	X	X	X		X

SM – Significant Impact, can be Mitigated	LTS – Less-than-significant Impact	B – Beneficial Impact	X – Mitigation in place
SU – Significant Impact, Unavoidable	LTS – Less-than-significant Impact	– – No Impact	

TABLE ES-3
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF PHASE 1 AND PHASE 2 OF THE REGIONAL PROJECT

		Regional Project Phase I								**Regional Project Phase II**					
	Impact	**Regional Desalination Facility (North Marina)**	**5 Vertical Intake Wells**	**Regional Desalination Plant Outfall (MRWPCA)**	~~**Surface Water Delivery to Urban Users (Surface Water Treatment Plant)**~~	**Treated Water Storage and Conveyance (Transmission Main South and Seaside Carmel Valley Conveyance and Storage Facilities)**	**Terminal Reservoir Site**	**Aquifer Storage and Recovery Facilities**	~~**Seaside Basin ASR Expansion I**~~	**Regional Desalination Expansion (Including 5 Brackish Wells and MRWPCA Outfall)**	~~**Seaside Basin ASR Expansion II**~~	~~**Seaside Groundwater Replenishment**~~	~~**CSIP Expansion (including SRDF Expansion)**~~	**OVERALL PHASE I PROJECT**	**OVERALL PHASE II PROJECT**
Surface Water Resources	**6.1-1**: Project construction activities could cause erosion and increase stormwater runoff resulting in an adverse water quality impact.	SM	SM	-	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.1-1: Additional Erosion Control Measures and Monitoring Program	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.1-2: Excavation during construction could require dewatering of shallow groundwater. The water discharge, if contaminated, could adversely affect surface water.	SM	SM	-	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.1-2: Extracted Groundwater Measures	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.1-3: The product water generated at the desalination facilities would be used as potable water that would be compliant with the drinking water standards.	-	-	LTS	~~-~~	-	-	-	~~-~~	-	~~-~~	~~-~~	~~-~~	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	6.1-4: The project discharge from the desalination facility could degrade the marine water quality in Monterey Bay.	-	-	SM	~~-~~	-	-	-	~~-~~	SM	~~-~~	~~-~~	~~-~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.1-4c: Develop an Aeration System			X						X				X	X
	~~6.1-4: Test Discharge for Organic Contaminants~~			~~X~~						~~X~~				~~X~~	~~X~~
	6.1-5: The proposed project would add impervious surfaces that could alter the drainage pattern and increase storm runoff that could exceed the storm drainage system. The increased runoff flow could cause downstream erosion, siltation, and/or flooding.	LTS	LTS	-	~~LTS~~	LTS	LTS	LTS	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS

TABLE ES-3 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF PHASE 1 AND PHASE 2 OF THE REGIONAL PROJECT

		Regional Project Phase I								Regional Project Phase II					
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Surface Water Resources	*EIR Mitigation Measures*														
	None required.														
	6.1-6: Operation of the SRDF in winter, which could alter the flows in Salinas River, could affect the hydrology of the river bank.	-	-	-	-	-	-	-	-	-	-	-	-	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	6.1-7: Portions of the proposed project would be located within a 100-year flood hazard area and could impede or redirect flood flows.	LTS	LTS	LTS	~~LTS~~	LTS	LTS	LTS	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	6.1-8: The proposed project facilities could expose people or structures to risk from flooding due to a tsunami.	LTS	LTS	LTS	~~LTS~~	LTS	LTS	LTS	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS
	EIR Mitigation Measures														
	~~4.1-9: Tsunami Run-up Study~~ None Required.														
	6.1-9: The proposed project facilities could be subject to flooding due to the sea level rise from global warming.	LTS	LTS	LTS	~~LTS~~	LTS	LTS	LTS	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	6.1-10: The proposed project could expose people or structures to risk from flooding resulting from failure of a dam or levee.	LTS	LTS	LTS	~~LTS~~	LTS	LTS	LTS	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS
	None required.														

TABLE ES-3 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF PHASE 1 AND PHASE 2 OF THE REGIONAL PROJECT

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Surface Water Resources	**6.1-11:** The Regional Project would result in use of recycled water over a larger agricultural area. The recycled water applied to the irrigated lands would infiltrate through the subsurface levels affecting surface and groundwater quality.	-	-	-	~~-~~	-	-	-	~~-~~	-	~~-~~	~~-~~	~~LTS~~	-	LTS
	EIR Mitigation Measures														
	None required.														
	6.1-12: Expansion in recycled water use under the Regional Project would reduce the discharge of treated wastewater to Monterey Bay.	-	-	B	~~-~~	-	-	-	~~-~~	B	~~-~~	~~-~~	~~B~~	-	B
	EIR Mitigation Measures														
	None required.														
	6.1-13: The Regional Project would involve blending of the stored recycled water with other supplies prior to distribution, which could affect water quality.	-	-	-	~~-~~	-	-	-	~~-~~	-	~~-~~	~~SU~~	~~LTS~~	_	SU
	EIR Mitigation Measures														
	None required.														
Groundwater Resources	**6.2-1:** Projects under the Regional Project may violate water quality standards or waste discharge requirements.	-	LTS	-	~~-~~	-	-	SM	~~SM~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	SM	SM
	EIR Mitigation Measures														
	See Measure 4.2-1							X	~~X~~					X	X
	6.2-2: The Regional Projects would increase groundwater storage of Carmel River water or desalinated water and would increase groundwater storage, water levels, and available water in the SGB and SVGB.	-	-	-	~~-~~	-	-	-	~~B~~	-	~~B~~	~~B~~	~~B~~	B	B

TABLE ES-3 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF PHASE 1 AND PHASE 2 OF THE REGIONAL PROJECT

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Groundwater Resources	*EIR Mitigation Measures*														
	None required.														
	6.2-3: Groundwater extraction for desalination water supply could lower groundwater levels and damage neighboring water supply wells within the vicinity of the proposed seawater intake wells.	-	LTS	-	~~-~~	-	-	-	~~-~~	LTS	~~-~~	~~-~~	~~-~~	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	6.2-4: Groundwater extraction for desalination water supply could deplete or decrease groundwater supplies/resources within the SVGB, export groundwater from the SVGB, or could change groundwater storage and water levels throughout the Pressure Subarea.	-	~~-~~ LTS	-	~~-~~	-	-	-	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	6.2-5: The proposed desalination plant water supply wells may be completed within a portion of the 180-Foot Aquifer in an area where well installation and groundwater extraction are prohibited.	-	LTS	-	~~-~~	-	-	-	~~-~~	LTS	~~-~~	~~-~~	~~-~~	LTS	LTS
	EIR Mitigation Measures														
	None required.														
Marine Biological Resources	**6.3-1:** The project discharge from the Regional desalination facility could result in degradation of marine habitat and species.	-	-	SM	~~-~~	-	-	-	~~-~~	SM	~~-~~	~~-~~	~~-~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.1-4c			X						X				X	X
	~~See Mitigation Measure 6.1-4~~			~~X~~						~~X~~				~~X~~	~~X~~
	~~Measures 6.3-1: Conduct Periodic Sampling of Organisms~~			~~X~~						~~X~~				~~X~~	~~X~~

TABLE ES-3 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF PHASE 1 AND PHASE 2 OF THE REGIONAL PROJECT

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Biological Resources	**6.4-1:** Construction and operation of the new facilities associated with the Regional Project may adversely affect species identified as rare, threatened, endangered, candidate, sensitive, or other special status by the California Department of Fish and Game or U.S. Fish and Wildlife Service.	SM	SM	-	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.4-1	X	X		~~X~~	X			~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.4-2								~~X~~					X	
	6.4-2: Construction and operation of the new facilities associated with the Regional Project may adversely affect riparian habitat or other sensitive natural community identified in local or regional plans, policies regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.	LTS	SM	-	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~-~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.4-2		X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~		X	X
	6.4-3: Construction and operation of the new facilities associated with the Regional Project may adversely affect federally protected wetlands as defined by Section 404 of the Clean Water Act.	LTS	SM	-	~~LTS~~	LTS	LTS	LTS	~~LTS~~	SM	~~LTS~~	~~-~~	~~-~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.4-3		X							X				X	X
	6.4-4: Construction and operation of the new facilities associated with the Regional Project could adversely affect the movement of native resident or migratory fish or wildlife species or established native resident or migratory wildlife corridors.	LTS	LTS	LTS	~~LTS~~	LTS	LTS	LTS	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS
	EIR Mitigation Measures														
	None required.														

TABLE ES-3 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF PHASE 1 AND PHASE 2 OF THE REGIONAL PROJECT

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Biological Resources	**6.4-5:** Construction and operation of the new facilities associated with the Regional Project could conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	SM	SM	-	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.4-5	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.4-6: Operation of the Regional Project would alter Salinas River flows and may thus indirectly affect federally threatened steelhead and other special-status aquatic species.	-	-	-	~~SM~~	-	-	-	~~-~~	-	~~-~~	~~-~~	~~-~~	SM	SM
	EIR Mitigation Measures														
	Measure 6.4-6: Formal Consultation with National Marine Fisheries Service				~~X~~									X	X
	6.4-7: The Regional Project may adversely affect south-central California coast steelhead and Pacific lampreys as a result of construction activities associated with the proposed expansion of the Salinas River Diversion Facility (SRDF).	-	-	-	~~-~~	-	-	-	~~-~~	-	~~-~~	~~-~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	6.4-7: Avoid or Minimize Impacts to Special-Status Fish Species												~~X~~	X	X
Geology, Soils and Seismicity	**6.5-1:** Large earthquakes would be expected to damage the proposed facilities, impairing and/or disrupting their intended operations if not engineered to withstand such ground shaking.	SM	SM	-	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.5-1	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.5-2: Proposed pipelines and facilities could incur damage as a result of underlying soil properties (high shrink-swell potential, and corrosivity).	SM	SM	-	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM

TABLE ES-3 (Continued)
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Geology, Soils and Seismicity	*EIR Mitigation Measures*														
	See Mitigation Measure 4.5-2	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.5-3: Continuing coastal erosion could expose sub-surface components of the project which may result in these structures being damaged or destroyed within the project lifetime rendering delivery systems inoperable.	-	-	-	~~-~~	-	-	-	~~-~~	-	~~-~~	~~-~~	~~-~~	-	-
	EIR Mitigation Measures														
	None required.														
	6.5-4: Potential injury and/or damage resulting from landslides including earthquake induced landslides.	SM	SM	-	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.5-4	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.5-5: Potential facility damage resulting from a major earthquake in areas susceptible to liquefaction.	SM	SM	-	~~SM~~	SM	SM	~~SM~~ LTS	~~LTS~~	SU	~~LTS~~	~~SM~~	~~SU~~	SM	SU
	EIR Mitigation Measures														
	See Mitigation Measure 4.5-1	X	X		~~X~~	X	X	X				~~X~~		X	
Hazards and Hazardous Materials	**6.6-1:** Excavation and grading for the project could expose construction workers, the public, or the environment to hazardous materials that may be present in excavated soil or groundwater.	SM	SM	-	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.6-1a	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.6-1b	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.6-1c	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X

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Hazards and Hazardous Materials	See Mitigation Measure 4.6-1d	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.6-1e	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.6-2: Potential for accidental release of hazardous materials from construction activities.	LTS	LTS	-	~~LTS~~	LTS	LTS	LTS	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	6.6-3: Handling and Use of Hazardous Materials within ¼-mile of a school during construction.	-	LTS	-	-	LTS	LTS	LTS	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	6.6-4: Increased risk of wildland fires during construction in high fire hazard areas.	LTS	LTS	-	~~LTS~~	LTS	LTS	LTS	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	6.6-5: Potential for accidental release of chemicals or petroleum products.	LTS	-	-	~~LTS~~	-	LTS	~~LTS~~ SM	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	6.6-6: Handling of hazardous materials within ¼-mile of a school.	-	-	-	-	LTS	-	LTS	~~LTS~~	-	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS
	EIR Mitigation Measures														
	None required.														

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Traffic and Circulation	**6.7-1:** Short-term increases in vehicle trips by construction workers and construction vehicles on area roadways.	SM	SM	-	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.7-1	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.7-2: Reduction in the number of, or the available width of, travel lanes on roads where pipeline construction would occur, resulting in short-term traffic delays for vehicles traveling past the construction zones.	-	SM	-	-	SM	SM	SM	-	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.7-1		X			X	X	X		X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.7-2		X			X	X	X		X	~~X~~	~~X~~	~~X~~	X	X
	6.7-3: Demand for parking spaces to accommodate construction worker vehicles.	SM	SM	-	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.7-1	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.7-3	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.7-4: Potential traffic safety hazards for vehicles, bicyclists, and pedestrians on public roadways.	SM	SM	-	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.7-1	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.7-4	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.7-5: Access disruption to adjacent land uses and streets for both general traffic and emergency vehicles.	-	SM	-	-	SM	-	SM	-	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														

TABLE ES-3 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF PHASE 1 AND PHASE 2 OF THE REGIONAL PROJECT

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Traffic and Circulation	See Mitigation Measure 4.7-1		X			X		X		X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.7-5		X			X		X		X	~~X~~	~~X~~	~~X~~	X	X
	6.7-6: Disruptions to transit and railroad service on pipeline alignment routes.	SM	SM	-	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.7-1	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.7-6	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.7-7: Increased wear-and-tear on the designated haul routes used by construction vehicles.	SM	SM	-	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.7-7	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.7-8: Long-Term Project Operations and Maintenance.	LTS	LTS	-	~~LTS~~	LTS	LTS	LTS	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS
	EIR Mitigation Measures														
	None required.														
Air Quality	**6.8-1:** Regional Project construction activities would generate emissions of criteria pollutants, including fugitive dust and equipment exhaust particulate matter.	SM	SU	-	~~SU~~	SM	SM	SM	~~SU~~	SU	~~SU~~	~~SU~~	~~SU~~	SU	SU
	EIR Mitigation Measures														
	See Measures 4.8-1a through 4.8-1~~d~~c	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.8-1a: Joint Construction Emissions Control Plan	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.8-2: Regional Project operations would result in emissions, including diesel particulates, from testing and emergency use of standby generators, as well as from material haul trips and employee trips related to inspections and maintenance.	LTS	LTS	-	~~LTS~~	LTS	LTS	LTS	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS

TABLE ES-3 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF PHASE 1 AND PHASE 2 OF THE REGIONAL PROJECT

		Regional Project Phase I								Regional Project Phase II					
	Impact	**Regional Desalination Facility (North Marina)**	**5 Vertical Intake Wells**	**Regional Desalination Plant Outfall (MRWPCA)**	~~**Surface Water Delivery to Urban Users (Surface Water Treatment Plant)**~~	**Treated Water Storage and Conveyance (Transmission Main South and Seaside Carmel Valley Conveyance and Storage Facilities)**	**Terminal Reservoir Site**	**Aquifer Storage and Recovery Facilities**	~~**Seaside Basin ASR Expansion I**~~	**Regional Desalination Expansion (Including 5 Brackish Wells and MRWPCA Outfall)**	~~**Seaside Basin ASR Expansion II**~~	~~**Seaside Groundwater Replenishment**~~	~~**CSIP Expansion (including SRDF Expansion)**~~	**OVERALL PHASE I PROJECT**	**OVERALL PHASE II PROJECT**
Air Quality	*EIR Mitigation Measures*														
	None required.														
	6.8-3: Construction activities associated with Phase 1 and Phase 2 of the Regional Project would generate a cumulatively considerable net increase of PM_{10} and long-term operations associated with Phase 2 of the Regional Project would result in a cumulatively considerable net increase in ozone precursors.	SU	SU	-	~~SU~~	SU	SU	SU	~~SU~~	SU	~~SU~~	~~SU~~	~~SU~~	SU	SU
	EIR Mitigation Measures														
	See Measures 4.8-1a through 4.8-1~~d~~c	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Measure 6.8-1a	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.8-4: Construction activities associated with the Regional Project would generate emissions of diesel particulate matter (DPM), potentially exposing local sensitive receptors to pollutant concentrations.	LTS	LTS	LTS	~~LTS~~	LTS	LTS	LTS	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS
	EIR Mitigation Measures														
	None Required.														
	6.8-5: Conflict with the State goal of reducing greenhouse gas emissions in California to 1990 levels by 2020, as set forth by AB 32, California Global Warming Solutions Act of 2006.	SU	SU	-	~~SU~~	SU	SU	SU	~~SU~~	SU	~~SU~~	~~SU~~	~~SU~~	SU	SU
	EIR Mitigation Measures														
	See Measure 4.8-1c	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Measure 4.8-5a	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Measure 4.8-5b	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Measure 4.8-5c	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X

TABLE ES-3 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF PHASE 1 AND PHASE 2 OF THE REGIONAL PROJECT

		Regional Project Phase I								Regional Project Phase II					
	Impact	**Regional Desalination Facility (North Marina)**	**5 Vertical Intake Wells**	**Regional Desalination Plant Outfall (MRWPCA)**	~~**Surface Water Delivery to Urban Users (Surface Water Treatment Plant)**~~	**Treated Water Storage and Conveyance (Transmission Main South and Seaside Carmel Valley Conveyance and Storage Facilities)**	**Terminal Reservoir Site**	**Aquifer Storage and Recovery Facilities**	~~**Seaside Basin ASR Expansion I**~~	**Regional Desalination Expansion (Including 5 Brackish Wells and MRWPCA Outfall)**	~~**Seaside Basin ASR Expansion II**~~	~~**Seaside Groundwater Replenishment**~~	~~**CSIP Expansion (including SRDF Expansion)**~~	**OVERALL PHASE I PROJECT**	**OVERALL PHASE II PROJECT**
Air Quality	**6.8-6:** Project construction and operations would result in odors.	LTS	LTS	LTS	~~LTS~~	LTS	LTS	LTS	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS
	EIR Mitigation Measures														
	None Required.														
Noise and Vibration	**6.9-1**: Construction activity would violate standards established in the local general plans or noise ordinances, and/or would adversely affect nearby sensitive receptors.	SM	SM	-	~~SM~~	SM	LTS	~~SU~~ SM	~~SU~~	SM	~~SM~~	~~SM~~	~~SM~~	SU	SM
	EIR Mitigation Measures														
	Measure 6.9-1: Distance from Residences During Nighttime Construction Work	X	X			X				X		~~X~~	~~X~~	X	X
	See Mitigation Measure 4.9-1a	X	X		~~X~~	X		X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.9-1b	X	X		~~X~~	X		X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.9-1c	X	X		~~X~~	X		X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.9-1d	X	X		~~X~~	X		X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.9-1e	X				X		X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.9-2: Operation of the water treatment plants and other conveyance facilities would potentially increase existing noise levels, which could exceed noise level standards and/or result in nuisance impacts.	SM	LTS	-	~~SM~~ ~~LTS~~	LTS	LTS	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.9-2	X			~~X~~			X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.9-3: Short-term construction would result in temporary vibration impacts on nearby sensitive receptors and structures.	LTS	LTS	LTS	~~SM~~	LTS	LTS	LTS	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM

TABLE ES-3 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF PHASE 1 AND PHASE 2 OF THE REGIONAL PROJECT

		Regional Project Phase I								Regional Project Phase II					
	Impact	**Regional Desalination Facility (North Marina)**	**5 Vertical Intake Wells**	**Regional Desalination Plant Outfall (MRWPCA)**	**~~Surface Water Delivery to Urban Users (Surface Water Treatment Plant)~~**	**Treated Water Storage and Conveyance (Transmission Main South and Seaside Carmel Valley Conveyance and Storage Facilities)**	**Terminal Reservoir Site**	**Aquifer Storage and Recovery Facilities**	**~~Seaside Basin ASR Expansion I~~**	**Regional Desalination Expansion (Including 5 Brackish Wells and MRWPCA Outfall)**	**~~Seaside Basin ASR Expansion II~~**	**~~Seaside Groundwater Replenishment~~**	**~~CSIP Expansion (including SRDF Expansion)~~**	**OVERALL PHASE I PROJECT**	**OVERALL PHASE II PROJECT**
Noise and Vibration	*EIR Mitigation Measures*														
	See Mitigation Measure 4.9-1b				~~X~~				~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.9-1d				~~X~~				~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	~~6.9-3: Trenchless Technology and Construction Vibration Mitigation Plan~~				~~X~~				~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~
Land Use, Recreation and Agriculture	**6.10-1:** Components of the Phase 1 Project and Phase 2 Project may permanently divide or temporarily disrupt an established community.	SM	LTS	-	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measures 4.10-1a	X			~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measures 4.10-1b	X			~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measures 4.10-1c	X			~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.10-2: Components of the proposed project may conflict with applicable land use plans, policies, or regulations of an agencies with jurisdiction over the project, including, but not limited to general plans, specific plans, local coastal plans, or zoning ordinances adopted for the purpose of avoiding of mitigating an environmental effect.	LTS	LTS	LTS	~~LTS~~	LTS	LTS	LTS	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS
	EIR Mitigation Measures														
	None Required.														
	6.10-3: Implementation of the proposed project could result in the permanent removal of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance from agricultural operation, or involve other changes that could result in conversion of farmland to nonagricultural use as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.	SM	-	LTS	~~SM~~	LTS	LTS	LTS	~~LTS~~	SM	~~LTS~~	~~LTS~~	~~LTS~~	SM	SM

TABLE ES-3 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF PHASE 1 AND PHASE 2 OF THE REGIONAL PROJECT

		Regional Project Phase I								**Regional Project Phase II**					
	Impact	**Regional Desalination Facility (North Marina)**	**5 Vertical Intake Wells**	**Regional Desalination Plant Outfall (MRWPCA)**	**~~Surface Water Delivery to Urban Users (Surface Water Treatment Plant)~~**	**Treated Water Storage and Conveyance (Transmission Main South and Seaside Carmel Valley Conveyance and Storage Facilities)**	**Terminal Reservoir Site**	**Aquifer Storage and Recovery Facilities**	**~~Seaside Basin ASR Expansion I~~**	**Regional Desalination Expansion (Including 5 Brackish Wells and MRWPCA Outfall)**	**~~Seaside Basin ASR Expansion II~~**	**~~Seaside Groundwater Replenishment~~**	**~~CSIP Expansion (including SRDF Expansion)~~**	**OVERALL PHASE I PROJECT**	**OVERALL PHASE II PROJECT**
Land Use, Recreation and Agriculture	*EIR Mitigation Measures*														
	See Mitigation Measure 4.10-3	X			~~X~~					X				X	X
	6.10-3: Identification and Avoidance of Prime Agricultural Lands	X								X				X	X
	6.10-4: Project facilities could conflict with agricultural zoning or Williamson Act contracts.	SM	SM	-	~~-~~	-	-	-	~~-~~	SM	~~-~~	~~-~~	~~-~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 6.10-3	X	X							X				X	X
	6.10-5: The proposed project could potentially increase the use of existing parks or recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.	LTS	LTS	LTS	~~LTS~~	LTS	LTS	LTS	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS
	EIR Mitigation Measures														
	None Required.														
	6.10-6: The project could potentially include recreational facilities or require construction or expansion of recreational facilities that might have an adverse physical effect on the environment.	-	-	-	~~-~~	-	-	-	~~-~~	-	~~-~~	~~-~~	~~-~~	-	-
	EIR Mitigation Measures														
	None required.														
Public Services and Utilities	**6.11-1:** Potential damage to or interference with existing public utilities.	SM	SM	SM	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.11-1a	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.11-1b	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.11-1c	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X

TABLE ES-3 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF PHASE 1 AND PHASE 2 OF THE REGIONAL PROJECT

		Regional Project Phase I								**Regional Project Phase II**					
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Public Services and Utilities	See Mitigation Measure 4.11-1d	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.11-1e	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.11-1f	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.11-1g	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.11-1h	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.11-1i	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.11-2: Potential short-term increase in demand for police, fire, or emergency services.	SM	SM	SM	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.11-2	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.11-3: Potential adverse effects on solid waste landfill capacity and/or failure to achieve state-mandated solid waste diversion rates.	SM	SM	SM	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.11-3a	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.11-3b	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.11-3c														
	6.11-4: Potential adverse effects on wastewater treatment facilities.	SM	SM	SM	~~SM~~	-	-	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.11-4a	X	X	X	~~X~~			X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.11-4b	X	X	X	~~X~~			X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X

TABLE ES-3 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF PHASE 1 AND PHASE 2 OF THE REGIONAL PROJECT

		Regional Project Phase I								**Regional Project Phase II**					
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Aesthetic Resources	**6.12-1:** Construction associated with proposed pipelines and facilities could temporarily degrade the existing visual character of a site or surroundings.	LTS	LTS	LTS	~~LTS~~	LTS	LTS	LTS	~~LTS~~	LTS	~~LTS~~	~~LTS~~	~~LTS~~	LTS	LTS
	EIR Mitigation Measures														
	None required.														
	6.12-2: Permanent facilities could have an adverse effect on scenic vistas, damage scenic resources, or degrade the existing visual character or quality of the site and its surroundings.	LTS	SM	LTS	~~LTS~~	LTS	SM	LTS	~~LTS~~	SM	~~LTS~~	~~LTS~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.12-2a		X							X	~~X~~		~~X~~		
	See Mitigation Measure 4.12-2b		X							X	~~X~~		~~X~~		
	See Mitigation Measure 4.12-2c		X							X	~~X~~		~~X~~		
	6.12-3: Exterior lighting associated with proposed facilities would create new sources of light and glare in the surrounding areas.	SM	-	-	~~SM~~	SM	SM	~~SM~~ -	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.12-3a	X			~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.12-3b	X			~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
Cultural Resources	**6.13-1:** Project Construction Has the Potential to Affect Known Archaeological Resources	SM	SM	SM	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.13-1a	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.13-1b	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.13-1c	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.13-1d	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X

TABLE ES-3 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF PHASE 1 AND PHASE 2 OF THE REGIONAL PROJECT

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Cultural Resources	~~See Mitigation Measure 4.13-1e~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~
	~~See Mitigation Measure 4.13-1f~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~
	See Mitigation Measure 4.13-2a	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 4.13-2b	X	X	X	~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.13-2: Unanticipated Archaeological Discoveries May Be Damaged or Destroyed During Project Construction	SM	SM	-	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 4.13-2a	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	~~See Mitigation Measure 4.13-2b~~	~~X~~	~~X~~		~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~
	4.13-3: Potential to uncover human remains	SM	SM	-	~~SM~~	SM	SM	-	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	4.13-3: Human Remains	X			~~X~~	X	X		~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
Energy	**6.14-1:** Construction of the Phase 1 and Phase 2 Regional Projects could result in the substantial consumption of energy such that existing supplies would be constrained and could result in the wasteful use of energy resources that are not renewable.	SM	SM	-	~~SM~~	SM	SM	SM	~~SM~~	SM	~~SM~~	~~SM~~	~~SM~~	SM	SM
	EIR Mitigation Measures														
	See Mitigation Measure 6.8-1c	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	See Mitigation Measure 6.8-1d	X	X		~~X~~	X	X	X	~~X~~	X	~~X~~	~~X~~	~~X~~	X	X
	6.14-2: Operation of the Phase 1 and Phase 2 Regional Projects would increase long-term consumption of electricity at the project facilities, which could result in the wasteful use of energy resources that are not renewable.	~~LTS~~ SM	~~LTS~~ SM	~~LTS~~ SM	~~LTS~~ SM	~~LTS~~ SM	~~LTS~~ SM	~~LTS~~ SM	~~LTS~~ SM	LTS	~~LTS~~	~~LTS~~	~~LTS~~	~~LTS~~ SM	LTS

TABLE ES-3 (Continued)
IMPACT AND MITIGATION SUMMARY FOR FACILITY CONSTRUCTION AND OPERATION OF PHASE 1 AND PHASE 2 OF THE REGIONAL PROJECT

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Energy	*EIR Mitigation Measures*														
	6.14-1: An Energy Conservation Plan	X	X	X	~~X~~	~~X~~	X	X	~~X~~					X	

SM – Significant Impact, can be Mitigated
SU – Significant Impact, Unavoidable
LTS – Less-than-significant Impact
B – Beneficial Impact
– – No Impact
X – Mitigation in place

CHAPTER 1

Introduction

The California Public Utilities Commission (CPUC or Commission) as the Lead Agency, has prepared this Draft Environmental Impact Report (EIR) for the Coastal Water Project (CWP) in compliance with the California Environmental Quality Act (CEQA) and the CEQA Guidelines. The EIR is a public document for use by CPUC, other governmental agencies, and the public in identifying and evaluating the potential environmental consequences of a project, identifying mitigation measures to lessen or eliminate adverse impacts, and examining feasible alternatives to the project. The impact analyses in this report are based on a variety of sources; references for these sources are listed at the end of each technical section. The information contained in this EIR will be reviewed and considered by the CPUC Commissioners prior to the ultimate decision to approve, deny, or modify the proposed project.

This chapter contains the following sections:

1.1 Purpose of CWP EIR

This EIR has been prepared to analyze the potential environmental impacts of a proposed new water supply project for the Monterey Peninsula. The proposed project is called the Coastal Water Project and is being proposed by the California American Water Company (CalAm) (see Chapter 3, Project Description). In an application before the Commission (A.04-09-019), CalAm has filed to construct, own, and operate the proposed CWP. CalAm prepared a Proponent’s Environmental Assessment (PEA) for the Coastal Water Project in 2005 at the direction of the CPUC’s Administrative Law Judge (ALJ) and included an analysis of an alternative regional project that would provide for the supply needs beyond those of CalAm. The CPUC (and other agencies) may use this EIR in deciding whether to approve the project.

The proposed water supply is needed to replace existing supplies that are constrained by recent legal decisions affecting the Carmel River and Seaside Groundwater Basin water resources: State

Water Resources Control Board (SWRCB) Order No. WR 95-10 (Order 95-10) and the Monterey County Superior Court adjudication of water rights in the Seaside Groundwater Basin. Both rulings reduce CalAm's use of its two primary sources of supply for the Monterey District and provide the most immediate impetus for the CWP. Information about these two decisions, with a brief overview of the water supply system for context, is presented in Chapter 2, Section 2.2.

The CWP would produce desalinated water, convey it to the existing CalAm distribution system, and increase the system's use of storage capacity in the Seaside Groundwater Basin. The CWP would consist of several distinct components: a seawater intake system; a desalination plant; a brine discharge system; product water conveyance pipelines and storage facilities; and an aquifer storage and recovery (ASR) system.

1.2 Project Background and the CWP EIR

The EIR analyzes at an equal level of detail three water supply projects that can each satisfy the objectives of the Coastal Water Project. The Proponent's Environmental Assessment (CalAm and RBF Consulting, 2005) described the CWP assuming the proposed desalination plant would be situated at Moss Landing (this is referred to as the Applicant's Proposed Project, or the Moss Landing Project) to take advantage of the existing cooling water intake system at the Moss Landing Power Plant (MLPP) for source water, and the existing MLPP ocean outfall for the disposal of brine. Since that time, two alternative projects have been developed that are also capable of satisfying the objectives of the CWP.

The first alternative, known as the North Marina Project, includes most of the infrastructure improvements proposed for the CWP. The main differences are that the North Marina Project's desalination facility would be constructed at a different site (in North Marina) and the desalination facility's production capacity would be slightly greater than that of the Moss Landing facility. The North Marina Project would also utilize subsurface seawater intakes for the desalination plant source water (slant wells at the end of Reservation Road), and would require fewer miles of product water conveyance pipeline than the Moss Landing Project. The North Marina Project was initially identified in the PEA and subsequently refined by CalAm and the CPUC. The North Marina Project would meet all of the project objectives of the CWP and is analyzed in this EIR at a level of detail equal to that devoted to the CWP. Both the Moss Landing and North Marina Projects are described in Chapter 3, and both projects are analyzed in Chapter 4 of this EIR. CalAm would be the owner and operator of either of these two projects. The CPUC, as the Lead Agency under CEQA, will use this document to approve one of them to implement the CWP if it decides to approve either of these two projects.

The second alternative project analyzed in this EIR is the Monterey Regional Water Supply Project (Regional Project), which is proposed by Water for Monterey County (formerly known as the Regional Plenary Oversight Group, or REPOG) as a community-developed long-term water supply alternative. The Regional Project, which is described separately in Chapter 5 and analyzed in Chapter 6, would integrate the development and allocation of several water supply sources, including desalination, to address existing and projected future demands within the CalAm service area, as well as existing and future demands in other areas of northern Monterey County. (See Chapter 5, Sections 5.1 and 5.2 for further explanation about the origins and evaluation of the Regional Project.) The Regional Project as proposed would be implemented in phases and would incorporate most of the components of the North Marina Project. ~~Specifically, the Regional Project would utilize the existing Salinas River Diversion Facility (SRDF), and would include a new surface water treatment plant.~~ However, instead of employing slant wells for source water as would the North Marina Project, the Regional Project would employ vertical wells to draw water from beneath the inland side of the beach dunes ~~and would add capacity to store additional water in the Seaside Groundwater Basin~~. As proposed in the Regional Project alternative, the Marina Coast Water District (MCWD) would be the owner of the regional desalination facility and Monterey County Water Resources Agency (MCWRA) would be responsible for the source water wells ~~and the surface water treatment plant~~. To be implemented, it is assumed the MCWD and MCWRA (and the Monterey Regional Water Pollution Control Agency [MRWPCA]) would use this EIR in considering approval of some of the Regional Project facilities.

1.3 California American Water Company

The California American Water Company has served the Monterey Peninsula since it acquired properties from California Water and Telephone Company in 1966. CalAm’s Monterey District service area is located in the semi-arid central California coastal area and is entirely dependent on local rainfall for its water supply; imported water is not a viable option. By reason of its geography and rainfall patterns, the area is prone to severe droughts. Wells located along the Carmel River that draw water from the Carmel River Aquifer are the primary source of water for CalAm. An additional source of water for CalAm is a network of eight wells located in the Seaside Basin, which CalAm shares with a number of users and purveyors. CalAm’s supply storage facilities include two small reservoirs on the Carmel River: the Los Padres Dam and Reservoir and the San Clemente Dam and Reservoir. In 1987, CalAm’s water production peaked at approximately 18,000 AFY. (See Section 2.1, Introduction, for further detail regarding the CalAm service area and infrastructure.)

1.4 The California Public Utilities Commission

The California Public Utilities Commission is a constitutionally-established state agency charged with providing regulatory oversight of investor-owned utilities in the transportation, energy, communications, and water industries. The Commission consists of five commissioners who are appointed for six-year terms by the Governor. The commissioners are served by an Executive Director and a staff of professional engineers, economists, policy and industry analysts, attorneys and administrative law judges. The CPUC provides regulatory oversight in the areas of purpose and need; economic cost; ratemaking; safety and reliability; and customer service; among others. The Commission is located in San Francisco and makes decisions by vote of its commissioners at regularly scheduled public business meetings. More information on the CPUC may be found at: http://www.cpuc.ca.gov.

1.4.1 The Draft EIR

In accordance with Sections 15063 and 15082 of the CEQA Guidelines, the CPUC prepared a Notice of Preparation (NOP) for this EIR. The NOP was circulated to local, state, and federal agencies on September 29, 2006. Comments were requested by November 9, 2006. The NOP provided a description of the Coastal Water Project, a discussion of possible alternative projects being considered, a map of the project location and the area, and a summary of the probable environmental effects of the project to be addressed in the EIR. During the scoping period, the CPUC held a series of four scoping meetings in Monterey County to discuss the project and to solicit public input as to the scope and content of this EIR. **Appendix A** of this Draft EIR includes the NOP and presents a description of public outreach efforts.

This Draft EIR ~~will be~~ was available to local, state, and federal agencies and to interested organizations and individuals who may have wanted to review and comment on the report. Notice of this Draft EIR ~~will~~ was also ~~be~~ sent directly to every agency, person, or organization that commented on the NOP. The publication of the Draft EIR marked~~s~~ the beginning of a ~~60~~75-day public review period, ending April 1, 2009[1]. During the ~~60~~75-day review period, written comments ~~should be~~ were mailed or hand delivered to:

Andrew Barnsdale, CPUC
c/o Environmental Science Associates
225 Bush Street, Suite 1700
San Francisco, CA 94104
Or visit www.cwp-eir.com/notify.html

During this ~~60-day~~ review period, the CPUC ~~will~~ conducted four public participation meetings on March 2-4, 2009 to answer questions about, and to receive oral comment on, the Draft EIR. The meetings ~~will be~~ were held at three locations in the local Monterey area.

1.4.2 The Final EIR

Following circulation of this DEIR and incorporation of public comments and responses to comments, a Final Environment Impact Report (FEIR) ~~will be~~ was published by the CPUC and submitted into the formal record of the Commission's Certificate of Public Convenience and Necessity (CPCN) proceeding for CalAm (A.04-09-019). The FEIR will then be reviewed by a CPUC administrative law judge, who will submit a proposed decision to the Commission concerning certification of the EIR and approval of the CWP. In addition to environmental impacts, the ALJ will consider any other issues that have been established in the formal proceeding record, including but not limited to economic issues, social impacts, specific routing and alignments, and the need for the project. During this process the ALJ will also take into account testimony and briefs from parties who have formally intervened in A.04-09-019, as well as the formal record of any hearings held by the ALJ in this case.

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[1] The CPUC initially circulated the Draft EIR for review for a 60-day public comment period, starting January 30 and scheduled to close on April 1. At the request of several agencies and members of the public, CPUC extended the public comment period by 15 days, and written comments on the Draft EIR were accepted through April 15, 2009.

1.4.3 Alternative Selection and The Proposed Decision

The ALJ and the commissioners have the discretion to select any alternative or combination of project components they deem most appropriate. In order to allow the ALJ and the commissioners to make an informed decision, and in order to provide them with a variety of options to select from in case a component proves to be infeasible or is undesirable for environmental or other policy reasons, this EIR and alternatives analysis has been set up to allow for "mixing and matching" components that may not have originally been proposed together. Almost all potential project components put forth in the Applicant's Proposed Moss Landing Project, the North Marina Project, and the Regional Project, as well as the options presented in Chapter 7, Section 7.6, can be interchanged with components from other projects. If, for example, the ALJ finds that the North Marina Project is the best proposal but that slant wells have become infeasible, she may issue a proposed decision to proceed with the North Marina Project but with a substitution of vertical wells for the source water. Alternately, the ALJ could find that the Moss Landing Project is the best proposal for infrastructure, but that the size of the desalination plant should be scaled down and pieces of the Regional Project should be implemented to make up the difference in volume of water produced.

After an independent review of the FEIR, the ALJ will issue a proposed decision on the application and project. The ALJ's proposed decision will provide a review of the formal record before the Commission in A.04-09-019, including the non-environmental issues presented by parties to the proceeding. This proposed decision will include a decision of approval or denial of the CWP, or some alternative variant thereof. During this general time period the CPUC Assigned Commissioner, as well as any other CPUC commissioner, may issue an alternate decision on the application and proposed project.

1.4.4 A Final CPUC Decision

Upon FEIR certification, the CPUC may proceed with project approval actions. Should the ~~ALJ~~ CPUC decide in favor of the CWP, as proposed or as modified, the ~~judge will~~ CPUC must make findings on each significant environmental impact ~~that remains significant after mitigation~~. As to each such impact, the lead agency must find that either (1) the environmental effect has been reduced through mitigation measures to a less-than-significant level, essentially "eliminating, avoiding, or substantially lessening" the expected impacts, or (2) the residual significant adverse impact that cannot be mitigated to less-than-significant level is outweighed by project benefits. This latter finding is called a Statement of Overriding Considerations.

The ALJ may also deny the proposed project, but decide in favor of an alternative that may require further action on the part of other parties and public agencies. The Commission's final decision may therefore include an order for CalAm to return to the Commission at a later time for approval of either a specific project or some form of water supply agreement, either of which would resolve at a minimum the water supply issues raised by SWRCB Order 95-10 and the Seaside Basin adjudication. In either event, if the proposed decision (or an alternate) finds the FEIR adequate for the Commission's decision making purposes, the Commission as the Lead

Agency for CEQA may certify the FEIR by formal vote and direct that CalAm take the necessary steps to implement the Commission's final decision.

~~Upon FEIR certification, the CPUC may proceed with project approval actions. CEQA requires that the Lead Agency neither approve nor implement a project unless the project's significant environmental effects have been reduced to less-than-significant levels, essentially "eliminating, avoiding, or substantially lessening" the expected impacts unless specific findings are made. If the Lead Agency approves the project despite residual significant adverse impacts that cannot be mitigated to less-than-significant levels, the agency must state the reasons for its action in writing. This Statement of Overriding Considerations must be included in the record of project approval.~~ In addition, State law requires Lead Agencies to adopt a mitigation monitoring and reporting program for those changes to the project that it has adopted or made a condition of project approval in order to mitigate or avoid significant effects on the environment. ~~The~~ CEQA ~~Guidelines do~~does not require that the specific reporting or monitoring program be included in the EIR. Throughout this EIR, however, proposed mitigation measures have been clearly identified and presented in language that will facilitate establishment of a monitoring program. All adopted measures will be included in a mitigation monitoring and reporting program to verify compliance.

1.5 Regulatory and Legislative History

The water supply challenges facing CalAm and the Monterey Peninsula are long-term, significant and have been well-documented in a number of venues including the SWRCB, the Monterey County Superior Court, the Commission, and the California Legislature. SWRCB Order 95-10 and the Seaside Basin adjudication are discussed in more detail below. During CalAm's previous attempt to propose a dam and storage reservoir on the Carmel River (the Carmel River Dam and Reservoir Project (CRDRP) – discussed below in Section 1.7.1), the legislature passed Assembly Bill 1182 which mandated that the CPUC conduct a study to review water supply alternatives for the Monterey Peninsula. This study was completed in 2002, became known as "Plan B" and is discussed below in Section 1.7.1. Plan B provided the technical foundation and point of departure for the analysis of the CWP in the PEA and in this EIR. In 2003, the CPUC issued a decision that dismissed CalAm's CRDRP application without prejudice, ordered CalAm to file a new application for the CWP, and determined that the CPUC should be the Lead Agency for the CWP EIR. CalAm responded to the CPUC's decision by filing an application for a Certificate of Public Convenience and Necessity (A.04-09-019) and proposing the Coastal Water Project.

1.5.1 SWRCB Order 95-10

The SWRCB Order 95-10 (SWRCB, 1995) substantially reduces diversion of all supplies along the Carmel River. The Order states that CalAm has been diverting approximately 10,730 afy from the Carmel River or its underflow without a valid basis of right and directs CalAm to diligently undertake the following actions: obtain appropriative rights to the Carmel River water that was being unlawfully diverted; obtain water from other sources and make one-for-one reductions of the unlawful diversions; and/or contract with other agencies having appropriative rights to divert and use water from the Carmel River. In the interim, while CalAm is pursuing the development of an alternative supply, Order 95-10 directs CalAm to implement conservation measures to offset 20 percent of demand and restricts CalAm to an annual diversion from Carmel Valley sources, representing a 20 percent reduction from CalAm's historic usage. The Order also prohibits water from being diverted from the San Clemente Dam when stream flows reach a predetermined low flow. The Order directs CalAm to maximize use of the Seaside Basin for the purpose of serving existing connections – while honoring existing allocations – to reduce diversions from the Carmel River to the greatest practicable extent. Development of the replacement supply required in Order 95-10 is part of the proposed CWP.

1.5.2 Seaside Basin Groundwater Adjudication

Another purpose of the proposed project is to reduce CalAm's reliance on the Seaside Basin, currently CalAm's other principal source of supply for the Monterey District. The Monterey County Superior Court recently issued a final decision in the case, *California American Water v. City of Seaside, et al.*, Case No. 66343 (Monterey County Superior Court, 2006) (Decision) for the adjudication of water rights of the various parties who produce groundwater from the Seaside Basin. The establishment of adjudicated water rights of all the users of the Basin is intended to avoid long-term damage to the basin, including potential seawater intrusion, subsidence, and other adverse impacts of over-pumping.

The Decision establishes a physical solution to Basin management that is "intended to ultimately reduce the drawdown of the aquifer to the level of the Natural Safe Yield; to maximize potential beneficial use of the Basin; and to provide a means to augment water supply for the Monterey Peninsula." Although CalAm submitted its application and PEA (CalAm, 2005) for the proposed project before the final Decision was issued, CalAm expected its Seaside Basin allocation to be reduced and therefore included in the proposed CWP 1,000 afy to be used to replace that amount of the current Seaside Basin allocation.

1.6 Project Setting

The Monterey Peninsula and coastal areas of Monterey County have long suffered from water supply challenges and the constant threat of drought conditions. Water sources consist of surface water from the Salinas and Carmel Rivers as well as groundwater from the Seaside Basin aquifer. Rainfall is the primary source of water and groundwater recharge within coastal Monterey County. In addition, the river courses in the County serve as habitat for two federally-listed endangered species, both of which appear to be highly vulnerable under current conditions.

1.6.1 Existing Supply Infrastructure – Monterey County Water Resources Agency

Coastal Northern Monterey County has long faced water supply challenges (Chapter 3, Figure 3-1 shows the area referred to as Coastal Northern Monterey County). The problems of seawater intrusion and excess diversion have existed for decades. Seawater intrusion was identified in

Monterey County in the late 1930s and documented by the State in 1946 as part of Bulletin 52. This report discussed methods to combat future seawater intrusion. As one of the primary custodians of potable water supplies in North Monterey County, Monterey County Water Resources Agency (MCWRA) took action based on these recommendations and has developed four important projects: Nacimiento and San Antonio Reservoirs; the Castroville Seawater Intrusion Project; and the Salinas Valley Water Project.

The first two projects, the Nacimiento and San Antonio Reservoirs, were put in place in the late 1950s and mid-1960s, respectively, to develop a new source of water for the needs of Monterey County. These dams are now owned and operated by MCWRA. The third project is the Castroville Seawater Intrusion Project (CSIP), developed by MCWRA in conjunction with the Monterey Regional Water Pollution Control Agency (MRWPCA). This project delivers up to 14,000 acre-feet per year (AFY) of recycled water to approximately 12,000 acres of agricultural lands surrounding Castroville. The recycled water is blended with groundwater to provide a supply adequate to meet the needs of the irrigation requirements of the CSIP service area.

The fourth project is the Salinas Valley Water Project (SVWP), which consists of modifying the Nacimiento Dam spillway, reoperating the storage and release schedules of the Nacimiento and San Antonio reservoirs, and the construction and operation of the Salinas River Diversion Facility (SRDF). The SRDF is under construction and is anticipated to become operational in 2010. The SRDF will direct Salinas River water for delivery to CSIP customers to replace the current use of groundwater. These four projects provide critical infrastructure that will stop seawater intrusion, provide adequate water supplies to meet current and future (year 2030) needs in the Salinas basin, and improve the hydrologic balance of the groundwater basin in the Salinas Valley.

1.6.2 Existing Supply Infrastructure – California American Water

The San Clemente Dam was constructed on the Carmel River in 1921 and continues to be the major point of surface water diversion from the river. Diversion from the San Clemente reservoir was the sole water supply for the Monterey Peninsula until the 1940s when customer demand exceeded that source of supply. CalAm's predecessor installed wells at the upper end of the Carmel Valley to produce water to meet summer demand. The Los Padres Dam was constructed about six miles upstream of the San Clemente Dam in 1949. The Los Padres reservoir is operated in conjunction with the San Clemente reservoir and controls inflow into it. Both dams have been owned and operated by CalAm since 1965. Over the years, sedimentation has reduced the usable storage at both the San Clemente and Los Padres reservoirs. By 1995 the primary source of water supply for CalAm was multiple wells located along the lower Carmel River, which supplied approximately 70 percent of CalAm's customer demand. The balance of the water supply was provided by storage at the Los Padres reservoir, diversions from San Clemente reservoir and water pumped from the Seaside Basin. In addition to the Carmel River sources, CalAm's main distribution system includes eight wells in the Coastal subarea of the Seaside Basin. The Seaside Basin encompasses a 24-square mile area and consists of several subareas. CalAm also has nine wells in the Laguna Seca subarea (CalAm, 2006a).

1.6.3 Water Supply Issues

The Carmel Valley Aquifer, which underlies the Carmel River, presently supplies approximately 70 percent of the Monterey Peninsula's water through CalAm's system. As a result of State Water Resources Control Board Order 95-10, California American Water is required to find a new source of water to replace the supply that it historically diverted from the Carmel Valley Aquifer. CalAm was also ordered by the SWRCB to reduce pumping in the Carmel Valley by 20 percent from historic levels. Since 1995 CalAm customers have managed to reduce water use on the Monterey Peninsula from more than 17,000 AFY to 14,000 AFY, a reduction of more than 20 percent. However, conservation efforts alone cannot adequately address the water demand and supply issues faced by the community.

Water resources in the Carmel Valley and the greater Monterey Peninsula are regulated by the MPWMD. In addition to restrictions on CalAm's use of its Carmel Valley wells by NOAA Fisheries and the US Fish and Wildlife Service (see below), CalAm is also restricted by an annual Memorandum of Agreement (MOA) between CalAm, MPWMD and the California Department of Fish and Game (DFG). Based on SWRCB Order WR 95-10 and the Seaside Basin adjudication, CalAm must develop a replacement water supply in the first instance to meet existing water demands within its service area. In addition, based on the level of growth envisioned to occur in the adopted general plans of jurisdictions within the service area, additional water supply will be needed to meet approved future service area demand.

1.6.4 Endangered Species

There are two federally-listed endangered species present in the CalAm Monterey District service territory. The presence of these species in the Carmel Valley Aquifer area has resulted in agreements between CalAm and State and Federal agencies that restrict pumping and withdrawals from the Aquifer and therefore limit available water supplies. These agreements are outlined below.

California Red Legged Frog. In 1996, the California Red-Legged Frog (CRLF) was listed as threatened under the Federal Endangered Species Act (ESA). In 1997, the U.S. Fish and Wildlife Service (USFWS) issued an ESA-4(d) ruling that allowed it to prosecute for a "take" of the frog. The Carmel River is inhabited by the California Red-Legged Frog. In 1997, CalAm entered into an agreement with USFWS to further regulate its well production activities in an attempt to avoid and/or mitigate impacts on the CRLF and has renewed that agreement several times.

Steelhead Trout. In 1997 the South Central California Coast Steelhead Trout (steelhead) was listed as threatened under the ESA, and in 2000 the National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) issued an ESA-4(d) rule allowing it to prosecute for take of steelhead. The steelhead inhabits the Carmel River. The USFWS and NOAA Fisheries have taken the position that any entity that pumps water from the Carmel Valley Aquifer may be liable for a "take" because the pumping may alter the habitat, affect the steelhead's ability to migrate in the river, and affect the CRLF's ability to grow to maturity.

In 2001, CalAm negotiated a Conservation Agreement with NOAA Fisheries that included various changes in operations, with the long-term goal of procuring an alternative water supply source to reduce withdrawals from the Carmel River Aquifer. Failure of CalAm to satisfy USFWS and NOAA Fisheries' concerns regarding ESA compliance could subject CalAm and its customers to enforcement actions for take, including further reduction of the water supply obtained from the Carmel Valley Aquifer and fines that could be in the millions of dollars.

1.7 Coastal Water Project History

The CWP is the result of a multi-year planning effort that has entailed thorough consideration of many alternatives in the context of several different proposed projects and various related documents. Since 1989, several options have been proposed that proponents have hoped would meet the water supply needs of the Monterey Peninsula and address the impacts on the Carmel River underlying SWRCB Order 95-10, as well as the Seaside Basin adjudication. Following is a brief summary of the various proposals/projects and the environmental documentation prepared for those proposals.

1.7.1 Other Water Supply Proposals and EIRs

New Los Padres Dam and Reservoir EIR. The New Los Padres Dam and Reservoir (NLP) was originally proposed by the MPWMD in 1989. The MPWMD prepared the required CEQA documentation in 1994-1995, obtained a Section 404 permit under the federal Clean Water Act in 1995, and obtained a water right permit from the SWRCB in June and July 1995. In November 1995, however, the MPWMD voters failed to pass a measure authorizing funding of the NLP.

Carmel River Dam and Reservoir Project Supplemental EIR. In 1996, California American Water proposed to construct a "no growth" dam and reservoir as a means to comply with Order 95-10. The new proposal was called the Carmel River Dam and Reservoir Project (CRDRP). The project was physically the same as the NLP project, but would have been operated to serve only existing community needs (estimated at 17,641 AFY) rather than the 21,000 AFY envisioned in the NLP. CalAm submitted an application for a Certificate of Public Convenience and Necessity to the CPUC in 1997 to construct and operate the project (A.97-03-052), and the MPWMD acted as Lead Agency and prepared a draft Supplemental EIR in 1998 based on the NLP EIR. Completion of the final environmental documents was delayed because of state legislation (Assembly Bill 1182, passed in 1998) that mandated the CPUC to identify an alternative or alternatives to the dam (Jones and Stokes 1998).

CPUC Water Supply Contingency Plan Evaluation ("Plan B"). In response to Assembly Bill 1182, the CPUC in 1999 began evaluating alternatives to the CRDRP. In 2002 the CPUC, working with CalAm and others, completed a water supply contingency plan (also known as Plan B) for the Monterey Peninsula. The Plan B evaluation concluded that a combination of desalination and aquifer storage and recovery (ASR) could produce 10,730 AFY[2]. The desalination component of the project would be located adjacent to the Moss Landing Power Plant and would produce 9,430 AFY. Treated water would be transported to the CalAm service area through a new pipeline. The ASR element would provide 1,300 AFY by diverting surplus water from the Carmel River during periods of high flow and storing this water in the Seaside Groundwater Basin for later use.

1.7.2 Plan B and The Coastal Water Project

After considering public opposition to dams on live streams, NOAA Fisheries' opposition to the CRDRP, the results of the Plan B research, and other factors, CalAm concluded that the CRDRP was not feasible. In 2003 CalAm requested the CPUC to allow it to amend its application for a CPCN to substitute in a new water supply project called the Coastal Water Project. In 2003 the CPUC dismissed CalAm's CRDRP application without prejudice, ordered CalAm to file a new application for the CWP, and determined that the CPUC should be the Lead Agency for the CWP EIR.

From a technical perspective, Plan B provided the foundation and point of departure for the analysis of the CWP in the PEA and in this document. Plan B provided an engineering and environmental analysis of fifteen water supply options that were explored as potential opportunities to meet the requirements of SWRCB Order 95-10. Plan B included all of the essential features of the Proposed Project: a desalination project at Moss Landing using the MLPP cooling water system for feedwater; a water conveyance pipeline from Moss Landing to CalAm's Monterey Peninsula service territory; ASR facilities near Seaside; and storage of Carmel River winter flows at the ASR site for recovery in the summer. At 10,730 AFY capacity, Plan B did not include a provision to replace some of the water pumped from the Seaside Basin Aquifer because the over pumping problem was not recognized at that time.

Since the completion of Plan B, significant additional engineering design and environmental analysis has been conducted. That additional work has refined, modified, and focused the results presented in Plan B in order to reduce anticipated significant impacts; improve community support; increase feasibility of each of the CWP project components; and provide for a replacement supply for the Seaside Basin Aquifer. Plan B involved a water supply alternative screening process that was conducted by the CPUC at the behest of the Legislature (AB 1182). A summary of the Plan B alternative screening process is provided in this EIR in Chapter 7. Potential alternatives that were examined and dismissed during the Plan B analysis are not considered further in this EIR. CalAm adopted the Plan B concept in February 2003, when it formally applied to the CPUC to undertake the project, which became known at the time as the

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[2] The draft Plan B Project Report included a desalination plant at Sand City, Seaside Basin ASR, a water reclamation component, and a water rights component. Further analysis, however, found the following: that the water rights component was not currently feasible due to agency policies; that the water reclamation component was not practical due to institutional complexities and project costs; and that a desalination plant at Sand City would be more difficult to implement and less appropriate for the desired scale of production than a desalination plant at Moss Landing. See **Appendix K** for more information.

"Coastal Water Project", ~~Coastal Water Project~~ in their application and PEA filing A.04-09-019. At the direction of the CPUC ALJ, CalAm included an alternative for a regional project in their PEA.

1.8 The Regional Project

The Regional Project location is defined as the CalAm service area, including the Peninsula Cities of Carmel, Del Rey Oaks, Monterey, Pacific Grove, Sand City, and Seaside, and the unincorporated areas of Pebble Beach, Carmel Valley, and Monterey; the Highway 1 Corridor; the Marina Coast Water District service area, including the former Fort Ord and Marina; the City of Salinas; and the Northern Monterey County rural and urban areas, including Castroville, Prunedale, Moss Landing, and Pajaro.

1.8.1 REPOG: Water for Monterey County

Since January 2007 the Division of Ratepayer Advocates (DRA)[3] of the CPUC has been working in conjunction with the University of California Santa Cruz, Center for Integrated Water Research (CIWR) to evaluate whether there is an alternative regional approach that would be less expensive for CalAm ratepayers in the Monterey District by spreading costs over a larger customer base and could be presented as an alternative to the Coastal Water Project. The DRA and the CIWR viewed public participation as critical to the development of an implementable water supply program and facilitated a series of public meetings which led to the establishment of the Regional Plan Technical Work Group, Public Information and Involvement Work Group, and Regional Plenary Oversight Group (REPOG). The meetings[4] for each group were attended by a wide range of agencies, general public, interest groups, and other parties and provided a forum for identifying project components, confirming criteria, evaluating alternatives, assembling portfolios, and establishing a preferred community-based regional water supply alternative that addresses the regulatory replacement needs of SWRCB Order 95-10 and the Seaside Basin adjudication. Through that process, the Regional Project was developed.

The Regional Project described herein is proposed to provide up to 25,600 AFY to serve the water needs of northern Monterey County, including:

- The CalAm service area, including Carmel, Del Rey Oaks, Monterey, Pacific Grove, Sand City, and Seaside, and the unincorporated areas of Pebble Beach, Carmel Valley, Monterey-Salinas Highway Corridor, and the airport district;
- The Marina Coast Water District service area, including the former Fort Ord and Marina;
- Northern Monterey County rural and urban areas, including Castroville, Prunedale, Granite Ridge, Moss Landing, and Pajaro.

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[3] The Division of Ratepayer Advocates is an independent arm of the California Public Utilities Commission whose responsibilities include formal advocacy before the Commission on behalf of California ratepayers. The DRA is a separate and independent body of staff from the Commission Advisory staff who produced this EIR.

[4] Appendix I lists the water and wastewater agencies, other government agencies and stakeholders that participated in one or more meetings of the REPOG, Technical Work Group, and/or Outreach Work Group.

1.8.2 Regional Project Objectives

The Monterey Regional Water Supply Program, as defined, will satisfy the requirements of the State Water Resources Control Board (SWRCB) Order 95-10 and the Seaside Basin adjudication; diversify and create a reliable drought-proof water supply that meets the region's needs; and create a diversified water supply portfolio across a larger number of ratepayers. In addition, the Monterey Regional Water Supply Program describes objectives and potential opportunities that could be created by regional partnerships to:

- Satisfy Marina Coast Water District's obligations to provide a water supply adequate to meet the approved redevelopment of the former Fort Ord;
- Satisfy Monterey County Water Resources Agency's obligation to maintain hydrologic balance of the Salinas Groundwater Basin;
- Satisfy Monterey County Water Resources Agency's obligation to protect agricultural water resources;
- Maximize regional reliability;
- Avoid duplicative facilities and infrastructure;
- Maximize use of recycled and freshwater sources;
- Maximize funding opportunities through regional cooperation;
- Minimize energy requirements and greenhouse gas emissions per unit of water delivered; and
- Integrate urban, agricultural and environmental objectives.

The Regional Project would provide a total incremental regional water supply of up to 25,600 AFY for urban users. Due to the schedule constraints of the Seaside Basin adjudication and the Order 95-10 mandate ordering CalAm to pursue a new water supply source to replace the water it currently produces above from the Carmel River, the "regulatory replacement" supply is the first priority for project implementation. Delivery of new water supplies would be phased with the first priorities being the 12,500 AFY of regulatory replacement water and the 2,700 AFY of Fort Ord demands.

The Regional Project would have two phases. Phase 1 of the Regional Project, which would provide a total regional water supply of up to 15,200 AFY, is described in more detail in Chapter 5, Section 5.2. Phase 2 Project components, which would provide the remaining 10,400 AFY for the Monterey Peninsula and North Monterey County, are summarized in Chapter 5, Section 5.3. The needs of the City of Salinas were considered as a part of this planning effort[5]. However, the incremental water supply needs for the City of Salinas are being addressed outside of the regional project described here.

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[5] The increased groundwater pumping required to meet the City of Salinas' projected future needs has been included in the hydrologic analyses of the Salinas Groundwater Basin.

1.8.3 Regional Project Overview

The Regional Project would be developed in two phases to ultimately provide up to 25,600 acre-feet per year (AFY) to serve the water needs for parts of northern Monterey County. The Phase 1 Monterey Regional Water Supply Program (the Phase 1 Project) includes 15,200 AFY to meet the immediate needs of the Monterey Peninsula, the former Fort Ord, and Marina. The Phase 1 Project consists of components that have been approved and are underway by local agencies, expansion of some existing projects, as well as the proposed regional desalination facility. Implementation of the Phase 1 Project components would occur in phases over a time span of three years. The Phase 1 Regional Project includes the following components and is presented in Chapter 5, Table 5~~.1-1~~-2:

- Conservation
- Sand City Desalination Facility
- Regional Urban Water Augmentation Project (RUWAP)
- Seaside Basin Aquifer Storage and Recovery (Seaside ASR)
- ~~Seaside ASR Expansion I~~
- ~~Surface Water Delivery to Urban Users (Salinas River diversions and surface water treatment plant)~~
- Regional Desalination Facility (including conveyance and storage facilities)

The second phase of the Regional Project (the Phase 2 Project) would include some combination of the following components to supply an additional 10,400 AFY of water to meet the anticipated regional water demand. The actual components and their contribution to the water supply will be determined in the future. The Phase 2 Project components ~~may~~ will require further evaluation of cost-effectiveness, technical, and implementation issues, as well as further environmental review. These Phase 2 project components are described in Section 5.3, and include:

- Pacific Grove Stormwater Collection and Treatment Project;
- Surface Water Delivery to Urban Users (Salinas River diversions and surface water treatment plant)
- Salinas River Diversion Facility Expansion;
- Castroville Seawater Intrusion Project (CSIP) Expansion;
- Regional Desalination Facility Expansion;
- Seaside Groundwater Basin Replenishment Project;
- Seaside ASR Expansion I
- Seaside Basin ASR Expansion II; and
- Salinas Basin Groundwater for North Monterey County.

CHAPTER 2
Water Demand and Supplies

2.1 Introduction

This chapter describes the bases for the estimates of current and future water demand and supplies assumed in the analyses presented in this EIR. As noted in Chapter 1, Introduction, CalAm filed an application before the California Public Utilities Commission (CPUC) to construct, own, and operate the proposed CWP. In addition to the CWP, CalAm's Proponent's Environmental Assessment (PEA) for the project considers, at the direction of the CPUC's Administrative Law Judge, a regional water supply project. The Monterey Peninsula Water Management District (MPWMD) manages and regulates the use, reuse, reclamation, and conservation of Carmel River water that is stored in San Clemente and Los Padres Reservoirs and groundwater pumped from wells in Carmel Valley and the Seaside Coastal Area (MPWMD, 2008). Subsequent to the submittal of CalAm's application and PEA, the MPWMD prepared an updated estimates of water supply to be met by the CWP and Regional Project. This chapter explains the bases for the water supply needs and assumptions.

CalAm's Monterey District~~,~~ serves most of the Monterey Peninsula, including the cities of Carmel-by-the-Sea, Del Rey Oaks, Monterey, Pacific Grove, Sand City, and Seaside, and the unincorporated areas of Carmel Highlands, Carmel Valley, Pebble Beach, and the Del Monte Forest. This part of CalAm's service area is supplied by surface water and groundwater from the Carmel River system and the coastal subarea of the Seaside Groundwater Basin (Seaside Basin). CalAm's service area boundaries generally correspond to those of the Monterey Peninsula Water Management District (MPWMD),[1] which manages surface water and groundwater resources in the Carmel Valley and groundwater in the Seaside coastal area (refer to **Figures 3-2a** and **3-2b in Chapter 3, Project Description**). Besides its main distribution system (i.e., the areas served by the Carmel River and Coastal subarea of the Seaside Basin), CalAm also operates three small independent waters systems along the Highway 68 corridor east of Monterey (Ryan Ranch, Bishop, and Hidden Hills) that are within MPWMD's boundaries and draw water from the Laguna Seca subarea of the Seaside Basin.[2] Under the regional project alternative, the Coastal

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[1] While the boundaries of the MPWMD and CalAm Monterey District generally coincide, there are a few exceptions: an area north and east of Seaside and Sand City is within the MPWMD boundaries but served by the Marina Coast Water District (MCWD), as shown in Figure 2.1. CalAm also operates three small independent waters systems in the Highway 68 corridor east of Monterey (Ambler, Chular, and Ralph Lane) that are outside MPWMD's boundaries and outside the Seaside Basin (CalAm, 2006a; CalAm, 2007). According to MPWMD, CalAm's Monterey District includes about 40 parcels that are outside the MPWMD boundaries (MPWMD, 2006).

[2] Although CalAm does not consider the areas outside the Carmel River system and Seaside Basin Coastal subarea to be part of its proposed CWP (CalAm, 2007), replacement supply will eventually be needed for these systems (and for some other Seaside Basin producers) based on the adjudication of water rights within the Seaside Basin, as discussed in this chapter.

Water Project (CWP) would also provide water to meet demand in a portion of northern Monterey County outside CalAm's service area; this area is indicated generally as "North County Groundwater Wells" in **Figure 5-1** in **Chapter 5, Regional Project**.

A key purpose of the proposed CWP and one of its basic objectives is to provide replacement water supply to meet existing demands in light of State Water Resources Control Board (SWRCB) Order No. WR 95-10 (Order 95-10) and the Monterey County Superior Court adjudication of water rights in the Seaside Groundwater Basin. Both rulings reduce CalAm's use of its two primary sources of supply for the Monterey District and provide the most immediate impetus for the CWP. Information about these two decisions, with a brief overview of the water supply system for context, is presented in **Section 2.2**. Order 95-10 includes an estimate of the amount of water CalAm would need to replace to meet existing demand and remain within its legal rights to Carmel Valley surface and groundwater. MPWMD more recently has prepared an updated estimate of current demands in the CalAm service area, taking into account more recent usage data, the requirements of Order 95-10 and the Seaside Basin adjudication, and other factors. In consultation with the jurisdictions served by CalAm, MPWMD has also prepared an estimate of water supply needed to meet expected future planned and approved growth within the service area. These estimates of existing and future demands are presented in **Section 2.3**. **Section 2.4** summarizes information on water supplies available to meet the identified current and future demands in the CalAm service area. **Section 2.5** provides information on estimated demands for the portion of northern Monterey County outside the CalAm service area that would be served under the Regional Project alternative.

2.2 Background

2.2.1 Water Use on the Monterey Peninsula

The San Clemente Dam was constructed on the Carmel River in 1921 and continues to be the major point of surface water diversion from the river. Diversion from the San Clemente reservoir was the sole water supply for the Monterey Peninsula until the 1940s when customer demand exceeded that source of supply. CalAm's predecessor installed wells at the upper end of the Carmel Valley to produce water to meet summer demand. The Los Padres Dam was constructed about six miles upstream of the San Clemente Dam in ~~1949~~ 1951. The Los Padres reservoir is operated in conjunction with the San Clemente reservoir and controls inflow into it. Both dams have been owned and operated by CalAm since ~~1965~~ 1966. Over the years, sedimentation reduced the usable storage at both the San Clemente and Los Padres reservoirs. By 1995 the primary source of water supply for CalAm was multiple wells located along the lower Carmel River, which supplied approximately 70 percent of CalAm's customer demand. The balance of the water supply was provided by storage at the Los Padres reservoir and diversions from San Clemente reservoir and water pumped from the Seaside Basin.

Water resources in the Carmel Valley and the greater Monterey Peninsula are regulated by the MPWMD. MPWMD has historically restricted CalAm's annual allocation of Carmel Valley surface and groundwater to 16,683 acre-feet per year (afy)[3] (approximately 14.9 million gallons per day [mgd]) (CalAm, 2007). CalAm's use of its Carmel Valley wells is also restricted by an annual Memorandum of Agreement (MOA) between CalAm, MPWMD and the California Department of Fish and Game (DFG). The MOA provides a guideline to minimize localized drawdown from the use of wells located along certain reaches of the river, limits surface water diversions from April to October, and requires releases to the river from San Clemente Reservoir (CalAm, 2007).

In addition to the Carmel River sources, CalAm's main distribution system includes eight wells in the Coastal subarea of the Seaside Basin. The Seaside Basin encompasses a 24-square mile area and is generally bounded by the Pacific Ocean on the west, the Salinas Valley on the north, the Toro Park area on the east, and Highways 68 and 218 on the south. The Basin consists of several subareas in which geologic features form partial hydrogeologic barriers between the subareas. CalAm also has nine wells in the Laguna Seca subarea (CalAm, 2006a). As noted above, wells from this subarea supply several small systems in the Highway 68 corridor east of CalAm's main distribution system. CalAm is able to provide Carmel River water for fire and emergencies to its Ryan Ranch system in the Laguna Seca subarea via an emergency connection from the Crest Tank. ~~MPWMD limits~~CalAm currently has a combined operating yield allocation for its ~~usage of the~~ Seaside Basin wells of 3,849 afy ~~to 4,000 afy~~ from the Seaside Watermaster.

2.2.2 State Water Resources Control Board Order No. WR 95-10

The State Water Resources Control Board (SWRCB) Order 95-10 (SWRCB, 1995), issued in July 1995, substantially reduces diversion of all supplies along the Carmel River. In the Order, the SWRCB establishes that CalAm has a legal right to 3,376 acre-feet per year (afy) (equivalent to about 3 million gallons per day [mgd]) from the Carmel River system, including surface water diversions and water pumped from Carmel Valley wells, compared to the 14,106 afy (12.6 mgd) that had been pumped historically. The Order states that CalAm had been diverting approximately 10,730 afy from the Carmel River or its underflow without a valid basis of right, and directs CalAm to diligently undertake the following actions: obtain appropriative rights to the Carmel River water that was being unlawfully diverted; obtain water from other sources and make one-for-one reductions of the unlawful diversions; and/or contract with other agencies having appropriative rights to divert and use water from the Carmel River. In the interim, while CalAm is pursuing the development of an alternative supply, Order 95-10 directs CalAm to implement conservation measures to offset 20 percent of demand[4] and restricts CalAm to an annual diversion of 11,285 afy (10.1 mgd) from Carmel Valley sources. (This amount represents a 20 percent reduction from CalAm's historic usage of 14,106 afy.) The Order also prohibits water from being diverted from the San Clemente Dam when stream flows reach a predetermined low flow. The Order directs CalAm to maximize use of the Seaside Basin for the purpose of serving

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[3] An acre foot is the amount of water that would cover an acre to a depth of one foot and is equivalent to approximately 325,850 gallons.

[4] Order 95-10 requires a conservation reduction, in combination with conservation measures required by MPWMD, of 15 percent in the 1996 water year (WY) and a reduction of 20 percent in each subsequent year.

existing connections – while honoring existing allocations – to reduce diversions from the Carmel River to the greatest practicable extent. Development of the replacement supply required in Order 95-10 is part of the proposed CWP.

2.2.3 Seaside Basin Adjudication

Another purpose of the proposed project is to reduce CalAm's reliance on the Seaside Basin, currently CalAm's other principal source of supply for the Monterey District. The Monterey County Superior Court recently issued a final decision in the case, *California American Water v. City of Seaside, et al.*, Case No. 66343 (Monterey County Superior Court, 2006) for the adjudication of water rights of the various parties who produce groundwater from the Seaside Basin. The Court's decision (referred to herein as the Decision or adjudication) resulted from a complaint and cross complaints among the current users of the Seaside Basin. Among other points, the complaint requested a declaration of the parties' individual and collective rights to groundwater and coordination of groundwater management within the Seaside Basin. The establishment of adjudicated water rights of all the users of the Basin is intended to avoid long-term damage to the basin, including potential seawater intrusion, subsidence, and other adverse impacts of over-pumping. The Decision identifies the Natural Safe Yield[5] for the basin as a whole and for the Coastal and Laguna Seca subareas, and found that production in each of the preceding five years had exceeded the Natural Safe Yield throughout the Seaside Basin and in each of its subareas. The Decision also found (and noted that all the parties agreed on this issue) that continued production in excess of the Natural Safe Yield would result in seawater intrusion, with deleterious effects.

The Decision establishes a physical solution to Basin management that is "intended to ultimately reduce the drawdown of the aquifer to the level of the Natural Safe Yield; to maximize potential beneficial use of the Basin; and to provide a means to augment water supply for the Monterey Peninsula." Among other provisions, the Decision allocates the groundwater rights of the various users, establishes an initial Operating Safe Yield,[6] and establishes a Watermaster to administer and enforce the provisions of the Decision. The Watermaster consists of representatives of the parties to the complaint as specified in the Decision. CalAm's current allocation, under the initial Operating Safe Yield from the Coastal subarea as allocated by the Watermaster, is 3,504 afy and 345 afy from the Laguna Seca subarea. Since the Operating Safe Yield allocations will be decreased over time until they equal the Natural Safe Yield of the respective subareas, these initial allocations will be reduced. Eventually CalAm's allocation from the Seaside Basin overall ~~Coastal subarea~~ will be ~~1,494~~ 1,474 afy ~~and 0 afy from the Laguna Seca subarea~~ (Seaside Basin Watermaster ~~MPWMD, 2006a~~2009).

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[5] The Decision defines Natural Safe Yield as the quantity of groundwater existing in the Seaside Basin that occurs solely as a result of natural replenishment. The estimate of Natural Safe Yield assumes no action is taken to capture subsurface flow exiting the northern boundary of the Basin.

[6] The Decision defines Operating Safe Yield (also referred to as Operating Yield) as the maximum amount of groundwater resulting from natural replenishment that the Decision, based upon historical usage, allows to be produced from each subarea for a finite period of years, unless such level of production is found to cause material injury. In general, the Operating Yield for each subarea is to be maintained for three years; starting on the fourth year and triennially thereafter, it is to be decreased by 10 percent until the Operating Yield is the equivalent of the subarea's Natural Safe Yield.

Table 2-1 summarizes key determinations contained in the Decision and the Seaside Basin Groundwater Account subsequently prepared by the Watermaster that are relevant to the Basin as a whole and CalAm's allocation. For comparison, Table 2-1 also shows the CalAm production level from the Seaside Basin prior to Order 95-10 and the MPWMD allocation for CalAm prior to the Seaside Basin adjudication. Although CalAm submitted its application and Proponent's Environmental Assessment (PEA) (CalAm, 2005) for the proposed project before the final Decision was issued, CalAm expected its Seaside Basin allocation to be reduced and therefore included in the proposed CWP 1,000 afy to be used to replace that amount of the current Seaside Basin allocation. As described in Section 2.3.1, MPWMD prepared a technical memorandum updating the estimates of existing demand to account for the difference between CaAm's estimate and the final adjudication decision and other factors.

2.3 California American Water Service Area Demands

Based on SWRCB Order WR 95-10 and the Seaside Basin adjudication, CalAm must develop replacement water supply in the first instance to meet existing water demands within its service area. In addition, based on the level of growth envisioned to occur in the adopted general plans of jurisdictions within the service area, additional water supply will be needed to meet future service area demand. The information presented in this section is based primarily on MPWMD's analyses of existing and future demands for the area.

2.3.1 Existing Demands

2.3.1.1 CalAm's Main Distribution System

As discussed above, when Order WR 95-10 was issued, existing demand from the Carmel River system (as indicated in the Order) was estimated to be 14,106 afy. This estimate represented the average, non-drought use for the years 1979 to 1988, based on information submitted to the SWRCB by CalAm (SWRCB, 1995). Based on the estimate of 14,106 afy total production, of which CalAm was found to have a legal water right to use 3,376 afy, the SWRCB estimated that CalAm would need to develop 10,730 afy in replacement supplies. According to Order 95-10, CalAm provided service to about 105,000 persons and supplied a total of approximately 17,000 acre feet (af) in an average normal year. Of this, approximately 2,700 afy came from the Seaside Basin (i.e., 2,700 afy was from the Seaside Basin and 14,106 afy was from the Carmel River, for a total of 16,806, or approximately 17,000 afy) (SWRCB, 1995). CalAm's application to the CPUC and the PEA for the proposed project specify that 10,730 afy would be needed to replace supply from the Carmel River system in compliance with Order 95-10 and that approximately 1,000 afy would be needed to replace supply currently drawn from the Seaside Basin (in anticipation of the Seaside Basin adjudication, which was not final at the time).

MPWMD recently prepared a technical memorandum updating estimates of existing demand within the District and CalAm service area (MPWMD, 2006a). (This memorandum, Technical Memorandum 2006-02, is included as **Appendix B** of this EIR.) MPWMD's estimates of replacement water needed to meet existing demand within the service area and vicinity are described below and summarized in **Table 2-2**.

TABLE 2-1
SEASIDE BASIN OPERATING AND NATURAL SAFE YIELD, AND RECENT PRODUCTION

Basin Management Element	**Quantity**
Operating Safe Yield -Entire Basin	5,600 afy
Total Operating Safe Yield -Coastal Subarea (finite period of years)	4,611 afy[a]
Coastal Subarea Operating Safe Yield Committed to Standard Production Allocations	3,868 afy[a]
Coastal Subarea Operating Safe Yield Committed to Alternative Production Allocations	743 af[a]
CalAm’s Standard Production Allocation of Operating Safe Yield - Total Coastal Subarea (%)	77.55 percent
CalAm’s Standard Production Allocation of Available Coastal Operating Yield (in Excess of Alternative Production Allocations)	90.6 percent[b]
CalAm’s Standard Production Allocation of Operating Safe Yield as of 2007 - Coastal Subarea (AF)	3,504 afy[b]
Total Operating Safe Yield -Laguna Seca Subarea (finite period of years)	989 afy[a]
Laguna Seca Subarea Operating Safe Yield Committed to Standard Production Allocations	345 afy[a]
Laguna Seca Subarea Operating Safe Yield Committed to Alternative Production Allocations	644 afy[a]
CalAm’s Standard Production Allocation of Operating Safe Yield - Total Laguna Seca Subarea (%)	45.13 percent
CalAm’s Standard Production Allocation of Available Laguna Seca Operating Yield (in Excess of Alternative Production Allocations)	100 percent[b]
CalAm’s Standard Production Allocation as of 2007 - Laguna Seca Subarea (af)	345 af[b]
Natural Safe Yield - Entire Basin	2,581 - 2,913 afy
Natural Safe Yield - Coastal Subarea	1,973 - 2,305 afy
~~CalAm’s Eventual Allocation - Coastal Subarea (77.55% of Natural Safe Yield, Standard Allocation) (af)~~	~~1,494 afy~~
Natural Safe Yield - Laguna Seca Subarea	608 afy
Natural Safe Yield - CalAm’s Eventual Allocation - Entire Basin ~~Laguna Seca Subarea (0% of Natural Safe Yield, Standard Allocation)~~ (af)	~~0~~1,474 afy [c]
CalAm Seaside Basin Production when Order 95-10 was issued	2,700 afy
CalAm Average Annual Production, Water Years 1996-2006, Coastal Subarea	3,695 afy
CalAm Average Annual Production, Water Years 1996-2006, Laguna Seca Subarea	432 afy
MPWMD Allocation for CalAm for the Coastal Subarea Prior to the Adjudication	4,000 afy

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NOTE: afy = acre feet per year.

[a] Initial Operating Safe Yield was established for the first three years; at the beginning of the fourth year and triennially thereafter, it is to be decreased by 10 percent until it is equivalent to the Natural Safe Yield. The decision provides for possible revisions of established Operating Safe Yield based on findings of the Watermaster.

[b] CalAm’s Standard Production Allocations are based on the table, “Seaside Basin Groundwater Account Per Amended Decision, Dated February 9, 2007,” prepared by the Seaside Basin Watermaster.

[c] This Seaside Basin Watermaster estimate (SB Watermaster, 2009) revises MPWMD’s 2006 estimate that CalAm’s eventual allocation for the Coastal Subarea would be 1,494 afy and for the Laguna Seca Subarea would be zero.

SOURCES: Monterey County Superior Court, 2006; Monterey County Superior Court 2007; Seaside Basin Watermaster, 2007; MPWMD, 2006a, Seaside Basin Watermaster, 2009.

TABLE 2-2
REPLACEMENT SUPPLY NEEDED TO MEET EXISTING DEMAND WITHIN THE CAW SERVICE AREA (afy[a])

Water Supply	PEA Demand (Replacement) (afy[a])	Source / Explanation	Updated Demand[b] (Replacement) (afy[a]`)	Source / Explanation
Carmel River Replacement	10,730	SWRCB Order No. WR 95-10 (SWRCB, 1995) and Proponent's Environmental Assessment (PEA) (CalAm, 2005). Estimate is based on Carmel River diversions of 14,106 afy minus CalAm's legal water right, per Order No. WR 95-10, of 3,376 afy.	8,498	MPWMD Technical Memorandum 2006-02 (MPWMD, 2006a) Existing average annual production from the Carmel River was updated based on usage in water years 1996-2006 (11,015 afy) and adjusted for weather (by 7.8 percent) resulting in an average, weather-adjusted demand from Carmel River sources of 11,874 afy, minus CalAm's legal right of 3,376 afy.
Seaside Groundwater Basin Replacement (Entire Basin)	1,000	PEA (CalAm, 2005). When Order 95-10 was issued, CalAm produced about 2,700 afy from the Seaside Basin. Following Order 95-10 and prior to the Seaside Basin adjudication, CalAm's allocation set by MPWMD was 4,000 afy. The PEA estimated that CalAm would need to develop 1,000 afy of supply to replace a portion of its existing basin production.	2,975	MPWMD Technical Memorandum 2006-02 (MPWMD, 2006a) and Seaside Basin Watermaster (2009). MPWMD's 2006 technical memorandum estimated that, based on water years 1996-2006, CalAm's average annual production from the Coastal Subarea (3,695 afy) adjusted for weather is 3,983 afy, minus CalAm's eventual allocation[c] of 1,494 afy needed replacement for CalAm would be 2,489. The MPWMD technical memorandum estimated that, based on water years 1996-2006, MPWMD CalAm's average annual production from the Laguna Seca Subarea (432 afy), adjusted for weather, is 466 afy; assuming CalAm's eventual allocation[c] for this subarea of 0 afy, needed replacement supply is 466 afy. The combined replacement supply for the two subareas estimated by MPWMD (2,955 afy) was adjusted upward by 20 afy to reflect 2009 information from the Seaside Basin Watermaster that CalAm's eventual allocation for the entire basin will be 1,474 afy.
~~Seaside Groundwater Basin - Coastal Subarea~~			~~2,489~~	~~MPWMD Technical Memorandum 2006-02 (MPWMD, 2006a). Based on water years 1996-2006, CalAm's average annual production from the Coastal Subarea (3,695 afy) adjusted for weather is 3,983 afy, minus CalAm's eventual allocation[c] of 1,494 afy.~~
~~Seaside Groundwater Basin - Laguna Seca Subarea~~			~~466~~	~~MPWMD Technical Memorandum 2006-02 (MPWMD, 2006a). Based on water years 1996-2006, CalAm's average annual production from the Laguna Seca Subarea (432 afy), adjusted for weather, is 466 afy. minus CalAm's eventual allocation[c] of 0 afy.~~
Carmel River Surface Supply - Los Padres Reservoir			762	MPWMD Technical Memorandum 2006-02 (MPWMD, 2006a). Based on continuing sedimentation of the Los Padres Reservoir, MPWMD estimates that 762 acre feet of capacity has been lost since Order 95-10~~95-00~~ was issued. Unless this capacity is restored, this amount of replacement supply would be needed to meet existing demand.
Subtotal: CalAm Service Area	**11,730**		**~~12,215~~12,235**	

TABLE 2-2 (Continued)
REPLACEMENT SUPPLY NEEDED TO MEET EXISTING DEMAND WITHIN THE CAW SERVICE AREA (afy[a])

Water Supply	PEA Demand (Replacement) (afy[a])	Source / Explanation	Updated Demand[b] (Replacement) (afy[a]`)	Source / Explanation
Seaside Groundwater Basin - Non-CalAm Production			272	MPWMD Technical Memorandum 2006-02 (MPWMD, 2006a). Adjudication of water rights in the Seaside Basin reduced the amount of water other producers may extract to prevent long-term damage to the Basin. The eventual allocation of other producers will require replacement of 272 afy to meet existing demand.
Total Existing Need for Replacement Supply	**11,730**		**12,500 (12,507 ~~12,487~~ rounded)**	

[a] afy = acre-feet per year.
[b] Updated demand based on MPWMD Technical Memorandum 2006-02.
[c] The Seaside Basin Decision establishes an initial allocation for each producer for the first three~~four~~ years following the decision, and provides that commencing in ~~after~~ the fourth year the allocation will be reduced by 10 percent every three years until withdrawals equal the Basin's Natural Safe Yield. CalAm's "eventual allocation" refers to CalAm's allocation assuming the Natural Safe Yield level of production. The Seaside Basin Watermaster's recent calculation of CalAm's eventual allocation for the Basin as a whole (1,474 afy, as shown) has slightly revised the MPWMD's estimate of 1,494 afy. Neither calculation was available at the time the PEA was prepared.

SOURCE: CalAm, 2005; MPWMD, 2006a, Seaside Basin Watermaster, 2009.

As part of its analysis of existing demand, MPWMD reviewed actual monthly water use for water years[7] 1996 to 2006, based on CalAm monthly production reports for its Carmel River and Seaside Basin Coastal Subarea sources, to determine the annual average quantity of water currently used by CalAm customers within MPWMD boundaries. Given the regular occurrence of drought periods on the Monterey Peninsula and the effect of weather on water demand, MPWMD also evaluated weather conditions during the years reviewed, which on average were wetter than normal, and developed demand estimates adjusted to reflect normal, dry, and critically dry conditions. The average annual unadjusted demand and weather-adjusted demand for the years reviewed are as follows (MPWMD, 2006a):

- Unadjusted Demand: 14,710 AF
- Normal-year demand: 15,095 AF
- Dry-year demand: 15,474 AF
- Critically-dry-year demand: 15,858 AF

MPWMD considers the critically-dry year values to provide a worst-case basis[8] for assessing the effect of weather on water production during the analysis period and that the demand values adjusted to reflect critically dry conditions – rather than the unadjusted values, which do not account for the wetter-than-normal conditions during the period of analysis – should be used for water supply planning (MPWMD, 2006a). **Table 2-3** shows the breakdown of unadjusted average annual demand and adjusted (by 7.8 percent) critically-dry year demand for the Carmel River system and Seaside Basin Coastal subarea. As shown, the unadjusted average annual production over this period is 14,710 afy, and adjusted critically dry year demand is 15,858. From these totals, MPWMD deducted the quantity of Seaside Basin and Carmel River water to which CalAm has an existing legal right based on the Seaside Basin adjudication and Order 95-10 ~~(4,870 afy)~~ to determine the replacement water supply needed to meet demand under the conditions reflected in the unadjusted and critically dry year scenarios. According to Order 95-10's determination of CalAm's legal right to Carmel River system water and MPWMD's calculation of CalAm's eventual legal right to Seaside Basin groundwater, Cal Am's combined rights from these sources would be 4,870 afy. ~~As shown in Table 2-3, a~~Assuming critically-dry year demand for the two areas minus this estimate of CalAm's combined recognized water rights, MPWMD calculated that approximately 10,988~~7~~ AF of replacement water would be needed to meet current demand in the areas served by these sources. More recently, the Seaside Basin Watermaster calculated CalAm's rights to Seaside Basin groundwater for the basin as a whole (rather than by subbasin, as MPWMD had done) and determined that CalAm's eventual right to basin groundwater was 1,474 afy, a slight decrease from MPWMD's estimate of 1,494 afy. Based on this revised calculation, replacement water supply needed to meet critically dry year demand for the Carmel River System and Seaside Basin Coastal Subarea is 11,008 afy, as shown in Table 2-3. Unlike Table 2-2, Table 2-3 shows only demand for Carmel River and Seaside Basin -Coastal Subarea sources. It excludes the Laguna Seca Subarea, which CalAm does not consider to be part of the

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[7] A water year extends from October 1 through September 30 of the following year; it is identified by the calendar year in which it ends (i.e., water year [WY] 2006 extends from October 1, 2005 through September 30, 2006).

[8] Water usage data indicate that there is more irrigation and people drink more water in the hotter dryer weather associated with dry years, driving up demand.

TABLE 2-3
SUMMARY OF AVERAGE ANNUAL PRODUCTION, WATER YEARS 1996-2006
CARMEL RIVER AND SEASIDE BASIN COASTAL SUBAREA
ADJUSTED FOR WEATHER CONDITIONS (afy[a])

	Unadjusted demand (average water year)	Critically-Dry-Year Demand
Carmel River System Demand	11,015	11,874
Seaside Basin Coastal Subarea Demand	3, 695	3,983
Subtotal	**14,710**	**15,858**
Minus Legal Water Rights to Carmel River System and Seaside Basin Water	~~4,870~~ 4,850	~~4,870~~ 4,850
Total Replacement Water Needed	**~~9,840~~ 9,860**	**~~10,988~~ 11,008**

NOTE: Numbers may not sum due to rounding.

[a] afy = acre-feet per year.

SOURCE: MPWMD, 2006a.

CWP (CalAm, 2007). Nor does Table 2-3 include the lost capacity from Los Padres Reservoir sedimentation included in MPWMD's estimate shown in Table 2-2. Other existing demands and needed replacements supply that will need to be met and are included in Table 2-2 are discussed further in the next section.

According to information provided in a technical memorandum prepared subsequent to the CWP Draft EIR on changes to the DEIR Phase 1 Project (Appendix Q), CalAm's annual normal-weather demand is approximately 15,270 afy. This estimate is similar to MPWMD's estimate shown above (between the estimates of normal and dry weather demand).

2.3.1.2 Other Existing Demands

CalAm's Laguna Seca Subarea Demands

The average annual unadjusted demand for the same period (1996-2006) from the Laguna Seca subarea of the Seaside Basin was 432 afy. MPWMD applied the same adjustment factor used for the Carmel River and Seaside Coastal subarea (7.8 percent) to calculate the critically-dry-year demand for this subarea of 466 afy. CalAm's adjudicated allocation from this subarea will eventually be zero. Therefore, assuming critically-dry-year demand, eventually 466 afy replacement water would be needed to meet CalAm customer demand currently supplied by this subarea.

Los Padres Reservoir Storage Capacity Loss

The MPWMD's analysis of existing demand also addresses the potential loss of storage capacity in the Los Padres Reservoir (due to ongoing sedimentation), because such loss of capacity could affect the amount of replacement water CalAm needs to develop in order to comply with Order 95-10. The MPWMD analysis points out that, in Order 95-10, the SWRCB reduced

CalAm's right to divert surface water to storage in Los Padres Reservoir (from CalAm's initial licensed right of 3,030 afy to the company's 1984 estimate of storage capacity of 2,179 afy) based on the premise that the legal right to divert water to storage is limited by the physical ability to store the water. MPWMD addresses the possibility that the SWRCB could revisit Order 95-10 and, by applying the same logic, further reduce CalAm's right to divert water to storage based on the additional loss of capacity.

In the assessment of Los Padres Reservoir storage capacity, MPWMD notes that the 1984 estimate of storage capacity provided to the SWRCB by CalAm, and used as the basis for provisions in Order 95-10, was likely in error as it was inconsistent with previous and subsequent capacity estimates. Based on a 1978 USGS estimate of 1,950 AF, which MPWMD concluded was more accurate than the 1984 estimate, and a 1998 estimate of capacity by CalAm of 1,569 AF, MPWMD calculated that capacity had decreased by an average rate of 19 afy between 1978 and 1998. Based on this assumed annual sedimentation rate, MPWMD estimated that an additional 152 af of reservoir capacity had been lost in the eight years since the 1998 estimate, resulting in current storage capacity of approximately 1,417 af (MPWMD, 2006a).

Based on the difference between MPWMD's revised estimate of current reservoir capacity (1,417 af) and the estimated capacity assumed in Order 95-10 (of 2,179 af), MPWMD estimates that an additional 762 af of replacement water supply would be needed to offset lost storage capacity.

Replacement Supply Needed for Non-CalAm Water Producers

MPWMD's analysis of needed replacement supply assumed that the project or projects developed by CalAm to provide replacement supplies would be sized to meet the existing water needs of other Seaside Basin producers whose legal rights had also bee reduced in the adjudication. In the its technical memorandum describing its analysis of existing needs (MPWMD, 2006a), MPMWD notes that while CalAm is not directly responsible for developing replacement supply for non-CalAm producers in the Seaside Basin, it was reasonable to assume, based on economies of scale, that CalAm would be able to provide the least cost replacement supplies for the non-CalAm Seaside Basin producers as part of the proposed project. According to MPWMD this assumption is consistent with Section III.M.1, California American's Obligations to Augment Water Supply, in the Seaside Basin adjudication decision (MPWMD, 2006a). Based on these considerations, MPWMD's analysis of existing water needs also considers the need for additional replacement supply due to the effect of the Seaside Basin adjudication on other (non-CalAm) water producers within the Basin. As with CalAm, the adjudicated water rights of the other producers that use the Seaside Basin are less than the amount they had been pumping. Although the areas served by these producers are outside CalAm's service area, the reduction in supply of the other producers creates an additional shortfall that will need to be addressed in order to meet current water needs for the immediate Monterey Bay area vicinity.

Based on production records for the Seaside Basin Coastal subarea, the other producers in this subarea used an average of 316 afy from 1996 through 2005. MPWMD applied the same adjustment factor used for CalAm production (7.8 percent) to estimate that critically-dry-year demand for non-CalAm producers in the Coastal subarea would be 341 afy. The eventual allocation for these producers, pursuant to the Seaside Basin adjudication, will be 155 afy. Therefore, 186 afy of replacement supply would be needed for these producers to meet their existing level of demand.

MPWMD similarly evaluated production volumes of the other producers in the Laguna Seca subarea over the same period (1996-2005). In this subarea, however, MPWMD observed a substantial increase in demand in the most recent five years (an average of 644 afy was produced from water years 2001 through 2004, compared to an average of 418 afy for the entire period). MPWMD therefore used the average production for water years 2001 through 2005 as a more accurate reflection of current pumping levels. MPWMD applied the same adjustment factor used for CalAm production figures and non-CalAm Coastal subarea production to estimate that critically-dry-year demand for the non-CalAm producers in the Laguna Seca subarea would be 694 afy. The eventual allocation for these producers, pursuant to the Seaside Basin adjudication, will be 608 afy. Therefore, 86 afy of replacement supply would be needed for the other producers in the Laguna Seca subarea to meet their existing level of demand.

Therefore, based on these estimates for the Coastal and Laguna Seca subareas, MPWMD estimates that the total replacement supply needed to meet existing demands of the other producers in the Seaside Basin would be 272 afy. With CalAm's needed replacement supply of 12,215, the total updated demand including the other producers is 12,487afy (rounded to 12,500), as shown in Table 2-2.

2.3.1.3 UWMP Demand Estimates

CalAm's Monterey District Urban Water Management and Water Shortage Contingency Plan (UWMP) (CalAm, 2006a) also includes information on CalAm's near-term demands. According to water production information presented in the UWMP, CalAm's Monterey District produced 15,184.7 af in 2005, all of which was from wells. Demand projections included in the UWMP also include an estimate of 15,550 af for 2005, which assumes that the Stage 1 conservation program implemented by MPWMD in 1999 continues to be in effect. This is slightly higher (358 af) than MPWMD's average demand unadjusted for weather and somewhat lower (823 af) than MPWMD's total weather adjusted demand.

2.3.2 Future CalAm Service Area Demand - General Plan Buildout

2.3.2.1 MPWMD Projections

Based on information provided by each jurisdiction, MPWMD developed a projection of water supply needed to meet the level of growth anticipated in the jurisdictions' adopted general plans. Each jurisdiction provided MPWMD with its estimate of the number of residential units and non-residential square footage that would be developed under buildout of the applicable currently-adopted general plan. In general, projections of residential development included the number of single family units, multifamily units, secondary units, and residential remodels.

Projected non-residential development included information on commercial, industrial, public, and other land uses provided for in the general plan. Water use factors developed based on actual water use by various land use types within the district were then applied to project future water demands associated with the projected growth. A “contingency” component equivalent to 20 percent of demand based on general plan buildout was included for each jurisdiction. The contingency component is intended to address unanticipated water needs or (among other contingencies) an increase in demand that is expected from a relaxation of current conservation restrictions (required to comply with Order 95-10) when additional water supply is available. A summary of the District’s estimate of additional long-term water needs by jurisdiction is shown in **Table 2-4**. The table reflects *future* annual water demands expected to result from buildout of the general plans, and is in addition to existing water demands. Since the different jurisdictions prepare and adopt their general plans at different times, the expected buildout-year represented by these estimates is 2020 to 2025, depending on the planning horizon of each jurisdiction’s general plan. The estimate of water needed to meet these future demand is 4,545 afy.

2.3.2.2 UWMP Demand Projections

CalAm’s UWMP (CalAm, 2006a) cites several sources and several estimates of future demand[9], including:

- a projection that a total of 26,450 afy would be needed in 2025 (an addition of approximately 10,000 afy above current demand), from an evaluation of potential maximum build out prepared by MPWMD in the 1990s and based on planning and zoning designations in effect in 1988;
- a more recent study conducted in conjunction with the EIR prepared for the New Los Padres Dam and Reservoir project, which CalAm proposed in the 1990s following issuance of Order 95-10, which indicated an increase of 3,570 afy would be needed by 2020; and
- a 2001 MPWMD analysis based on a review of vacant legal lots of record, which indicated additional demand of 1,181 afy.

The UWMP notes that, although estimates may vary depending on the assumptions used, there is demand for additional water above that needed to replace Carmel River supply pursuant to Order 95-10. The estimates developed by MPWMD (MPWMD, 2006b) represent a refinement of earlier estimates, developed in consultation with the cities in its jurisdiction, and supersede the earlier estimates that are cited in the UWMP.

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[9] Two of the three studies referenced in the UWMP were by the MPWMD. As discussed in the preceding section, MPWMD’s current estimate of future demands for the CalAm service area is based on a recent (2005) analysis that uses jurisdictions’ build out estimates based on the jurisdictions’ currently adopted general plans.

TABLE 2-4

ESTIMATED LONG TERM WATER NEEDS BY JURISDICTION BASED ON GENERAL PLAN BUILD-OUT: NEEDS BEYOND CURRENT DEMAND (afy[a])

Jurisdiction	**Single-Family Dwellings (afy[a])**	**Multi-Family Dwellings (afy[a])**	**Second Units (afy[a])**	**Non Residential (afy[a])**	**Residential Remodels (afy[a])**	**20% Contingency (afy[a])**	**Residential Retrofit Credit Repayment [b] (afy[a])**	**Total Acre-Feet Needed**
City of Carmel	19	56	25	20	120	48		**288**
City of Del Rey Oaks	5			30	5	8		**48**
City of Monterey	46	426		123		109	0.526	**705**
City of Pacific Grove	73	376	298	260	43	210	3.545	**1,264**
City of Sand City	48	68		210		60		**386**
City of Seaside	133	21	44	283	4	97	0.023	**582**
Monterey County (Unincorporated)	892			10	37	188	8.134	**1,135**
Monterey Peninsula Airport District				115		23		**138**
Total	**1,216**	**947**	**367**	**1,051**	**209**	**743**	**12**	**4,545**

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[a] afy = acre-feet per year.

[b] MPWMD Ordinance 90 allows the reinvestment of retrofit water savings from toilet retrofits on single-family residential properties. The retrofit credit is accounted for by the MPWMD for each jurisdiction and is deducted from the jurisdiction's next available water allocation.

SOURCE: MPWMD, 2006b.

2.4 Available Supplies

This section summarizes information on water supplies available to meet existing and projected future demand within the CalAm service area.

2.4.1 Existing supplies

CalAm's principal existing supply sources are the Carmel River sources (groundwater and surface water) and the Seaside Basin, as discussed in Section 2.3 in the context of replacement supplies that are needed. Existing supplies from these sources are shown in **Table 2-5**. As discussed in Section 2.2, the SWRCB granted CalAm's interim use of Carmel River water above its recognized water rights while it develops replacement supply. This level is shown in the table for current (2007) supply only, although this level of interim use potentially could be allowed for a longer period, depending on the time needed to implement the CWP or develop another source of supply. The Seaside Basin Decision establishes a specific timeline for withdrawals to be reduced until the Operating Yield is equal to the Natural Safe Yield, as also discussed in Section 2.2. As determined by the Watermaster, CalAm's allocation in 2007 is 3,503 afy, which is 90.6 percent of the total remaining allocation for the year after the allocations for producers using the "alternative" allocation method have been subtracted. The quantities shown in Table 2-5 assume that the total allocation will be reduced triennially by 10 percent, as required in the Seaside Basin Decision, and that CalAm will continue to be allocated 90.6 percent of the remaining allocation after the alternative producers' allocations are subtracted.

In addition to these Carmel River and Seaside Basin sources, the MPWMD is implementing Phase 1 of its Aquifer Storage and Recovery (ASR) project, for which environmental review (MPWMD, 2006) and permitting have been completed. This project entails diversion and conveyance of excess surface flows from the Carmel River during the rainy season (November to May) to the Seaside Basin, where it is injected into the basin (aquifer) for storage and later recovery. When fully operational, Phase 1 of this project will have a long term average yield of ~~divert up to~~ 920 afy[10] ~~from the Carmel River~~ (MPWMD and Seaside Watermaster, 2008). (As described in Chapter 3, Project Description, the proposed CWP also includes an ASR component.)

2.4.1.1 Conservation

Since MPWMD prepared its Water Conservation Plan for Monterey County in 1989, the agency estimates that conservation savings of 15 to 25 percent have been achieved. Because this level of conservation is reflected in existing demands, it is not deducted from existing demand estimates. According to CalAm's UWMP, since 1995 (when Order 95-10 was issued), CalAm's customers on the Monterey Peninsula reduced water use from more than 17,000 afy to 14,000 afy, a reduction of more than 20 percent (CalAm, 2005). According to information at CalAm's website based on its

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[10] While the environmental impact report for the MPWMD ASR project evaluated a project that would divert up to 2,464 afy, the long term average annual yield of the project being implemented is estimated to be ~~for~~ 920 afy.

TABLE 2-5 ~~TABLE~~
AVAILABLE WATER SUPPLIES - CALAM SERVICE AREA (afy[a])

Source of Supply	2007	2010	2015	2020	2025	2030
Carmel River System						
Carmel River System - CalAm Recognized Water Rights	3,376	3,376	3,376	3,376	3,376	3,376
Carmel River System - Interim Limit over CalAm Recognized Water Rights Provided in Order WR 95-10 [b]	7,909					
Seaside Basin						
Coastal Subarea [c,d]	3,504	3,087	See note h ~~2,711~~	See note h~~2,068~~	See note h~~1,794~~	See note h ~~1,494~~
Laguna Seca Subarea [c,d]	345	246	See note h ~~157~~	See note h ~~5~~	See note h ~~0~~	See note h~~0~~
Entire Basin[h]			See note h	See note h	See note h	1,474
Subtotal Existing Carmel River and Seaside Basin Sources	~~11,758~~ 15,134	6,709	See note h ~~6,244~~	See note h ~~5,449~~	See note h ~~5,170~~	4,8~~7~~50
Aquifer Storage and Recovery Phase 1 [e]		920	920	920	920	920
Subtotal Existing Sources	~~15,607~~ 15,134	~~10,962~~ 7,629	See note h ~~10,032~~	See note h ~~8,442~~	See note h ~~7,884~~	7,2~~8~~64
Other Potential Supply Projects						
Expansion of Pebble Beach recycled water project [f~~g~~]			136	136	136	136
Unaccounted for Water Recovery	300	300	300	300	300	300
Sand City Desalination [g~~f~~]		300	300	300	300	300
Subtotal – Other Potential Supplies	300	600	736	736	736	736

[a] afy = acre-feet per year.

[b] Order WR 95-10 orders ~~provides~~ that CalAm divert no more than ~~may draw~~ 11,285 afy from the Carmel River (based on the specified maximum diversion of 14,106 afy, reduced by conservation savings of 20 percent each year) on a temporary basis until unlawful diversions are ended~~replacement supplies needed to meet demand in excess of CalAm's recognized legal water rights of 3,376 is developed~~. The Order provides for the interim limit to protect public health and directs CalAm to diligently undertake actions to obtain replacement water supply needed to meet demands above 3,376 afy, without specifying a time by which the interim limit would no longer be allowed.

[c] Seaside Basin allocations for 2007 are based on the 2007 allocations set by the Seaside Basin Watermaster. The allocations shown for 2010 are MPWMD's estimates (MPWMD, 2006a) based on provisions of the Seaside Basin Decision, ~~Coastal subarea allocations in future years~~ which were calculated assuming that CalAm continues to receive 90.6 percent of the allocation remaining after the alternative producers' portion is deducted, with the triennial reductions until Natural Safe Yield is reached. ~~CalAm's eventual allocation under Natural Safe Yield is assumed to be 1,494 (per MPWMD, 2006a). With the triennial reductions, by 2025 the alternative producers' allocation will exceed the total allocation for the Laguna Seca; therefore, no water would be available for standard allocation producers.~~

[d] Note that CalAm's UWMP assumes somewhat different Seaside Basin allocations from those shown in the table. The UMWP was prepared before the final Seaside Basin Decision was issued and before the initial allocations been established by the Watermaster.

[e] Implementation of ASR Phase 1 is expected to reduce CalAm's unlawful diversions from the Carmel River during low flow months (June through November) by an average of approximately 920 af (MPWMD, 2006c).

[f] An existing recycled water project provides an average of 664 afy to golf courses and other users for irrigation; the expansion project would increase supply by at least 136 afy, to a total of 800 afy (CalAm, 2006a).

[g] Part of the 300 afy to be supplied by this project is expected to offset current demands and part will meet future demands (City of Sand City, 2008).

[h] The Seaside Basin Watermaster, using somewhat different methodology from MPWMD's, calculates that CalAm's eventual allocation under Natural Safe Yield for the entire basin will be 1,474 afy (Seaside Basin Watermaster, 2009). Estimates of CalAm's allocation for interim years using the Seaside Basin Watermaster's methodology are not available.

SOURCE: CalAm, 2006a; MPWMD, 2006a, MPWMD, 2006c, City of Sand City, 2008, Seaside Basin Watermaster, 2009.

2004-05 Water Year Report, Monterey Peninsula customers reduced water consumption by 28 percent between 1987 and 2003 while the number of connections increased by 18 percent. Per capita water use during this period decreased by 37 percent (CalAm, 2006b). Currently, the MPWMD's Stage 1 Conservation Requirements are in effect. In 2007, because the Carmel River watershed had only 55 percent of average rainfall and 17 percent of average run-off, MPWMD determined that 2007 was a "critically dry year." By May of that year, CalAm was close to its pumping limits on the Carmel River and Seaside Basin because of increased demand caused by the dry conditions. As a consequence, MPWMD invoked Stage 1 Conservation requirements. Stage 1 Conservation rules require that all water users in the MPWMD participate and follow specified conservation actions, including limiting outdoor watering to a specified schedule, fixing correctable leaks and malfunctions, and taking other actions to eliminate water waste (MPWMD, 2007).

2.4.2 Potential Future Supplies

2.4.2.1 Water Projects

A number of other projects intended to help provide water supply to the Monterey Peninsula are also shown in Table 2-5. These projects are at various stages of planning, and none of them have been approved. Therefore, the information provided on these projects is for informational purposes only; since these projects have not been approved, it is not certain that they would be implemented.

2.4.2.2 Unaccounted-for Water Recovery

A preliminary estimate suggests that ~~This~~a project ~~is expected~~ to address ~~reduce~~ water system losses could produce savings of ~~by~~ 300 afy~~,~~ based on the assumption that system improvements would ~~will~~ reduce the current average unaccounted for water within the CalAm system as a percentage of total production (currently 14,804 af) by 2 percent. Further investigation is needed before such savings can be reliably quantified and assumed as an offset (reduction) of estimated demand.

2.4.~~2.~~3 Distribution System Considerations

As discussed in Section 2.2, above, diversions via the reservoirs and supplementary wells on the upper Carmel River were originally the primary supply source for the CalAm system. Since the supply shifted to the lower Carmel River and Seaside Basin, CalAm has observed significant operational challenges, as the system was not originally designed to receive water from two different locations. Water generated in the lower Carmel Valley cannot be transferred via the Monterey Peninsula to Seaside due to a hydraulic trough that exists in the area between Monterey and Seaside. For the same reason, water from Seaside wells cannot be transferred via the Monterey Peninsula to Peninsula cities or the Carmel Valley.

Because of this hydraulic trough, water from the Seaside Basin would not be readily available to help meet Carmel Valley demand when the Carmel River supply is reduced pursuant to CalAm's recognized water rights in Order 95-10. According to CalAm, the most effective solution to this problem would be construction of a pipeline connecting Seaside and the Monterey Peninsula to serve as a "hydraulic bridge" and thereby eliminate the hydraulic trough. Such a "bridge" is proposed as part of the CWP (the "Monterey Pipeline") and would allow CWP supply to flow to Carmel Valley and supply the entire system (CalAm, 2007). Whether or not the CWP was implemented, the existence of the hydraulic trough needs to be taken into account in considering the availability of supplies to meet existing and future demands within the CalAm service area.

2.5 Regional Water Demands

In its 2003 Decision D.03-09-022 (which established the CPUC as the lead agency for the proposed project), the CPUC observed that water supply issues were of interest not only to CalAm customers but to Monterey County as a whole, and directed CalAm to "thoroughly explore opportunities for partnerships with other regional water supply entities as [CalAm] prepares its PEA and incorporate such partnerships in the project if appropriate" (CPUC, 2003). As a consequence, the ~~proposed project~~ PEA included~~s~~ a Regional Project as an alternative to the proposed CWP.~~,~~ The Regional Project, which has been further developed and refined since the PEA was prepared, is ~~as~~ discussed in more detail in Chapter 5. ~~Under this alternative, the CWP would provide water supply to areas of the county outside CalAm's service area.~~ In addition to providing water service to CalAm's Monterey District, this project alternative would include water service to areas of northern Monterey County that are~~. This area is~~ currently served by the Pajaro/Sunny Mesa Community Services District and the Castroville Water District. The Regional Project also includes service to the Marina Coast Water District[11], which is located directly north of the CalAm service area. **Table 2-6** shows estimated future demands for the areas outside the CalAm service area that would be served under this alternative, as presented in the PEA and updated by MPWMD.

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[11] As shown in Table 2-6, the Regional Project would provide water for only part of the MCWD service area: the former Fort Ord area included within the MCWD, and replacement water for a desalination plant that is no longer operating.

TABLE 2-6
FUTURE DEMANDS OUTSIDE THE CAW SERVICE AREA (afy[a])

Area/Existing Water District	PEA Demand Estimate (afy[a])	Source for PEA Estimate	MPWMD Updated Demand Estimate (afy[a])	Source for Updated Estimate / Additional information
Marina Coast Water District				
Marina Coast Water District (MCWD)	2,400	Fort Ord Base Reuse Plan, 1997	2,700	Monterey Regional Water Supply Program (RMC, 2008). According to RMC, the demand estimate is based on MCWD's Urban Water Management Plan (UWMP). The UWMP shows 2,400 afy for the former Fort Ord area demand (under current development restrictions, as shown in the Base Reuse Plan) and assumes that a 300 afy MCWD desalination facility is operational and meeting that that level of demand; since the desalination plant is not operational, RMC added the 300 afy to the UWMP estimate of future needs. The Base Reuse Plan has received CEQA review and the project has been approved.
Subtotal - MCWD	**2,400**		**2,700**	
North County				
Moss Landing	70	See note b		Included as part of North County estimate (below).
North County	1,500	See note b	4,900	Monterey Regional Water Supply Program (RMC, 2008). The total includes 3,039 afy for North County, based on the water gap stated in a May 5, 1998 Monterey County Water Resources Agency (MCWRA) Memorandum to Files (MCWRA, 1998), 70 afy for Moss Landing, and 1,800 afy for the area served by Pajaro Sunny Mesa Community Services District (PSMCSD). Based on MCWRA communications with RMC, Moss Landing and PSMCSD are included with the North County estimate to avoid double counting (RMC, 2008).
Castroville Community Services District	1,000	See note b	1,000	PEA[c]
Subtotal - North County	**2,570**		**5,900**	
Total: Future Regional Demand	**4,970**		**8,600**	

[a] AFY = acre-feet per year.
[b] The PEA states that the water demand estimates in the PEA are based on a preliminary survey conducted by the Monterey County Water Resources Agency.
[c] Estimate is based on information in the PEA Projection Description (which indicates 1,000 afy for Castroville); Chapter 8 of the PEA shows 1,216 afy.

SOURCE: CalAm, 2006a; RMC, 2008.

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CHAPTER 3

Project Description

3.1 Introduction

This introduction discusses the origin of the Coastal Water Project and provides an overview of the Moss Landing and North Marina Project components. In response to additional analyses and to public comments received on the DEIR since its publication in January 2009, Marina Coast Water District, (MCWD) California American Water (CalAm), and Monterey County Water Resources Agency (MCWRA) have been working together to clarify and refine the necessary desalination process as well as components of Phase 1 of the Regional Project. This Chapter has been updated to reflect the resulting corresponding changes to the desalination treatment process for the Moss Landing and North Marina Projects.

3.1.1 Project Overview

This Environmental Impact Report (EIR) evaluates the potential environmental effects of a project proposed by California American Water Company (CalAm) to provide a new water supply for the Monterey Peninsula. The project is known as the Coastal Water Project (CWP). The water supply is needed to replace existing supplies that are constrained by recent legal decisions affecting the Carmel River and Seaside Groundwater Basin water resources, as described in more detail in Chapter 2. The CWP would produce desalinated water, convey it to the existing California American Water (CalAm) distribution system, and increase the system's use of storage capacity in the Seaside Groundwater Basin. The CWP would consist of several distinct components: a seawater intake system; a desalination plant; a brine discharge system; product water conveyance pipelines and storage facilities; and an aquifer storage and recovery (ASR) system. The Proponent's Environmental Assessment (PEA) (CalAm and RBF Consulting, 2005) described the CWP assuming the proposed desalination plant would be situated at Moss Landing (this is referred to as the Applicant's Proposed Project, or the Moss Landing Project)[1] to take advantage of the existing cooling water intake system at the Moss Landing Power Plant (MLPP) for source water, and the existing MLPP ocean outfall for the disposal of brine. Since that time, two alternative projects have been developed that are also capable of satisfying the objectives of the CWP. The first alternative project, known as the North Marina Project, includes most of the infrastructure improvements proposed for the CWP. The main differences between

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[1] A portion of the project proposed in the PEA was subsequently superceded by a February 14, 2007, technical memo by CalAm (RBF Consulting, 2007). The technical memo analyzed several alternatives to the Segunda Pipeline, including the Monterey Pipeline, and concluded that the best method for delivering desalinated water to the Monterey Peninsula would be the Monterey Pipeline. The Monterey Pipeline officially replaced the Segunda Pipeline in a November 21, 2008, letter from CalAm.

the Moss Landing and North Marina Projects are that the North Marina Project's desalination facility would be constructed at a different site (in North Marina) and the desalination facility's production capacity would be slightly greater than that of the Moss Landing Project's facility. The North Marina Project would also utilize subsurface seawater intakes for the desalination plant source water (slant wells at the end of Reservation Road), and would require fewer miles of product water conveyance pipeline than the Moss Landing Project. The North Marina Project was initially identified in the PEA and subsequently refined by CalAm and the CPUC. The North Marina Project would meet all of the project objectives of the CWP and is analyzed in this EIR at a level of detail equal to that devoted to the Moss Landing Project. Both the Moss Landing and North Marina Projects are described in this chapter, and both projects are analyzed in Chapter 4 of this EIR. CalAm would be the owner and operator of either of these two projects, and the CPUC, as the Lead Agency under CEQA, will use this document to approve one of the two projects to be implemented in the CWP.

The second alternative project analyzed in this EIR is the Monterey Regional Water Supply Project (referred to as the Regional Project), which is proposed by Water for Monterey County (formerly known as the Regional Plenary Oversight Group, or REPOG) as a community-developed long-term water supply alternative. The Regional Project, which is described separately in Chapter 5 and analyzed in Chapter 6, would integrate the development and allocation of several water supply sources, including desalination, to address existing and projected future demands within the CalAm service area, as well as existing and future demands in other areas of northern Monterey County. (See Sections 5.1 and 5.2 for further explanation about the origins and evaluation of the Regional Project.) The Regional Project, as proposed, would be implemented in phases and would incorporate most of the components of the North Marina Project, including the desalination facility at North Marina. However, instead of employing slant wells for source water as would the North Marina Project, the Regional Project would employ vertical wells to draw water from beneath the inland side of the beach dunes, and would add capacity to store additional water in the Seaside Groundwater Basin. ~~Additionally, the Regional Project would utilize the existing Salinas River Diversion Facility (SRDF), and would include a new surface water treatment plant.~~ As proposed in the Regional Project, the Marina Coast Water District (MCWD) would be the owner of the regional desalination facility and the surface water treatment plant. In order for the Regional Project to be implemented, it is assumed in this EIR that in that event, the MCWD would use this EIR in considering approval of some of the Regional Project facilities. None of the three projects analyzed in the EIR standing alone would have sufficient capacity to meet total demand; any of the three projects would provide the majority, but not all, of the water required.

Certain other projects and measures capable of supplying additional water or reducing customer demand in the service area are assumed to be operational or in effect under all alternatives in this EIR. These projects and measures are not part of any of the three alternatives evaluated in this EIR; each of these projects and measures has been implemented or could be implemented independently of the alternatives analyzed in this EIR[2].

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[2] For summaries of the environmental impacts associated with those already-approved projects, please see Appendix J, which is included for informational purposes. The effects of these projects are taken into account in the cumulative analysis contained in ~~Section 8~~Chapter 9 of this EIR.

The Sand City desalination facility, which will provide 300 afy, is one of these projects. Following certification of the EIR for the project, the Sand City desalination facility was approved and is expected to be under construction in 2009. Also, the MPWMD in partnership with CalAm has constructed and started operating two Seaside Groundwater Basin ASR injection/extraction wells that will deliver 920 afy on average. These existing projects are listed and discussed in this ~~C~~chapter to indicate how total demand for replacement water in the service area can be met.

In addition to these two existing water supply projects, two implementable measures could also support achievement of the total water supply objective for the service area in other ways. The first, implementation of feasible water conservation measures, would reduce water demand in the service area while the second, improved inspection and maintenance of water mains, would reduce current leakage~~ and evaporative losses~~. These measures could be implemented independent of a decision to proceed with any of the three projects considered in the EIR and are not further discussed herein.

Table 3-1 summarizes the facilities that would be included in each of the projects analyzed in this EIR. Certain facilities already exist while others are proposed as part of one or more of the alternatives. Consistent with CEQA and its guidelines, this EIR evaluates the significant adverse changes to existing conditions that would result under the Applicant’s Proposed Project and the alternatives to it. Such changes may involve modifications to and/or changes in the use of existing facilities as well as construction and operation of new facilities.

3.1.2 Project Objectives

The primary objectives of the CWP, as listed in the Notice of Preparation (NOP), are to:

- Satisfy CalAm’s obligations to meet the requirements of SWRCB Order 95-10;
- Diversify and create a reliable drought-proof water supply;
- Protect the Seaside Basin for long-term reliability;
- Protect listed species in the riparian and aquatic habitat below San Clemente Dam;
- Protect the local economy from the effects of an uncertain water supply;
- Minimize water rate increases by creating a diversified water supply portfolio;
- Minimize energy requirements and greenhouse gas (GHG) emissions per unit of water delivered to the extent possible;
- Explore opportunities for regional partnerships, consistent with the Administrative Law Judge Decision (Decision 03-09-022, dated September 4, 2003);
- Avoid duplicative facilities and infrastructure.[3] The final three objectives listed here were not submitted as part of the original PEA or CalAm’s Application for a CPCN. They were developed, rather, by the CPUC during the process of compiling this EIR.

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[3] The final three objectives listed here were not submitted as part of the original PEA or CalAm’s Application for a CPCN. They were developed, rather, by the CPUC during the process of compiling this EIR.

TABLE 3-1
PROJECT FACILITIES

	Moss Landing Project	North Marina Project	Phase 1 Regional Project	Full Regional Project
Desalination Plant	10 MGD at Moss Landing	11 MGD at North Marina	10 MGD at North Marina	13 MGD (total) at North Marina
Source Water	Existing cooling water system at the MLPP	6 new subsurface intakes (slant wells)	~~5~~ 6 new subsurface intakes (vertical wells)	~~10~~8 (total) new subsurface intakes (vertical wells)
Brine Disposal	Existing MLPP Outfall	Existing Outfall at MRWPCA		
Product Water Conveyance	Transmission Main North			
	Transmission Main South			
Seaside Groundwater ASR	2 existing and 2 new injection/extraction wells			
			~~3 additional injection wells~~	3 additional injection wells
				2 additional injection wells
Surface Water Treatment			~~Existing Salinas River Diversion Facility and new 14 MGD Plant at North Marina~~	Existing Salinas River Diversion Facility and new 14 MGD SWTP at North Marina
				Expansion of Salinas River Diversion Facility and 14 MGD SWTP at North Marina
Salinas Basin Groundwater for North Monterey County				Expansion of the Castroville Seawater Intrusion Project, Perched water storage at the Armstrong Ranch, additional distribution pipelines
Seaside Groundwater Basin Replenishment Project				Reverse Osmosis treatment of recycled water from MRWPCA treatment plant at an Advanced Water Treatment Plant and injection of treated water for groundwater recharge

SWRCB Order 95-10 requires CalAm to develop a replacement supply for any diversions from the Carmel River in excess of its legal entitlement of 3,376 afy. The Seaside Basin Adjudication requires CalAm to reduce its use of the Seaside Basin from approximately 4,000 afy to ~~1,494~~ 1,474 afy.[4] Both SWRCB Order 95-10 and the Seaside Basin Adjudication are discussed in more detail in Chapter 2. As discussed in Chapter 2, a total of 12,500 afy is needed to meet regulatory

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[4] The Seaside Basin Watermaster's recent calculation of CalAm's eventual allocation for the Basin as a whole (1,474 afy, as shown) has slightly revised the MPWMD's estimate of 1,494 afy. Neither calculation was available at the time the PEA was prepared.

replacement requirements within the CalAm service area as stated in MPWMD Technical Memo 2006-02 (see Table 2-2).

The following project description describes both the Moss Landing Project, which is the Applicant's Proposed Project, and the North Marina Project, which is an alternative to the project as proposed. **Chapter 4** of this document assesses the potential environmental impacts of each of the project components included in each alternative in this chapter, as well as the whole of each alternative.

The CWP (either the Moss Landing or North Marina project), in combination with the Sand City Desalination and existing ASR supplies, would meet the need for 12,500 afy. **Table 3-2** lists each expected source of supply.

TABLE 3-2
WATER SUPPLIES FOR CALAM, FROM THE COASTAL WATER PROJECT AND OTHER SOURCES

Sources of Water Supply	Amount of Water Provided (in afy)
New Desalination Plant	10,900
ASR (Carmel River water via Seaside Basin)	1,300 (920 under construction, 380 added as part of the CWP)
Sand City Desalination	300
Total	**12,500**

3.1.2.1 Supply from New Desalination Plant

The proposed new desalination plant locations are described in this chapter, within both the Moss Landing (Section 3.2.2) and North Marina (Section 3.3.2) projects. The Moss Landing Project would be a 10-million-gallon-per-day (mgd) plant and the North Marina Project would be an 11-mgd plant.

3.1.2.2 Supply from Carmel River, via Seaside Basin ASR

The Seaside ASR supply component, which is identical for both the Moss Landing and North Marina Projects, is described below in Section 3.2.6. Note that of the 1,300 afy of water accounted for in the ASR supply component, 920 afy are already being implemented[5]. The ASR described and analyzed in this EIR will provide an additional long-term average of 380 afy. This may not be the ultimate capacity of Seaside ASR, but it is the ~~best information available~~planned

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[5] The MPWMD is currently conducting an ASR project in the Seaside Groundwater Basin. An EIR (Jones and Stokes, 2006) and EIR Addendum have been completed and certified for this project, which is estimated to supply a long-term average of 920 afy of water. This existing ASR program includes two injection/extraction wells, initially known as Santa Margarita Test Injection Wells 1 and 2 (now referred to as Production Wells 1 and 2). Testing of these two injection/extraction wells has been completed and operation of the ASR project is scheduled to begin in 2009. Two additional ASR injection/extraction wells, a pump station and pipeline are being proposed as part of the CWP.

usage within the context of the CWP. The court-appointed Seaside Watermaster will continue to explore additional opportunities to remedy the Seaside Basin.

3.1.2.3 Supply from Sand City Desalination

The Sand City Desalination facility was analyzed in the Sand City Water Supply Project EIR (Sand City, 2004), has been approved, and is nearly under construction. The presence and use of the facility is assumed as part of baseline conditions. It is discussed further in Chapter 2 of this EIR.

3.1.3 Regional Location

The CalAm Monterey Service Area, also known as the Monterey District[6], is located in coastal Monterey County (see **Figure 3-1, Regional Vicinity Map**) and includes the cities of Monterey, Carmel-by-the-Sea, Pacific Grove, Seaside, Sand City, and Del Rey Oaks, in addition to the Monterey Airport District, the unincorporated areas of Carmel Highlands, Carmel Valley, and Pebble Beach, and other unincorporated county areas.

Moss Landing, an unincorporated ~~census-designated place~~, community of Monterey County classified by the U.S Census Bureau as a “census designated place” is located approximately 19 miles north of the CalAm service area. The City of Marina, unincorporated Castroville, and other areas of unincorporated Monterey County lie between Moss Landing and the CalAm service area. **Figures 3-2a** and **3-2b**, **Local Agencies**, show the local municipalities and water agencies in the project region.

3.1.4 Existing Facilities

3.1.4.1 Existing CalAm Facilities

The infrastructure that supports the CalAm Monterey District includes two small surface reservoirs on the Carmel River, 29 wells (25 active and 4 inactive; 17 of which are in the Carmel River watershed and eight are in the Seaside Groundwater Basin), eight water treatment facilities, and a distribution system that includes over 500 miles of water main ranging in size from two to 36 inches in diameter. The distribution system incorporates 59 booster stations, 82 ground storage reservoirs of various volumes, and multiple pressure-reducing valve facilities. As of 2008, the Monterey District serves a total of approximately 40,000 customers with an average demand of 13 mgd and a maximum day demand of approximately 20 mgd.

As noted in the previous chapter, the Monterey District has historically received its water supply from impounded Carmel River water from the San Clemente and Los Padres Reservoirs, diversions from the upper and lower reaches of the Carmel River (via groundwater wells), and supplemental groundwater from wells located in the Seaside Basin.

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[6] The phrases “Monterey Service Area” and “Monterey District” are used to describe the portion of CalAm’s service area that encompasses lands on the Monterey Peninsula. The Monterey District/Monterey Service Area excludes CalAm’s satellite water systems within the Monterey interior along the Highway 68 corridor.

Surface Storage Reservoirs

The San Clemente Dam is a concrete arch dam on the Carmel River that was constructed in 1921 and has been owned and operated by CalAm since ~~1965~~ 1966. The dam impounds the San Clemente Reservoir. Although the reservoir has served as a major point of diversion, extensive siltation has reduced the available surface storage substantially and the dam does not meet current dam safety standards. ~~For these and other reasons, CalAm, the National Marine Fisheries Service (NMFS), and the California State Coastal Conservancy are implementing a project to remove the San Clemente Dam (California Department of Water Resources and U.S. Army Corps of Engineers, 2008).~~ Department of Water Resources, as lead agency under CEQA, and the U.S. Army Corps of Engineers, as lead agency under NEPA, have prepared an EIR/EIS to assess alternative projects to meet current seismic safety standards for San Clemente Dam. The proposed project is dam strengthening and the alternative is creation of a Bypass for Carmel River flows to allow removal of the dam. CalAm, NMFS and Coastal Conservancy are working together to see if funding and other issues can be resolved to allow the Bypass alternative to go forward. The California Division of Safety of Dams must approve whatever alternative goes forward.

The Los Padres Dam is an earth and rockfill embankment dam that was constructed in ~~1949~~ 1951 and has been owned and operated by CalAm since ~~1965~~ 1966. The dam impounds the Los Padres Reservoir upstream from the San Clemente Dam. Sedimentation has reduced storage capacity in the reservoir by an estimated 50 percent.

Production Wells and Treatment

The majority of the Monterey District water supply comes from groundwater wells located along the Carmel River in Carmel Valley. A few of these wells are located in upper Carmel Valley, but the majority of the water supply comes from wells in lower Carmel Valley producing water from the lower reaches of the Carmel River. The Carmel Valley supply is supplemented during the summer high-demand season by wells in the Seaside Groundwater Basin (see Figure 3-2b). The Seaside Groundwater Basin encompasses a 24-square-mile area subdivided into several sub-basins. These sub-basins include an inland sub-basin underlying Fort Ord, a coastal sub-basin underlying Seaside, and the Laguna Seca sub-basin.

Treatment applied to the Monterey District's water supply sources varies by site but in general includes: pressure filtration for iron and manganese removal; granular activated carbon (GAC) and Ozone (O_3) injection for hydrogen sulfide removal; corrosion control; and pH adjustment. Sodium hypochlorite is used to provide disinfection at each well and treatment facility that provides water to the distribution system. There are eight water treatment facilities that operate to serve the Monterey District.

Distribution

The CalAm Monterey District is a "patchwork" of distribution systems that has been assembled over time, starting with the Carmel Valley and Monterey Peninsula areas and eventually expanding to include the Seaside, Del Rey Oaks, and Sand City areas. It encompasses several distinct urban areas and water pressure zones. In addition, there are several satellite systems along the Highway 68 corridor. Water distribution piping in the Monterey District ranges in size from 2 inches to 36 inches in diameter within a multi-pressure zone system. The system is divided into four distinct districts:

- Upper Carmel Valley;
- Lower Carmel Valley and Monterey Peninsula;
- Seaside; and
- Upper Lift Zones.

Water produced from wells along the upper and lower reaches of the Carmel River in Carmel Valley is conveyed in two directions: westward and clockwise around the Monterey Peninsula to the City of Monterey; and northward over the hills via the Segunda Reservoir, Segunda Pipeline, Segunda Pump Station, and the Crest Tank facilities to the City of Seaside. The two flows converge at a low elevation (a hydraulic trough) near the Naval Postgraduate School in eastern Monterey. This hydraulic trough prevents water produced along the Carmel River from being conveyed clockwise around the Monterey Peninsula to Seaside, and also prevents water produced in Seaside from being conveyed counterclockwise around the Monterey Peninsula.

3.2 Moss Landing Project (Applicant's Proposed Project)

The Moss Landing Project consists of a seawater intake system, a desalination plant, a brine discharge system, and a variety of conveyance and storage facilities, including an ASR System. The following section provides a description of those components. The information provided in this section was summarized from the Applicant's PEA, with some supplemental information provided by additional CalAm documentation, by RBF Consulting, and by others as noted in the footnotes and References section. **Figure 3-3**, **Moss Landing Project Facilities Index Map**, depicts the infrastructure required for the project.

Figures 3-4a through **3-4g**, **Proposed Moss Landing Project Facilities**, show the Moss Landing Project components to scale on a map of the region.

The Moss Landing Project includes an intake using source water from the Moss Landing Power Plant (MLPP); a seawater desalination plant at a site in Moss Landing near the MLPP; open-water discharge of brine through the MLPP outfall; product water conveyance and storage infrastructure, including approximately 28.2 miles of pipeline; and ASR facilities. **Table 3-3** provides a summary of the quantity, size, and characteristics for each component of the Moss Landing Project.

3.2.1 Source Water Intake System

Source water for the desalination plant would be supplied from the existing MLPP once-through cooling (OTC) water return system after it has passed through the MLPP.

The MLPP has been in operation since 1950 and is currently owned and operated by Dynegy. The facility is natural gas-fired and is permitted at 2,539 megawatts (MW). The facility was re-licensed in 2000 by the California Energy Commission to operate an OTC process, in which seawater is used

TABLE 3-3
MOSS LANDING PROJECT FACILITIES SUMMARY

Facility	Quantity	Size and Characteristics
Desalination Plant:		
Source Water Pipeline	1.33 mi (7,000 LF)	54-inch diameter
Return Flow Pipeline	1.52 mi (8,000 LF)	24-inch diameter
Equalization Basin	1	4.8 MG
Plant Inlet Pump Station	1	24~~23.5~~ mgd, 200 HP (installed)
Pretreatment System	1	22 mgd, submerged media membrane filtration
Reverse Osmosis System	1	10 mgd, Reverse Osmosis (RO) membranes
Post-treatment System	1	Lime, ~~and~~ carbon dioxide, and sodium hypochlorite
Moss Landing to North Marina Conveyance and Storage Facilities:		
Clearwell	2	1.5 MG each, circular aboveground concrete
Desalinated Water Pump Station	1	7,000 gpm (10.1 mgd), 1,200 HP (installed)
Transmission Main North	9.47 mi (50,000 LF)	Up to 36-inch diameter
North Marina to Terminal Reservoir Conveyance and Storage Facilities:		
Transmission Main South	8.09 mi (42,700 LF)	Up to 36-inch diameter
Terminal Reservoir	2 tanks	3 MG each
Seaside/Carmel Valley Conveyance and Storage Facilities:		
Monterey Pipeline	5.37 mi (28,400 LF)	36-inch-diameter
Valley Greens Pump Station	1	2100 gpm (3.0 mgd), 110 ft TDH
Forest Lake Reservoir	3 (existing)	5 MG each (existing)
Eardley Pump Station	1 (existing)	4 pumps, 3,500 gpm (5.0 mgd), 215 ft TDH (existing)
Crest Tank	1 (existing)	0.25 MG each (existing)
Segunda Reservoir	~~1~~2 (existing)	1.5 MG each (existing)
Segunda Pump Station	3 pumps (existing) 1 standby pump (proposed)	4,500 gpm (6.5 mgd)~~, 150 HP~~ (existing) 2,300 gpm, 150 HP (proposed)
Segunda Pipeline	3.3 mi (17,500 LF) (existing)	16-inch diameter
ASR Injection/Extraction Wells	2	800-foot depth, 2.2-mgd injection/ 4.3-mgd extraction
ASR Pump Station	1	6,000 gpm (8.4 mgd), 200 HP (installed)
ASR Pipeline	2.46 mi (13,000 LF) (proposed) 1.50 mi (7,900 LF) (under construction)	30-inch diameter north of Coe Avenue to ASR Wells 30-inch diameter from Hilby Avenue to Coe Avenue owned by MCWD and shared with CalAm
ASR Pump-to-Waste System	1.1 mi (5,800 LF) pipeline; 1 settling basin	16-inch-diameter pipeline; 2500-square-foot by 12-foot-deep basin.

LF = linear feet; MG = million gallons; mgd = million gallons per day; HP = horsepower; gpm = gallons per minute

SOURCE: CalAm and RBF Consulting, 2005; RBF Consulting, 2008.

to cool power plant facilities. The power plant is located east of State Highway 1, with open-water intakes for the cooling water located in the Moss Landing Harbor and a cooling water discharge outfall extending approximately 1,000 feet off shore in Monterey Bay near the harbor inlet.

The MLPP is currently permitted to intake up to 1.226 billion gallons per day of seawater, under the assumption of 100-percent mortality and with the attending mitigation, through two sets of existing intake facilities located in the Moss Landing Harbor—a northern intake, which serves Units 1 and 2 of the MLPP, and a southern intake, which serves Units 6 and 7 of the MLPP. **Figures 3-5, Moss Landing Power Plant Existing Intake and Outfall; 3-6, Moss Landing Power Plant Northern Intake in Moss Landing Harbor; 3-7, Moss Landing Power Plant and Location of Proposed Desalination Plant Facilities; and 3-8, Moss Landing Power Plant and Proposed Moss Landing Desalination Plant, Intake, and Outfall,** show existing intake facilities at the MLPP, the relative locations of the existing and proposed facilities, and the path of water as it would flow from Moss Landing Harbor to the proposed desalination plant. The project, as proposed, would not increase the existing amount of cooling water taken in by the MLPP at either intake. Source water for the desalination plant would be diverted from the open-air disengaging basin, which receives spent cooling water from Units 1 and 2 of the MLPP, which are served by water from the northern intake facility. This intake facility was upgraded and permitted for use by the power plant on October 25, 2000 by the California Energy Commission. To screen debris from entering the cooling water system, MLPP currently utilizes modified traveling screens at its raw seawater intakes. This intake screening system consists of screen panels mounted on a continuous belt that rotates through the water vertically. The screen mechanism consists of 5/16-inch mesh, a drive mechanism, and a spray cleaning system.

3.2.2 Desalination Plant

The Moss Landing desalination plant would be located approximately 1,500 feet east of the MLPP in North Monterey County.[7] Figures 3-7 and 3-8 show the proposed location of the plant in relation to the existing MLPP.

The Moss Landing Project desalination plant would encompass approximately 16 acres (approximately 700,000 square feet) known as the East Parcel site, which is accessed from Dolan Road. The treatment plant's key facilities would include: (1) a source water pipeline connected to the disengaging basin of the MLPP; (2) an equalization basin, to receive and store the incoming source water; (3) an inlet pump station, to convey seawater from the equalization basin to a pretreatment system; (4) a pretreatment system; (5) an RO system; (6) a post-treatment system; (7) a return flow pipeline that conveys brine and washwater back to the disengaging basin; (8) chemical feed and storage facilities; and (9) facilities for residuals management. The plant facilities would also include non-process facilities for administrative and other uses.

A preliminary site plan of these facilities is shown in **Figure 3-9**, **Desalination Plant Layout for Moss Landing Project**. The following sections describe each of these facilities.

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[7] The proposed desalination plant site would be purchased or an agreement would be made between the owner and the applicant prior to construction.

3.2.2.1 Source Water Pipeline

The desalination plant would draw raw seawater from the existing flow of the MLPP cooling water return system. As mentioned above, the MLPP currently takes in seawater through two sets of intake facilities—a northern intake and a southern intake (see Figure 3-5)—but the desalination plant would only utilize water that entered through the northern intake.

Raw seawater drawn into the northern intake circulates once through the power plant prior to entering the existing disengaging basin, and then discharging through the existing outfall (see Figure 3-5). Water for use in the desalination plant would be diverted from the disengaging basin through a new 54-inch-diameter pipeline, approximately 7,000 feet long, that would convey the seawater south to Dolan Road and east to the desalination plant (see **Figure 3-10, Proposed Raw Water and Return Flow Pipeline Facilities at the Existing Disengaging Basin at Moss Landing Power Plant,** and Figure 3-8). The source water pipeline would terminate at the equalization basin of the desalination plant site. Diversion from the disengaging basin would occur at the rate of 55 cubic feet per second (cfs) for 16 hours of each day after passing through the OTC system.

3.2.2.2 Equalization Basin

The Moss Landing desalination plant would include an equalization basin at the desalination plant site to stabilize volume and temperature of the raw seawater received from the MLPP cooling water return prior to entering the desalination pretreatment process. The open, concrete-lined equalization basin would have a capacity of approximately 4.8 million gallons (MG) at a size of approximately 43,700 square feet with a 12-foot depth. Figure 3-9 shows the preliminary location and design of the basin.

3.2.2.3 Inlet Pump Station

A plant inlet pump station would pump raw seawater from the equalization basin to the pretreatment system. The pump station would be sized for a lift of approximately 30 feet and would have a capacity of 24~~23.5~~ mgd. Figure 3-9 shows the preliminary location of the pump station.

3.2.2.4 Pretreatment System

Because RO technology is sensitive to microbial contamination, turbidity, and other contaminants and conditions, pretreatment of the raw seawater is required to prevent the membranes from becoming fouled or encrusted with scale. Proper pretreatment can increase the efficiency of the RO system and extend the useful life of the RO membranes.

The proposed pretreatment system would have a capacity of 24~~23.5~~ mgd, to treat the entire source water intake. The pretreatment system for the Moss Landing Project would ultimately be determined after pilot studies are completed; however, pretreatment processes such as coagulation, flocculation, and membrane filtration are anticipated. In the coagulation-flocculation process, very fine suspended solids and colloidal particles (less than 1 micron in diameter) in the saltwater are aggregated to form larger particles that can be more easily settled and filtered out.

The membrane filtration process filters seawater by applying suction to hollow membranes suspended within a tank. The filtered seawater would then be pumped to the RO system.

The pretreatment process would deliver approximately 95 percent of the raw water to the RO process, while the remaining 5 percent of the total source water flow (1.2 mgd) and filtered solids would be diverted to the waste stream. A preliminary schematic drawing of the pretreatment system is shown in **Figure 3-11**, **Moss Landing Project Desalination Facility Pretreatment Process**. See Section ~~3.2.2~~ 3.2.2.9 Residuals Management, for details of the pretreatment backwash disposal.

3.2.2.5 Reverse Osmosis System

Reverse osmosis (RO) is an ion separation process that uses semi-permeable membranes to remove salts in saltwater to produce fresh water. Pretreated seawater is forced at very high pressures through the membranes, and the water molecules, smaller than almost all impurities, including salts, are selectively able to pass through the membranes. The fresh water produced, or product water, is also referred to as "permeate". The remaining impurities and residual water are discharged as brine. A schematic drawing of the proposed RO process is shown in **Figure 3-12**, **Desalination Process**.

The membranes would be housed in an approximately 32,000-square-foot building, comprising the largest structure within the desalination plant footprint. The RO membranes would be modular, with each module sized to produce 2 mgd. The exact type and configuration of the RO membranes are still being determined, but the assumed and proposed RO process would consist of a ~~single~~partial second-pass system with an overall recovery of 44 ~~45~~ percent; thus, the plant would have to have an RO feed stream of up to 22.7~~2~~ mgd to produce 10 mgd of desalinated water (and approximately 12.7~~2~~ mgd of brine). ~~Pilot studies are currently underway to determine the number of passes and stages required, the actual RO process recovery rate, and other design parameters of the RO process.~~ Since publication of the DEIR, further study has indicated the need for the partial second pass for water quality purposes due to three constituents of concern, namely boron, chloride and sodium. Pilot testing will determine specific design and operational parameters (see Appendix Q).

The clean-in-place (CIP) process for the RO membranes includes two steps: first, circulating a number of cleaning chemicals in a predetermined sequence through the membranes; and second, flushing the membranes with clean water to remove the waste-cleaning solutions. The contents of the cleaning solutions and the frequency of the cleaning (most likely in the range of once every six weeks to once every twelve months[8]) would be determined during the pilot testing process. The spent non-continuous cleaning solutions would be collected and disposed of at an appropriate disposal site (see Residuals Management section, below).

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[8] Membrane manufacturers typically recommend cleanings occur when the following fouling characteristics are evident: a 10-15% decrease in normalized permeate flow; a 10-15 percent increase in normalized permeate quality; a 10-15 percent increase in normalized pressure drop, as measured between the feed and concentrate headers. The nature and rapidity of fouling varies by site and depends on a number of factors, including quality of the feedwater, system recovery rate, and element flux. Cleaning intervals may vary from every 6-12 weeks in high fouling water to 6-12 months (or longer) in low fouling waters (http://www.torayro.com/).

The Moss Landing Project would include energy recovery from the brine stream using pressure exchanger technology. Energy recovery is a process in which the energy contained within pressurized brine flow is transferred to a portion of the RO feedwater to lower feedwater pumping requirements and thus lower overall energy consumption. Several different energy recovery options, including pressure-exchanger technology and energy recovery turbines, are available, and the most appropriate technology for the Moss Landing Project will be chosen later in the project design process[9]. Energy recovery is expected to significantly reduce overall energy consumption in the RO process.

3.2.2.6 Post-Treatment

Hardness, alkalinity, and pH of the product water would be adjusted after the RO process to make the water more compatible with the other sources of supply in the CalAm system and to ensure acceptable water quality. Typical post-treatment processes include adding carbon dioxide to adjust alkalinity, lime to adjust pH and hardness, sodium hydroxide as a corrosion inhibitor to protect piping, and sodium hypochlorite for disinfection. Final post-treatment requirements would be determined through the pilot project. **Table 3-4** provides estimated chemical usage required for post-treatment, as well as the anticipated annual consumption of each chemical.

3.2.2.7 Return Flow Pipeline

A 24-inch-diameter RO concentrate return flow pipeline would convey residue from the source water screening process, continuous spent backwash washwater from the membrane filtration process (if required), and concentrate (brine) from the RO process to the disengaging basin, a distance of approximately 8,000 feet. The pipeline would parallel the source water pipeline along Dolan Road (see Figures 3-9 and 3-10).

3.2.2.8 Chemical Feed and Storage Facilities

Various chemicals to be used during treatment would be stored and processed onsite. The estimated use, dosage (in units of milligrams per liter [mg/l]), and annual consumption (in units of pounds per year [lbs/yr]) of each chemical are summarized in Table 3-4 below.

The listed chemicals are non-flammable and will be stored in tanks that meet applicable regulatory requirements. It is anticipated that chemical storage tanks for daily use will be located within the pre-treatment, reverse osmosis, and post-treatment buildings. Bulk storage will be located in the chemical building. The design of this building will incorporate the regulatory requirements for hazardous materials storage, such as spill containment features that exceed the capacity of the tanks; segregation of individual chemicals to prevent mixing in the case of accidental spillage; and appropriate alarm and fire sprinklers. Chemicals that have specific reactivity risks with one another will be stored at opposite ends of the storage area to reduce the risk of mixing. In addition, two lime saturation tanks, situated adjacent to the chemical building, will contain a bed of calcite for post-treatment after the RO process.

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[9] Additional information on pressure-exchanger energy recovery systems is available at www.energyrecovery.com.

TABLE 3-4
PROJECT DESALINATION PLANT TREATMENT CHEMICALS

Chemical	**Usage**	**Dosage Concentration (mg/L)**	**Return Flow[1] Concentration (mg/L)**
Sulfuric Acid	Pretreatment[3]; Clean-In-Place[4]	30	54 (Sulfate); <1
Sodium hypochlorite (Chlorine)	Pretreatment[~~3~~4]; Post-treatment[~~3~~4]	3	5 (Chloride)
Ferric Chloride[2]	Pretreatment[3]	15	10 (Chloride)
Sodium Bisulfite	Reverse Osmosis[4]	6	10 (Sulfate)
Antiscalant	Reverse Osmosis[4]	TBD	TBD
Lime	Post-treatment[4]	35 (CaO) 60 ($CaCO_3$)	NA
Carbon Dioxide	Post-treatment[4]	30 (CO_2) 60 ($CaCO_3$)	NA
~~Potassium Permanganate~~	~~Greensand Filtration[5]~~	~~TBD~~	~~TBD~~
Citric Acid	Membrane Cleaning[3]	TBD	<1
Sodium Hydroxide	Post-treatment[4] Clean-In-Place[4]	2.4 TBD	TBD 0
EDTA	Clean-In-Place[4]	TBD	0

Notes: TBD=Dosages and frequency of cleanings to be determined during pilot testing.

[1] Impact on return flow may be greater than dosage due to high rejection of some constituents from membranes.
[2] Coagulant may or may not be required, as determined by pilot testing.
[3] Required for the Moss Landing Project desalination plant only.
[4] Required for both the Moss Landing and North Marina Projects' desalination plants.
~~[5] Required for the North Marina Project desalination plant only.~~

SOURCE: CalAm and RBF Consulting, 2005; RBF Consulting, 2008.

Chemicals would likely be purchased in bulk and then processed onsite for their designated purpose. Processing chemicals onsite would result in lower purchasing costs.

3.2.2.9 Residuals Management

The desalination treatment plant would produce several waste streams, including the following:

- Inlet pump screen station residue;
- Continuous backwash water from the membrane filtration pretreatment process;
- Concentrate (brine) from the RO process; and
- CIP solutions from cleaning of the membrane filters and RO membranes.

The disposal of these wastes is described below.

Inlet Pump Station Screen Residue

Screening of the source water intake would result in the collection of residue of organic marine material on the plant inlet pump station screens. The material removed by the screens would be mixed with carrying water and then pumped into the desalination plant's return flow pipeline. The amount of residue from the screens is expected to be less than 10,000 pounds per day, and the carrying water containing these screenings for the Moss Landing Project is expected to be less than 0.1 mgd.

Pretreatment Backwash

As noted above, further pretreatment of the MLPP cooling water, which may include processes such as coagulation, flocculation, and membrane filtration, would be required prior to the RO process. As part of routine operation, the membranes would be cleaned continuously, producing a membrane backwash waste stream of approximately 1.~~2~~3 mgd. This backwash stream would contain organic solids of marine origin that passed through the initial screening. If a chemical coagulant, such as ferric chloride, is used in the pretreatment process, this stream would also contain the chemical precipitate form of the chemical. In this case, the spent backwash water would be directed to a treatment facility, where it would be treated with additional chemicals to induce coagulation, flocculation, and sedimentation. The treated water from this process would be returned to the raw water equalization basin and reprocessed through the desalination plant or it would be pumped into the return flow pipeline. (Pilot testing would be conducted to determine which method to use.) Settled solids from this process would be dewatered by mechanical means and would be hauled off-site via truck or rail to an appropriate landfill for final disposal. Filtrate from the solids dewatering process would be redirected to the spent backwash water treatment facility for pretreatment.

If pretreatment coagulant chemicals are not necessary, the spent backwash water would be discharged directly to the MLPP outfall via the RO concentrate return flow pipeline (brine line), since suspended solids contained in the stream would be entirely of marine origin.

Brine Concentrate

The RO process would generate approximately 12.7~~2~~ mgd of brine with a total dissolved solids ~~(tds)~~ concentration of ~~approximately 60~~a maximum of 62.5 parts per thousand (ppt[10]). This brine stream would be returned to the MLPP disengaging basin via the return flow line (see Figure 3-6), from which the brine would be mixed with MLPP cooling water flow and discharged to Monterey Bay.

Clean-In-Place (CIP) Chemical Backwash

The accumulation of silts or scale on the RO membranes causes fouling, which reduces membrane performance. Intermittent (non-continuous) cleaning would involve passing proprietary CIP chemicals in a predetermined sequence through the membranes, followed by flushing of the membranes with clean water. The used CIP stream would be collected in a

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[10] 1 part per thousand (ppt) is equivalent to 1,000 milligrams per liter (mg/l)

separate collection sump and subsequently taken by tanker truck to an appropriate off-site disposal site. The exact chemicals, their concentrations, and the cleaning frequency required are not known at this time~~, but would be determined by pilot testing~~.

3.2.2.10 Non-process Facilities

The desalination plant would be equipped with non-process facilities, including an administration and operations building, laboratory facilities, chemical buildings, pump housing, parking lot, access roads, power generators, and an electrical building.

3.2.2.11 Pilot Plant and Studies

The seawater desalination pilot plant testing at Moss Landing Harbor began in May 2008 and will continue through May 2009. The testing is being conducted utilizing once-through cooling water from the MLPP cooling water system, which is pumped from Moss Landing Harbor. The Moss Landing Project would utilize the same source. The pilot plant is designed for a seawater intake capacity of approximately 0.14 mgd (CalAm and RBF Consulting, 2008). During the pilot plant testing, the equipment performance and water quality is being monitored. The testing includes pretreatment, RO, CIP, and post-treatment trials. The equipment performance, feedwater quality, and product water quality is being monitored. Based on the results of the pilot plant testing, the project applicant will determine what pretreatment, CIP chemical, RO, and post-treatment process is most efficient and economical. The results of, and decisions made as a result of the pilot plant testing, will not affect the analysis and conclusions of this EIR, because this document anticipates and evaluates the full likely range of options for these activities.

3.2.3 Brine Disposal

Once delivered to the disengaging basin, the RO brine discharged from the desalination process (approximately 12.7~~2~~ mgd) would mix with the discharged power plant cooling water. The salinity of the RO brine would be approximately 80 percent higher than that of the raw seawater, and it would be mixed with the MLPP discharge seawater for dilution before discharge through MLPP's two existing 144-inch-diameter ocean outfalls. These outfalls terminate approximately 1,000 feet off shore from the Moss Landing Harbor inlet at approximately 20 feet above the seabed (in water of a total depth of 40 feet).

3.2.4 Moss Landing to North Marina Conveyance and Storage Facilities

The conveyance and storage facilities for the Moss Landing Project are delineated into three sections, based on both geography and the type of water movement involved. The three sections are the Moss Landing to North Marina, North Marina to Terminal Reservoir, and Seaside/Carmel Valley conveyance and storage facilities. The Moss Landing to North Marina facilities are unique to the Moss Landing Project; the North Marina to Terminal Reservoir facilities are similar, with a few components in common, for both the Moss Landing and North Marina Projects; and the Seaside/Carmel Valley facilities are identical for both the Moss Landing and North Marina Projects.

The Moss Landing to North Marina conveyance and storage facilities would deliver product water from the desalination plant at Moss Landing to North Marina. The Moss Landing to North Marina conveyance and storage facilities would include the following infrastructure:

- Clearwell at the Desalination Plant;
- Desalinated Water Pump Station; and
- Transmission Main North.

Product water produced at the desalination plant would enter a water storage tank, known as a clearwell. From there, it would be pumped by the desalinated water pump station into the proposed Transmission Main pipeline (Northern section) for conveyance south. At Reservation Road in North Marina, the proposed pipeline would become known as Transmission Main South (discussed in Section 3.2.5). **Table 3-5** lists the relevant infrastructure components and the current status of each component (existing or proposed).

TABLE 3-5
MOSS LANDING TO NORTH MARINA CONVEYANCE AND STORAGE FACILITIES INFRASTRUCTURE

Infrastructure Component	Status	Proposed New Construction and/or Modifications	Relevant Figure(s)
Clearwell at the Desalination Plant	Proposed	Two 1.5-MG circular aboveground concrete reservoirs	Figure 3-9
Desalinated Water Pump Station	Proposed	Pump station with capacity of 7,000 gpm and a TDH of 420 feet	Figure 3-8 and 3-9
Transmission Main North	Proposed	9.5 mi of up to 36-inch-diameter force main pipeline	Figures 3-3 and 3-4a through 3-4c

SOURCE: CalAm and RBF Consulting, 2005

3.2.4.1 Clearwell

A 3-MG clearwell, consisting of two 1.5-MG circular aboveground concrete reservoirs, would be located at the desalination plant. The clearwell would serve as the initial product water conveyance storage facility. It would store treated, desalinated water. Figure 3-9 shows the location of the proposed clearwell.

3.2.4.2 Desalinated Water Pump Station

A desalinated water pump station is proposed to be located at the desalination plant site, to pump product water to Terminal Reservoir. This pump station would have a capacity of 7,000 gpm with a total ~~daily~~ dynamic head (TDH) of 420 feet. A conceptual layout of the desalinated water pump station is given in Figure 3-9.

3.2.4.3 Transmission Main North

The Transmission Main North (the northern portion of the main desalinated water conveyance system pipeline) would convey water from the proposed desalination plant to Reservation Road in North Marina, a distance of approximately 9.5 miles. The pipeline would be a force main with a diameter of up to 36 inches. **Table 3-6** describes preliminary design criteria for the desalinated water conveyance system pipeline.

TABLE 3-6
TRANSMISSION MAIN (NORTH AND SOUTH) PIPELINE PRELIMINARY DESIGN CRITERIA

Item	Design Criterion
Capacity	10 mgd
Pipeline Diameter	Up to 36 inches
Pipe Material	Steel cylinder concrete pipe
Pipe Class	150 psi and 250 psi

mgd = million gallons per day; LF = linear feet; psi = pounds per square inch.

SOURCE: CalAm and RBF Consulting, 2005

The PEA proposed a specific alignment for Transmission Main North, as shown in Figure 3-3. Figures 3-4a through 3-4c provide more detailed views of each pipeline segment. Generally, the proposed pipeline route follows public rights-of-way (ROWs), existing railroad easements, and agricultural roads. Crossings at all sensitive locations (either major intersections or drainage channels) would be accomplished by means of jack-and-bore techniques, horizontal directional drilling (HDD), tunneling, or the use of existing or new bridge structures to span the sensitive location (see, for example, **Figures 3-13**, **Salinas River Crossing**, and **3-14**, **Moro Cojo Slough Crossing–Trenchless Technology**).

From the Moss Landing desalination plant site, the Transmission Main North pipeline alignment would head east along Dolan Road to the existing Union Pacific Railroad (UPRR) ROW. The alignment would then turn south and continue parallel to and west of the UPRR. The UPRR is operational in this region, so an easement paralleling the UPRR ROW would be required. The alignment would turn to the southwest along Salinas Street in Castroville, crossing under Merritt Street. Approximately 1,000 feet southwest of the Merritt Street crossing, the pipeline would cross under Highway 156, then continue southwest along Highway 156 and southeast along Nashua Road to the Transportation Agency of Monterey County (TAMC) railroad ROW. Easements on private land would probably be required along Highway 156 and portions of Nashua Road. It is anticipated that the pipeline would be constructed parallel to the existing railroad tracks within the existing TAMC ROW, thereby minimizing environmental and community impacts. One exception would be the Salinas River crossing, at which point the pipeline alignment would depart from the TAMC railroad ROW and the pipeline would cross the Salinas River either on the piers of the Monte Road bridge (Figure 3-13) or subsurface using trenchless technology. Transmission Main North would end at the intersection of the TAMC ROW and Reservation Road in North Marina.

3.2.5 North Marina to Terminal Reservoir Conveyance and Storage Facilities

The North Marina to Terminal Reservoir conveyance and storage facilities would continue the delivery of product water from Reservation Road in North Marina to the Monterey Pipeline and Terminal Reservoir. The North Marina to Terminal Reservoir conveyance and storage facilities would include the following infrastructure:

- Transmission Main South and
- Terminal Reservoir.

Transmission Main South would begin at the intersection of the TAMC ROW and Reservation Road. Water would be conveyed through Transmission Main South primarily to the Monterey Pipeline for delivery to customers on the Monterey Peninsula, and secondarily to Terminal Reservoir, where it would be stored until needed for transfer to water customers or for injection into the ASR System (see below). **Table 3-7** lists the relevant infrastructure components and the current status of each component (existing or proposed).

TABLE 3-7
NORTH MARINA TO TERMINAL RESERVOIR CONVEYANCE AND STORAGE FACILITIES INFRASTRUCTURE

Infrastructure Component	Status	Proposed New Construction and/or Modifications	Relevant Figure(s)
Transmission Main South	Proposed	8.09 miles of up to 36-inch-diameter force main pipeline	Figures 3-3 and 3-4c through 3-4e
Terminal Reservoir	Proposed	Two 3-MG, 33-foot-high-, ~~102~~130-foot-diameter aboveground concrete tanks	Figure 3-15

SOURCE: CalAm and RBF Consulting, 2005

3.2.5.1 Transmission Main South

The Transmission Main South would have the same characteristics as Transmission Main North (see Table 3-6 for other preliminary design criteria). It would be a force main (up to 36 inches in diameter) to convey water from Transmission Main North to the proposed Monterey Pipeline and the Terminal Reservoir using approximately 8 miles of pipeline.

The alignment of Transmission Main South is shown in Figure 3-3 and Figures 3-4c through 3-4e. It would begin at the intersection of the TAMC ROW and Reservation Road. The alignment would follow the TAMC ROW south to its intersection with La Salle Avenue (Auto Parkway), where it would intersect with the northern end of the Monterey Pipeline. From that point, water would either flow south in the Monterey Pipeline or east in Transmission Main South. From the intersection of the TAMC ROW / La Salle Avenue intersection, the Transmission Main South alignment would run east along LaSalle Avenue to Yosemite Street, then south to Hilby Avenue, at which point it would turn east on Hilby, crossing General Jim Moore Boulevard en route to Terminal Reservoir and/or the ASR System.

3.2.5.2 Terminal Reservoir

The proposed Terminal Reservoir would be located east of General Jim Moore Boulevard in an area that was formerly Fort Ord but is currently proposed to be annexed by the City of Seaside. **Figure 3-15**, **Terminal Reservoir and ASR Pump Station Location Map**, shows the proposed location of the Terminal Reservoir. The Terminal Reservoir would consist of two 3-MG tanks for a total capacity of 6 MG. Each of the two approximately ~~30~~ 33-foot-high, ~~100~~ 130-foot-diameter aboveground concrete tanks would receive water from the desalination plant when production exceeds customer demand (and from other sources, such as ASR or the Carmel River, as conditions require—see below). It would act as a hydraulic control point for the CalAm system in Seaside. Water from different sources would mix in the Terminal Reservoir.

3.2.6 Seaside/Carmel Valley Conveyance and Storage Facilities

The Seaside/Carmel Valley Conveyance and Storage Facilities encompass the various infrastructure components that would be used to move water between Transmission Main South, Terminal Reservoir, the ASR system, and the rest of the CalAm Monterey District, which would include all water customers, the Seaside Basin, and various reservoirs. These conveyance and storage facilities, some of which are existing facilities, are as follows:

- Monterey Pipeline;
- Valley Greens Pump Station;
- Forest Lake Reservoir;
- Eardley Pump Station;
- Crest Tank;
- Segunda Reservoir;
- Segunda Pump Station;
- ASR Injection/Extraction Wells;
- ASR Pump Station;
- ASR Pipeline; and
- ASR Pump-to-Waste System.

Each of these facilities, upon completion of the CWP, would have at least one function within the CalAm system, and most of the components would have more than one function, with the function at any given time being dependent on whether it is the wet season or the dry season. **Table 3-8** lists the infrastructure components and the current status of each component (existing or proposed).The following sections describe the flow of water through the proposed Seaside/Carmel Valley Conveyance and Storage Facilities during the wet and dry seasons.

TABLE 3-8
MOSS LANDING PROJECT SEASIDE/CARMEL VALLEY CONVEYANCE AND STORAGE FACILITIES INFRASTRUCTURE

Infrastructure Component	Status	Proposed New Construction and/or Modifications	Relevant Figure(s)
Monterey Pipeline	Proposed	5.37 mi of 36-inch-diameter pipeline	Figures 3-3 and 3-4g
Valley Greens Pump Station	Proposed	Pump station with capacity of 2,100 gpm	Figure 3-16
Forest Lake Reservoir	Existing	None	Figure 3-16
Eardley Pump Station	Existing	None	Figure 3-16
Crest Tank	Existing	None	Figures 3-3 and 3-4f
Segunda Reservoir	Existing	None	Figures 3-3 and 3-4f
Segunda Pump Station	Existing Proposed	None 1 standby pump, 2,300 gpm, 150 HP	Figures 3-3 and 3-4f
ASR Injection/Extraction Wells	Existing Proposed	Two wells Two wells	Figures 3-17 and 3-18
ASR Pump Station	Proposed	Pump station with capacity of 6,000 gpm	Figure 3-17
ASR Pipeline	Proposed	1.86 mi (10,000 LF) of 30-inch-diameter pipeline	Figure 3-17
ASR Pump-to-Waste System	Proposed	1.1 mi (5,800 LF) of 16-inch-diameter pipeline; 2500-square-foot by 12-foot-deep settling basin.	Figure 3-17

SOURCE: CalAm and RBF Consulting, 2005

3.2.6.1 Wet Season Water Conveyance and Storage

During the wet season, water would be conveyed from the Carmel River north and northwest to CalAm customers in the Seaside area and north to the ASR System, and water would be conveyed from the Terminal Reservoir west and southwest to CalAm customers in the Seaside area and north to ASR.

Water from the Carmel River would be pumped north through existing pipelines to the Segunda Reservoir, and through existing pipelines to Crest Tank. From there it would either flow via gravity through existing pipelines to the ASR System and Terminal Reservoir, or it would flow, also via gravity, through existing pipelines to the Seaside area for use by CalAm customers.

Water from Terminal Reservoir would either be pumped by the ASR Pump Station through the ASR Pipeline to the ASR Injection/Extraction Wells for storage, or it would flow via gravity through existing pipelines to the Seaside area for use by CalAm customers.

3.2.6.2 Dry Season Water Conveyance and Storage

During the dry season, when no flow is being diverted from the Carmel River, water would be conveyed from the desalination plant, via the Desalination Plant Pump Station, to Terminal Reservoir and Forest Lake Reservoir, and to CalAm customers on the Monterey Peninsula and in Carmel Valley.

Water from the ASR System would be retrieved via the ASR Injection/Extraction Wells and be pumped through the ASR Pipeline to Terminal Reservoir. From that point it would either flow via gravity through existing pipelines to the Seaside area for use by CalAm customers or it would flow via gravity through existing pipelines and the proposed Monterey Pipeline to Forest Lake Reservoir and CalAm customers on the Monterey Peninsula and in Carmel Valley.

Note that the desalination plant would operate every day in both wet and dry seasons.

3.2.6.3 Seaside/Carmel Valley Water Conveyance and Storage Infrastructure Components

Monterey Pipeline

The Monterey Pipeline would connect the existing CalAm distribution system in the City of Seaside with the CalAm distribution system on the Monterey Peninsula, to facilitate the exchange of water between the two districts. Currently a hydraulic trough exists within the CalAm system in eastern Monterey that essentially prevents the flow of water between Seaside and the Monterey Peninsula. The Monterey Pipeline would utilize the head pressure provided by the proposed CWP to convey water from Seaside to the Monterey Peninsula cities. The 36-inch-diameter pipeline would be able to be operated in either direction, connecting the Forest Lake Reservoir pressure zone in Monterey to Seaside. The Monterey Pipeline would also connect to the proposed Transmission Main South, conveying desalinated water to the Monterey Peninsula. From the Forest Lake Reservoir, desalinated water could also flow via gravity to the lower Carmel Valley and by pumping to the upper Carmel Valley. The proposed pipeline alignment required for this component is shown in Figures 3-3 and 3-4g.

As described in this Chapter ~~3~~, the proposed alignment for the Monterey Pipeline begins where the Transmission Main South turns into Seaside at the intersection of Auto Center Parkway and Del Monte Boulevard. The alignment would continue southwest along the TAMC railroad alignment, and parallel the Monterey Regional Park District bike path starting at Canyon Del Rey Boulevard (Hwy 218). The alignment would continue along the bike path, under Highway 1, through the Naval Postgraduate School and El Estero Park. At the east end of El Estero Park, the alignment would turn north towards Del Monte Avenue. The alignment would then turn east on Del Monte Avenue. From Del Monte, the alignment would turn north on Van Buren Street and cross the Presidio of Monterey by paralleling an existing CalAm pipeline in an existing CalAm easement. At the end of the existing Presidio of Monterey easement, the alignment would continue on to Laine Street. The alignment would then turn from Laine Street southeast on

Eardley Street, and terminate near the existing Eardley Pump Station by connecting to an existing pipeline that connects to the Forest Lake Reservoir.

Valley Greens Pump Station

The pressure at Valley Greens (in Carmel Valley south of the Segunda Reservoir) would not be sufficient to fill Segunda Reservoir, which is required in order to serve the upper Carmel Valley. Valley Greens Pump Station (VGPS) would be constructed at or near the intersection of Carmel Valley Road and Valley Green Drive to provide the additional pressure required (see **Figure 3-16, Pump Station and Storage Associated with the Monterey Pipeline**). The VGPS would be a low-flow (approximately 2,100 gpm), low-lift (approximately 110 ft TDH) pump station to boost the pressure sufficiently to fill the Segunda Reservoir[11].

Forest Lake Reservoir and Eardley Pump Station

The existing Forest Lake Reservoir consists of three 5-MG tanks (see Figure 3-16). The tanks provide storage and act as a hydraulic control point on the Monterey Peninsula. The CWP would not change the physical or operational description of the Forest Lake Reservoir.

The existing Eardley Pump Station serves a lift zone on the peninsula. Four pumps are located at the Eardley Pump Station. The terminal storage tanks associated with the Eardley pump station are Withers Tank, Lower Toyon Tank, Viejo Tank and Lower Monte Vista Tank. The CWP would not change Eardley Pump Station.

Segunda Reservoir, Segunda Pump Station, Crest Tank, and Segunda Pipeline

The Segunda Reservoir, Segunda Pump Station, Crest Tank, and Segunda Pipeline are existing components of CalAm’s infrastructure, connected via existing pipelines (see Figures 3-3 and 3-4f).

The existing Segunda Reservoir provides a hydraulic control point within the CalAm system. The wells along Carmel River pump water through Begonia Iron Removal Plant (BIRP) into Segunda Reservoir. The Segunda Reservoir balances the water flow to Monterey Peninsula by gravity and also provides water for BIRP backwash. Segunda Pump Station conveys Carmel River water from Segunda Reservoir to Crest Tank. The existing Crest Tank is located at the highest elevation within the current CalAm system. Water flows by gravity from Crest Tank through the Segunda Pipeline to the CalAm Seaside-area distribution system.

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[11] The VGPS is one of two options for pumping water to the Segunda Reservoir. The VGPS option would not lose any pressure head, but has the disadvantage of requiring a site of at least ¼-acre in the general vicinity of the intersection of Carmel Valley County Road and Valley Greens Drive. The second option would be to install an air-gap tank in the Valley Greens Drive vicinity, and divert water from the Carmel Valley Pipeline to a new pump station located on the existing BIRP site, via the air-gap tank and the existing raw water piping system that supplies BIRP. The air-gap tank is needed to prevent a cross-connection between the existing raw water pipeline that conveys raw water from the lower Carmel Valley wells to BIRP and the treated water pipeline that connects BIRP to the existing CalAm system. At BIRP, the water from Forest Lake would be re-chlorinated and the new pump station would be used to pump the water into the existing potable water pipeline that is connected to the Segunda Reservoir. This option has the advantage of requiring only a small site of approximately 1,500 square feet at or near Valley Greens Drive for the air-gap tank. However, this option would require more energy to lift the water from BIRP to the Segunda Reservoir because of the loss of pressure head at the air-gap tank.

The Moss Landing Project would utilize these components to move water north from the Carmel River to the proposed ASR System and, when needed, to Terminal Reservoir. Once water reaches the Segunda Reservoir from the south through existing pipelines, it would be pumped to the Crest Tank by the existing Segunda Pump Station through existing pipeline. From the Crest Tank, water would flow via gravity through Segunda Pipeline north to the ASR Injection/Extraction wells or to Terminal Reservoir. During the wet season, Segunda Pipeline would convey Carmel River water to the ASR System for injection and storage and to Terminal Reservoir for storage. During periods when water is injected into the ASR System (typically winter months), the connection to the Terminal Reservoir would be closed and water would flow directly north to the ASR Pipeline from the Crest Tank. However, the Segunda Pipeline would also be connected to the Terminal Reservoir via an altitude valve, which would fill the tanks if the water level drops below a certain height for any reason. No changes would be made to the Segunda Reservoir, ~~Segunda Pump Station,~~ Segunda Pipeline, or Crest Tank as part of the CWP. One pump would be added to the Segunda Pump Station to increase reliability[12].

Aquifer Storage and Recovery (ASR) Facilities

ASR utilizes a groundwater aquifer for water storage when water is available, and recovers the stored water from the same aquifer when it is needed. The proposed ASR System would provide additional water storage capacity for CalAm, receiving both desalinated water and water from the Carmel River as needed, depending on relative demand and supply from customers, the Carmel River, and desalination operations. Water would be stored in the Seaside Groundwater Basin, and stored water would then be pumped from the Basin during periods of peak demand.

Existing ASR System

The MPWMD and CalAm are currently conducting an ASR program in the Seaside Groundwater Basin. Water from the Carmel River is conveyed north ~~over an unnamed set of hills~~ through existing pipelines to ASR wells located on General Jim Moore Boulevard. The existing ASR program includes 2 wells, known as Santa Margarita Test Injection Wells 1 and 2. Well 1 is 18 inches in diameter, 780 feet deep, with a perforated well screen situated approximately 480 to 700 feet deep. Well 2 is 20 inches in diameter, 790 feet deep, with a perforated well screen situated approximately 540 to 770 feet deep. The combined injection capacity of these two wells is approximately 4.3 million gallons per day (mgd) (3,000 gpm) into the sandstone aquifer. Only one well will be used for extraction at approximately the same rate. Construction of these two injection/extraction wells has been completed and testing ~~of the wells is underway as of January 2009~~ the Phase 1 ASR project began permanent operating status beginning in Water Year 2008. Operation of the ASR project is scheduled to begin in 2009.

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[12] The pump proposed for addition to the Segunda Pump Station will be a minor addition to the existing pump station. It will be contained within the existing pump station footprint. It won't affect any characteristics of the pump station as a whole, except to ensure its ability to operate when one of the main pumps is offline. The capacity of the pump station would not change; nor would the amount of energy it requires. The proposed standby pump would only operate when one of the main pumps is offline.

Proposed ASR System

The ASR System proposed as part of the CWP would utilize and augment MPWMD's existing ASR system of the two existing wells. It would also include the construction of:

- 2 ASR injection/extraction wells;
- ASR Pump Station;
- ASR Pipeline; and
- ASR pump-to-waste system.

These components are described below. A map showing the existing and proposed ASR facilities is shown in **Figure 3-17, Pipeline Alignment from ASR to Terminal Reservoir**, and a conceptual layout for a typical ASR well is shown on **Figure 3-18**, **ASR Typical Site Layout**.

The ASR System would generally be operated to provide storage capacity in the winter and peak water supply in the summer. During the wet season, water would be delivered to ASR from the proposed desalination plant and/or the Carmel River. Water from the desalination plant would be conveyed through the Transmission Main to Terminal Reservoir, and then pumped by the new ASR Pump Station through the new ASR pipeline to the ASR wells. Water from the Carmel River would be treated at the existing BIRP and the Carmel Valley Filter Plant (CVFP), conveyed northward through existing pipes to the existing Segunda Reservoir and Pump Station, and pumped further north to the existing Crest Tank, from which point it would flow via gravity through the Segunda Pipeline to the ASR wells. During the dry season (or other periods when water is recovered from the ASR System), water would be pumped from the ASR wells to the ASR Pipeline, and from there either would be distributed to the CalAm customers in the Seaside Area, conveyed via the Monterey Pipeline to CalAm customers in Carmel Valley and the Monterey Peninsula, or stored in Terminal Reservoir.

ASR Injection/Extraction Wells. As part of the proposed ASR System, two wells would be constructed at two different sites along General Jim Moore Boulevard (see Figure 3-17). The wells would serve both for injection of water for storage and extraction of water for use, and would be designed for injection capability of approximately 2.1 mgd and an extraction capacity of approximately 4.3 mgd. These wells would be used in conjunction with the existing MPWMD wells, so that water could be injected into any one of the four ASR wells.

ASR Pump Station. The proposed ASR Pump Station would be located at the Terminal Reservoir site, and would pump water from the Terminal Reservoir to the ASR wells during the wet season. The pump station would have a 6,000-gpm capacity.

ASR Pipeline. The 30-inch-diameter ASR Pipeline would allow conveyance of water between Terminal Reservoir and the ASR wells. The proposed ASR Pipeline would extend north along General Jim Moore Boulevard for approximately 13,000 feet, from a connection near Coe Avenue to the ASR well sites situated along General Jim Moore Boulevard. This pipeline would be located parallel to an existing 20-inch pipeline owned by the Marina Coast Water District (MCWD).

The MCWD has completed the design of an additional 30-inch potable water pipeline that will connect to their existing pipeline in General Jim Moore Boulevard. Construction is scheduled to begin in 2009. The proposed MCWD-owned pipeline will extend from Coe Avenue south to approximately South Boundary Road. Through an agreement with MCWD, CalAm and MCWD would share this pipeline. As part of the CWP, CalAm would provide a connection from the Terminal Reservoir to the shared pipeline at Hilby Avenue. In addition, CalAm would provide the connection at Coe Avenue in order to convey water to and from the ASR wells via CalAm's proposed ASR Pipeline.

During the wet season, water from the Carmel River, via Segunda Reservoir, Crest Tank, and the Segunda Pipeline, would also feed into the shared pipeline and the proposed ASR Pipeline directly (bypassing the Terminal Reservoir) for injection into the ASR wells.

Pipelines connecting the ASR wells, Terminal Reservoir, Crest Tank, and Segunda Reservoir are shown in Figures 3-4e and 3-4f.

In addition to the main ASR Pipeline, the proposed ASR System would include a smaller pipeline system that would convey startup flow to a settling basin, as shown on Figure 3-17. Drinking water regulations prohibit water from being placed into the distribution system at the beginning of the extraction season.

ASR Pump-to-Waste System. The proposed ASR Pump-to-Waste System would be required to flush sediment and turbidity from the two additional ASR wells. A 16-inch-diameter pipeline, up to approximately 5,800 feet in length, and a 2500-square-foot, 12-foot-deep settling basin would be constructed. The settling basin would be located in the ASR study area shown in Figure 3-17. Sediment in the settling basin would need to be periodically removed and disposed of at an appropriate disposal site. The proposed disposal option for the settled water is to provide this water to a beneficial use (e.g., irrigation water at the nearby golf course or percolation into the ground using an unlined settling basin).

3.3 North Marina Project

Consistent with CPUC ALJ's decisions and agency comments received following the public notice of the CWP, this EIR is also evaluating the North Marina Project at an equal level of detail to the Moss Landing Project. Comments by the California Coastal Commission (in a letter to the CPUC dated November 8, 2006) emphasized the need to evaluate both open-water and subsurface intakes for a desalination plant, while the ALJ decision (Decision 03-09-022) dated September 4, 2003 directs CalAm to explore opportunities for partnership with other regional water supply entities. The North Marina Project more centrally locates infrastructure, explores the use of subsurface source water intake systems, and takes advantage of an existing ocean outfall at the Monterey Regional Water Pollution Control Agency (MRWPCA). This section on the North Marina Project is based on the PEA as well as a subsequent technical memorandum from CalAm (CalAm and RBF Consulting, 2005; RBF Consulting, 2008).

The North Marina Project, like the Moss Landing Project, consists of a seawater intake system, a desalination plant, a brine discharge system, and a variety of conveyance and storage facilities, including an ASR system. The following section provides a description of these components. **Figure 3-19**, **North Marina Project Facilities Index Map**, and **Figures 3-20a** through **3-20e**, **North Marina Project Facilities**, show the North Marina Project components to scale on a map of the region.

The North Marina Project includes a subsurface beach well intake system; a seawater desalination plant at a site in North Marina near the MRWPCA wastewater treatment facility; open-water discharge of brine through the MRWPCA outfall; product water conveyance and storage infrastructure, including approximately 25 miles of pipeline; and ASR facilities. **Table 3-9** provides a summary of preliminary design criteria for each component of the North Marina Project.

3.3.1 Subsurface Intake Using Slant Wells

Source water for the North Marina Project desalination plant would be extracted from six subsurface slant wells that would draw seawater from beneath the seafloor. A slant well is a well that is drilled at an angle using modified vertical well construction methods. This allows construction of wells along the coastline that can reach and extract water from under the ocean floor. Angled drilling also would result in a substantially increased screen length in the target water source, allowing higher production rates as compared to vertical wells in the same water source. While data could not be located for an operating desalination plant using slant wells, the feasibility of using slant wells under the correct geological conditions was established in a test project funded by the Municipal Water District of Orange County (MWDOC) for the Dana Point desalination project (MWDOC, 2007).

Groundwater modeling results indicate that, over the long term, source water pumped from the slant wells would include a small amount of intruded groundwater from the Salinas Valley Groundwater Basin (SVGB). The North Marina Project desalination plant would be operated such that, on an annual average basis, the plant would return desalinated water to the SVGB in an amount equal to the volume of SVGB-groundwater that was extracted from North Marina Project slant wells, as measured by salinity. The proposed method to return the excess desalinated water to the SVGB is to deliver the water to the Castroville Seawater Intrusion Project (CSIP) 80-acre foot (AF) storage pond located on the MRWPCA's Regional Treatment Plant (RTP) property. During the irrigation season, the desalinated water would be blended with tertiary treated recycled water and delivered to farms connected to the CSIP. The annual quantity of desalinated water to be returned to the SVGB will be determined based on the actual quantities of SVGB water withdrawn, and desalinated water produced to meet CalAm customer needs. Additional discussion of groundwater modeling is presented in Chapter 4.

The preferred site for construction of the subsurface extraction slant wells is in a previously disturbed area behind existing Marina Coast Water District facilities at the west end of Reservation Road, as shown on Figure 3-20a. The slant well intake system would consist of six

TABLE 3-9
NORTH MARINA PROJECT FACILITIES SUMMARY

Facility	Quantity	Size and Characteristics
Subsurface Intake:		
Slant Wells	6	20-degree angle from horizontal; -170 ft MSL depth; 750 ft total length; maximum pumping capacity 3,000 gpm; average pumping 2,550 gpm
Source Water Pipeline	2.97 mi (15,700 LF)	36-inch diameter
Desalination Plant:		
Pretreatment System	1	22 mgd, ~~Greensand~~ Horizontal multimedia pressure ~~F~~filters, tbd from pilot testing
RO System	1	11 mgd, RO membranes
Post-treatment System	1	Lime and carbon dioxide for remineralization; Cl2 or sodium hypochlorite for disinfection
Return Flow and Outfall:		
Return Flow Pipeline	1.23 mi approx (6,500 LF)	From desalination plant to MRWPCA existing outfall headworks – length depends on plant site selected
MRWPCA Outfall Pipeline (existing)	2.13 mi (11,260 LF) (existing)	80 mgd capacity (existing), 60-inch diameter pipe
MRWPCA Outfall Diffuser (existing)	0.26 mi (1,368 LF) (existing)	~~5~~60-inch and 48-inch diameter pipes, 120 to 172 diffuser ports, 2-inch diameter ports; -95 to -109 ft MSL; 3.5 ft above seafloor
North Marina to Terminal Reservoir Conveyance and Storage Facilities:		
Clearwell	2 tanks	1.5 MG each; below grade
Desalinated Water Pump Station (for DWCS pipeline)	1	7,000 gpm (10.1 mgd)
Desalinated Water Pump Station (for non-CalAm users)	1	Tbd
Desalinated Product Water Pipeline	2.57 mi (13,600 LF)	From desalination plant to Transmission Main South
Transmission Main South	8.09 mi (42,700 LF)	Up to 36-inch diameter
Terminal Reservoir	2 tanks	3 MG each
Seaside/Carmel Valley Conveyance and Storage Facilities:		
Monterey Pipeline	5.37 mi (28,400 LF)	36-inch-diameter
Valley Greens Pump Station	1	2100 gpm (3.0 mgd), 110 ft TDH
Forest Lake Reservoir	3 (existing)	5 MG each (existing)
Eardley Pump Station	1 (existing)	4 pumps, 3,500 gpm (5.0 mgd), 215 ft TDH (existing)
Crest Tank	1 (existing)	0.25 MG each (existing)
Segunda Reservoir	~~1~~2 (existing)	1.5 MG each (existing)
egunda Pump Station	3 pumps (existing) 1 standby pump (proposed)	4,500 gpm (6.5 mgd)~~, 150 HP~~ (existing) 2,300 gpm, 150 HP (proposed)
Segunda Pipeline	3.3 mi (17,500 LF) (existing)	16-inch diameter
ASR Injection/Extraction Wells	2	800-foot depth, 2.2-mgd injection/4.3-mgd extraction
ASR Pump Station	1	6,000 gpm (8.4 mgd), 200 HP
ASR Pipeline	2.46 mi (13,000 LF) (proposed) 1.50 mi (7,900 LF) (under construction)	30-inch diameter north of Coe Avenue to ASR Wells 30-inch diameter from Hilby Avenue to Coe Avenue owned by MCWD and shared with CalAm
ASR Pump-to-Waste System	1.1 mi (5,800 LF) pipeline; 1 settling basin	16-inch-diameter pipeline; 2500-square-foot by 12-foot-deep basin.

LF = linear feet; MG = million gallons; mgd = million gallons per day; HP = horsepower; gpm = gallons per minute; TDH=total ~~daily~~ dynamic head.

SOURCE: CalAm and RBF Consulting, 2005; RBF Consulting, 2008 wells constructed in a fan array configuration (see **Figure 3-24, Slant Well Layout**). Each slant well would be drilled at an approximate angle of 20-degrees from the horizontal, approximately 170 feet below mean sea level (MSL), for an approximate well length of 750 lineal feet. The proposed 20-degree angle of the slant wells allows the wellheads to be located inland of the approximate 2050 beach bluff erosion line, assuming the bluff recedes approximately 300 feet shoreward as predicted by geologic studies (Johnson & Associates, 2004). Submersible well pumps would be sized to pump a maximum 3,000 gpm per well. It is assumed that the submersible pumps would be located approximately 50 feet below MSL.

Roughly 16,000 LF of mortar lined and coated steel pipe (MLCSP) would be used to convey seawater from the slant well clusters to the desalination plant. The source water pipeline alignment is shown in Figure 3-20a. The preferred pipeline alignment follows Reservation Road under Highway 1 to Beach Road, and continues on Beach Road to the intersection of De Forest Road near Windy Hill Park. At this point the pipeline would depart the public right-of-way and follow a private MCWD access road to the end, where the pipeline would continue south to the property line between Armstrong Ranch and Marina Municipal Airport. The alignment would parallel the property line northeast to its terminus at the proposed North Marina desalination plant site.

3.3.2 Desalination Plant at North Marina

The North Marina desalination plant would be designed as a RO desalination facility, similar to the plant proposed in the Moss Landing Project. The proposed processes at the desalination plant would be essentially the same as for the Moss Landing Project, except that no equalization basin would be needed and the pretreatment system would presumably consist of a ~~greensand~~horizontal multimedia pressure filtration system rather than membrane filtration (the actual pretreatment process will be determined by pilot testing)[13]. In addition, the North Marina desalinated water pump station would consist of two separate pumping systems.

The construction of the North Marina desalination plant would be on approximately 10 acres of currently vacant land on the Armstrong Ranch property, south of the MRWPCA RTP and the Monterey Regional Environmental Park. Construction would consist of the seawater desalination plant, storage facilities, and appurtenant facilities. Existing roads would provide access to the site. Structures at the site, as shown in **Figure 3-21**, **North Marina Project Desalination Plant Layout**, would consist of the following: (1) a pretreatment system; (2) an RO system; (3) a post-treatment system; (4) a return flow pipeline to return brine and spent backwash water to the MRWPCA outfall line; (5) chemical feed and storage facilities; and (6) non-process facilities. The following sections describe each of these facilities.

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[13] The Moss Landing Project would require more extensive pretreatment than the North Marina Project, since it is taking its source water from an open-intake system whereas the North Marina Project would use subsurface intakes that draw water through a sandy layer of soils, an intake process that effectively adds a method of pretreatment to their source water before the water reaches the proposed desalination plant facilities. The ~~greensand~~ horizontal multimedia pressure filtration system is less intensive, with less usage of chemicals, less waste, and higher efficiency~~,~~ than membrane filtration.

3.3.2.1 Pretreatment System

In order to prevent the RO membranes from becoming fouled or scaled, a pretreatment system may be required before raw seawater can pass through the RO membranes. In particular, the seawater pumped from the slant wells could contain ~~high concentrations of~~ iron and manganese[14]. This would be determined by pilot testing and, if so, ~~greensand~~ horizontal multimedia pressure filtration would be utilized to capture the iron and manganese to minimize fouling of the RO membranes. ~~It has been assumed that the greensand filtration process would not produce any wash water or reject return flows.~~ This and any other pretreatment processes would be determined through pilot studies.

3.3.2.2 Reverse Osmosis System

The RO process for the North Marina Project would be the same as the RO process for the Moss Landing Project (and, as with the Moss Landing Project, an energy recovery process would be incorporated into the design). As with the Moss Landing Project, studies since publication of the DEIR indicate the need for the partial second pass for water quality purposes due to three constituents of concern, namely boron, chloride, and sodium (see Appendix Q). Therefore, t~~T~~he plant is assumed to have a ~~single~~ partial second pass~~, single stage~~ RO process. ~~Pilot testing would determine specific design and operational parameters.~~ The project would utilize membranes and vessels mounted in modules (or arrays), with each module being sized to produce 2.2 mgd. During operation, production of the plant would be in 2.2 mgd increments. The assumed overall recovery is ~~50~~ 44 percent~~[15]~~; therefore, the plant would have an RO feed stream of ~~22~~ 25 mgd and produce up to 11 mgd of desalinated water. Pilot testing would determine specific design and operational parameters.

3.3.2.3 Post-Treatment

The post-treatment requirements would be similar to that of the Moss Landing Project. Hardness, alkalinity, and pH of the product water would be adjusted after the RO process to make the water more compatible with the other sources of supply in the CalAm system and to ensure acceptable water quality. Post-treatment processes could include re-mineralization with lime, re-carbonation with CO2, pH adjustment with sodium hydroxide, and disinfection with sodium hypochlorite. Final post-treatment requirements would be determined through the pilot project. Table 3-4 provides estimates of the dosage of chemicals required for post-treatment, as well as the anticipated annual consumption of each chemical.

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[14] Preliminary water quality data has indicated that iron and manganese will not be a concern, but until a full-scale test well is in place this conservative pretreatment assumption will remain in the project design.

[15] The assumed RO recovery rate for the Moss Landing Project is 45 percent, whereas the assumed RO recovery rate for the North Marina Project is 50 percent. This difference has to do with the use of the different proposed intake systems. The use of an open-water intake via the once-through cooling system at MLPP will result in greater variability of temperature and salinity of source water than the use of subsurface slant wells. The use of an open-water intake will also result in a higher level of dissolved organic material in source water.

3.3.2.4 Chemical Feed and Storage Facilities

The chemical feed and storage processes for the North Marina Project would be similar to the processes proposed in the Moss Landing Project, with a few differences. Table 3-4 provides information on the estimated use, dosage, and annual consumption of each chemical that would likely be used. The pretreatment at North Marina would include only ~~chlorine or~~ sodium hypochlorite (chlorine) for oxidation and biological fouling control. ~~The non-continuous regenerating chemicals would utilize potassium permanganate for regenerating the greensand filters.~~ Chemical usage for RO and post-treatment would be the same as for the Moss Landing Project.

3.3.2.5 Residuals Management

Because the pretreatment requirements for the North Marina Project desalination plant differ from the Moss Landing Project desalination plant, the North Marina Project desalination plant would utilize fewer chemicals for pretreatment and ~~different chemicals for cleaning of the pretreatment system~~does not require cleaning chemicals. The chemicals used in the RO process, ~~regenerating~~ cleaning the RO membranes, and post-treatment ~~chemicals~~ are essentially the same for the two projects. The desalination treatment plant would produce several waste streams, including the following:

- Concentrate (brine) from the reverse osmosis process;
- Wash water from the horizontal multimedia pressure filtration backwash cycle; and
- Non-continuous cleaning solutions from cleaning of the ~~greensand~~ horizontal multimedia pressure filters and RO membranes.

The disposal of these wastes is described below.

Brine Concentrate

The reverse osmosis process would generate approximately ~~11~~ 14 mgd of brine. This brine stream would be transported from the desalination plant via the return flow pipeline to the MRWPCA treatment plant outfall headworks. From there it would flow in an existing MRWPCA pipeline to the MRWPCA ocean outfall for discharge to the ocean. During storm events and when the CSIP is not in operation, the brine stream would be mixed with ~~stormwater~~ treated wastewater flow from the MRWPCA prior to being discharged to the ocean through the MRWPCA outfall. At all other times the brine stream would flow through the outfall and discharge without dilution.

Backwash

The horizontal multimedia pressure filters used for pretreatment would require routine backwashing, which would generate a waste washwater stream. The waste washwater would be treated and discharged along with the plant’s brine flow, or would be recycled back to the plant headworks.

Clean-In-Place Chemical Cleaning~~Backwash~~

~~The greensand filters used for pretreatment would require routine backwashing, which would generate a waste washwater stream.~~ The waste-~~re~~generating chemicals used to clean the RO membranes would be discharged into a separate collection sump. Depending on the strength and nature of these waste chemical solutions, they would either be rendered harmless through neutralization and discharged along with the plant's brine flow, or they would be pumped into tank trucks and transported to an appropriate offsite disposal site.

~~Proprietary chemicals (i.e., CIP chemicals) that would be used for cleaning the RO membranes on a non-continuous basis would be diluted by several orders of magnitude when they are used. The used CIP stream would be collected in a separate collection sump and subsequently taken by tanker truck to an appropriate off-site disposal site. The exact chemicals to be used and the frequency and amount required are not known at this time.~~

3.3.2.6 Non-process Facilities

The North Marina desalination plant would be equipped with non-process facilities, including an administration and operations building, laboratory facilities, chemical buildings, pump housing, parking lot, access roads, power generators, and an electrical building. The location of these facilities is shown in Figure 3-21.

3.3.2.7 Pilot Plant and Pilot Testing

Pilot testing for the slant wells and desalination process would be performed before construction as part of the planning and permitting process. However, no pilot studies have been designed or begun at this time.

3.3.3 Return Flow Pipeline and Outfall

A 36-inch-diameter return flow pipeline would convey RO brine (and possibly waste washwater from backwashing of the ~~greensand~~ horizontal multimedia pressure filters) from the desalination plant to the existing MRWPCA treatment plant and outfall, a distance of approximately 1.2 miles, depending upon the location of the North Marina desalination plant within the study area. The return flow pipeline would be situated along the western boundary of the North Marina desalination plant study area, as shown on Figure 3-20a. The pressure in the RO concentrate stream, as it emerges from the energy recovery system, would be sufficient to provide the necessary head to deliver brine without additional pumping.

The MRWPCA currently operates an ocean outfall as a part of its wastewater treatment plant. The 11,260-foot-long outfall pipe discharges approximately 100 feet below the ocean surface in Monterey Bay at the location shown on Figure 3-20a. The outfall discharges through a diffuser, 1368 feet in length, that has 172 2-inch diameter ports, spaced eight feet apart. Half of the ports discharge horizontally from one side of the diffuser and half from the other, in an alternating pattern. The ports are approximately 6 inches above the rock bedding used to anchor the diffuser to the seafloor, at a minimum of approximately 3.5 feet above the seafloor. According to

MRWPCA, the 52 ports nearest the shore (the shallowest ports) are currently closed. The brine from the desalination facility would be discharged to the ocean with a ~~salinity level of approximately 70~~maximum concentration of 62.5 ppt. Modeling and analysis of the proposed brine discharge is discussed in Section 4.1, Surface Water Resources.

3.3.4 North Marina to Terminal Reservoir Conveyance and Storage Facilities

The conveyance and storage facilities for the North Marina Project are delineated into two sections, based on both geography and the type of water movement involved. The two sections are the North Marina to Terminal Reservoir conveyance and storage facilities, which include some facilities that were also part of the Moss Landing Project, and the Seaside/Carmel Valley conveyance and storage facilities, which are identical to the Seaside/Carmel Valley facilities described in Section 3.2.6.

The North Marina to Terminal Reservoir conveyance and storage facilities for the North Marina Project include the infrastructure that would deliver water from the desalination plant at North Marina to the proposed Monterey Pipeline and Terminal Reservoir. This section of the conveyance and storage facilities would include the following infrastructure:

- Clearwell at the Desalination Plant;
- Desalinated Water Pump Station;
- Transmission Main South; and
- Terminal Reservoir.

Product water leaving the desalination plant would enter the clearwell. From there, water for CalAm users would be pumped by the desalinated water pump station into the Transmission Main South, and it would be conveyed in the Transmission Main South primarily to the Monterey Pipeline for delivery to customers on the Monterey Peninsula, and secondarily to Terminal Reservoir / the ASR System and further points south. **Table 3-10** lists the relevant infrastructure components and the current status of each component (existing or proposed).

3.3.4.1 Clearwell

Product water would be delivered to an onsite, below-grade clearwell prior to being pumped into the desalinated water conveyance pipelines. It is anticipated that the North Marina Project would utilize two 1.5-MG reservoirs to provide both operational and emergency storage. Figure 3-21 shows the location of the proposed clearwell.

3.3.4.2 Desalinated Water Pump Station

The Desalinated Water Pump Station would consist of two separate pumping systems: one to deliver product water through pipelines (referred to herein as the Product Water Pipeline and the Transmission Main South) to the Terminal Reservoir/ASR Pump Station; and the other to deliver water to the SVGB. The pump system that would deliver water to CalAm users via the Terminal

TABLE 3-10
NORTH MARINA PROJECT DESALINATED WATER INITIAL CONVEYANCE AND STORAGE FACILITIES INFRASTRUCTURE

Infrastructure Component	Status	Proposed New Construction and/or Modifications	Relevant Figure(s)
Clearwell at the Desalination Plant	Proposed	Two 1.5-MG circular below ground concrete reservoirs	Figure 3-21
Desalinated Water Pump Station (for DWCS)	Proposed	Pump station with capacity of 7,000 gpm and a TDH of 420 feet	Figure 3-21
Desalinated Water Pump Station (for non-CalAm users)	Proposed	Pumping system flow and pressure tbd (Same location)	Figure 3-21
Product Water Pipeline	Proposed	2.77 mi of 30-inch diameter force main pipeline	Figure 3-20a
Transmission Main South	Proposed	8.09 miles of up to 36-inch-diameter force main pipeline	Figures 3-19 and 3-20a through 3-20c
Terminal Reservoir	Proposed	Two 3-MG, 33-foot-high, ~~102~~130-foot-diameter aboveground concrete tanks	Figure 3-15

SOURCE: RBF Consulting, 2008

Reservoir would have a design capacity of 7,000 gpm (10 mgd) with a TDH of 420 feet. The flow and pressure of the pump system that would deliver water to the SVGB is still to be determined. A conceptual layout of the Desalinated Water Pump Station is given in Figure 3-21.

3.3.4.3 Product Water Pipeline

The desalinated water Product Water Pipeline would convey the product water from the pump station to Transmission Main South. The Product Water Pipeline would be located within the same alignment as the Source Water Pipeline described in Section 3.3.1 until the intersection of Beach Road and Del Monte Boulevard, where the pipeline would turn south. At the intersection of Reservation Road and Del Monte Boulevard, the product water pipeline ends, and Transmission Main South begins (as shown on Figure 3-20a).

3.3.4.4 Transmission Main South

Transmission Main South, the only length of transmission main for the North Marina Project, would be a force main (up to 36-inches in diameter) with the same characteristics and alignment as the transmission mains described in the Moss Landing Project (shown in Figures 3-20a through 3-20c). It would convey water from the proposed desalination plant a distance of approximately 8.09 miles to the proposed ~~Monterey Pipeline and~~ Terminal Reservoir with an intermediate connection to the proposed Monterey Pipeline. Section 3.2.5, Transmission Main South, describes this alignment.

3.3.4.5 Terminal Reservoir

Terminal Reservoir would be constructed and utilized in the same way under the North Marina Project as in the Moss Landing Project. It would similarly consist of two 3-MG aboveground tanks, and would receive water from the desalination plant, the ASR System, and the Carmel River.

3.3.5 Seaside/Carmel Valley Conveyance and Storage Facilities

The Seaside/Carmel Valley Conveyance and Storage Facilities would be constructed and utilized in the same way under the North Marina Project as in the Moss Landing Project. Section 3.2.6 describes these facilities.

3.4 Power Supply

3.4.1 Moss Landing Project

Electrical power requirements of the Moss Landing Project desalination plant and desalinated water pump station are expected to be approximately ~~5.4~~ 6.2 MW[16] for a 10-mgd plant. **Table 3-11, Estimated Plant Process and Delivery Power Requirements for the Moss Landing Project,** summarizes the maximum power requirements in kilowatts (kW) for treatment and conveyance processes at the desalination plant.

TABLE 3-11 (REVISED)
ESTIMATED PLANT PROCESS AND DELIVERY POWER REQUIREMENTS FOR THE MOSS LANDING PROJECT

Unit Process	Average Annual Energy Requirements (kW~~\~~-hrs)	Peak Power Demand at 10 MGD Production Rate (kW)
Intake	1,141,313	170
Treatment	32,809,000	5,000
Distribution	4,414,000	640
Sub Total	**38,364,000**	**4,379**
CalAm Only Facilities	133,000	360
Total Demand	**38,497,000**	**6,170**

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[16] One MW is roughly equal to the electrical demand of 400-900 homes, and the variance depends on the size of the home, its geographic location, and the consumption factor. The MLPP is permitted at 2,539 MW. http://www.utilipoint.com/issuealert/print.asp?id=1728.

~~TABLE 3-11~~
~~ESTIMATED PLANT PROCESS AND DELIVERY POWER REQUIREMENTS FOR THE MOSS LANDING PROJECT~~

~~Unit Process~~	~~Maximum Power Requirements (kW)~~
~~Inlet Pumping~~	~~120~~
~~Coagulation~~	~~50~~
~~Flocculation~~	~~5~~
~~Immersion Style Membrane Filtration~~	~~160~~
~~Filtrate pumps~~	~~410~~
~~RO High-Pressure Pumps, Single-Pass with Energy Recovery~~	~~3,800~~
~~Clearwell Pumping~~	~~70~~
~~Desalinated Water Pump Station (DWPS)~~	~~710~~
~~Peak Demand~~	**~~5,400~~**

For the Moss Landing Project, the power requirement was calculated based on an RO membrane operating pressure of 900 pounds per square inch (psi) and the RO operating pressure was calculated assuming that the feed water salinity would be ~~approximately 32~~ a maximum salinity of 35 ppt. Energy recovery devices were assumed to capture energy from the concentrate stream. The proposed power supply for the Moss Landing Project would be a negotiated "inside-the-fence" power purchase agreement with the owner of the MLPP, in which the desalination plant would purchase power from the MLPP without going through a third party[17]. An electrical substation would be required onsite to transform the power to usable voltage.

3.4.2 North Marina Project

Electrical power requirements of the North Marina Project desalination plant, desalinated water pump station, and slant well pumps are expected to be approximately ~~6.1~~ 7.1 MW for an 11-mgd plant. See **Table 3-12, Estimated Plant Process and Delivery Power Requirements for the North Marina Project**, for more detail. The power requirement was calculated based on an RO membrane operating pressure of 900 psi and the RO membrane operating pressure was calculated assuming that the well source water salinity ~~would be approximately 33~~as high as 35 ppt. For the purpose of calculating power requirements, a continuous demand of 1,200 kW was used for the slant wells based on a constant ~~22~~24 mgd extraction rate.

The power supply for the project components will be from one or more of the following potential sources. For the purpose of analysis in this document, it is conservatively assumed that power would be drawn from the Pacific Gas and Electric Company (PG&E) grid.

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[17] Failing the successful negotiation of an inside-the-fence power purchase agreement, power would be purchased from the PG&E grid.

TABLE 3-12 (REVISED)
ESTIMATED PLANT PROCESS AND DELIVERY POWER REQUIREMENTS FOR THE NORTH MARINA PROJECT

Unit Process	Average Annual Energy Requirements (kW\-hrs)	Peak Power Demand at 11 MGD~~MDG~~ Production rate (kW)
Intake	6,791,000	1,000
Treatment	33,567,000	5,300
Distribution	2,716,000	400
Sub Total	**43,074,000**	**6,700**
CalAm Only Facilities	133,000	360
Total Demand	**43,207,000**	**7,060**

SOURCE: CalAm, 2009

~~TABLE 3-12~~
~~ESTIMATED PLANT PROCESS AND DELIVERY POWER REQUIREMENTS FOR THE NORTH MARINA PROJECT~~

~~Unit Process~~	~~Maximum Power Requirements (kW)~~
~~Slant Well Pumps~~	~~1,200~~
~~Greensand Backwash Pumps~~	
~~**Peak Demand**~~	~~**6,050**~~

~~SOURCE: CalAm, 2005~~

3.4.2.1 Turbine Generators

This option would require construction of a natural gas-fired power plant utilizing turbine generators that would be connected in parallel and brought online as needed to meet the power demand. Energy, in the form of heat, would be recovered from the turbines and applied to heat the incoming seawater using either a simple-cycle or combined-cycle system.

3.4.2.2 Reciprocating Engine Generators

Natural gas-fired reciprocating engine generators would produce the power required; heat exchangers would capture exhaust energy and jacket water energy to heat the incoming seawater using simple-cycle.

3.4.2.3 Direct Engine-Driven RO High-Pressure Pumps and Desalinated Water Pump Station Pumps with Supplementary Purchased Power

This option would utilize natural gas-fired engines to directly drive the pumps, heat exchangers to capture exhaust energy and jacket water energy to heat the incoming seawater. The remaining energy required would be purchased from the PG&E grid.

3.4.2.4 PG&E

PG&E, the local purveyor of power, could provide a direct feed of power from the grid. This option requires construction of transmission lines to the desalination plant.

The power supply options listed above do not consider the power needed to pump water through the slant wells or other non-desalination-plant facilities (including ASR and the proposed VGPS). Power for all facilities outside of the desalination plant sites would be purchased from PG&E.

3.5 Construction Methods

The following sections describe the typical construction methods to be used for each project component. Unless otherwise noted, all methods described in this section apply to both the Moss Landing and North Marina Projects. **Figure 3-22, Tentative Permitting and Construction Schedule**, shows a hypothetical construction timeline. The timeline was prepared for the Moss Landing Project, but it would also be generally applicable to the North Marina Project.

3.5.1 Desalination Plant Construction

Construction of the desalination plant would include site preparation, equipment delivery, and building construction. Some excavation and grading would be required for locations with uneven gradient. Ground clearing and excavation of the site would be performed using heavy construction equipment such as bulldozers, backhoes, cranes, and graders. Heavy equipment would be used to construct connections with existing water conveyance systems, and to construct footings of tanks and other support equipment. Upon completion of excavation, construction activities would also include pouring concrete footings for tanks, laying pipeline and making connections, installing support equipment such as control panels, and fencing the perimeter of the site.

3.5.2 Pipeline Construction

Pipelines would be installed using conventional open-trench or trenchless technology. The pipelines would be constructed of reinforced concrete cylinder pipe, mortar-lined and coated steel pipe, steel cylinder concrete pipe, or ductile iron pipe, typically delivered and installed in 6- to 40-foot-long sections.

Most of the construction would be open-cut trenching. Pipe sections would be placed in a trench of varying depth depending on pipe size and topography, and covered using conventional equipment such as backhoes, side-boom cranes, wheeled loaders, sheep's-foot excavators, and compactors. Typically, earth cover over the pipe would be 5 feet. Variations in this depth would be required to accommodate local topography, hydraulic grade, and utility congestion, among other factors. The trench width would be mostly 10 to 15 feet.

For portions of the alignment where it is not feasible to perform open-cut trenching, trenchless technology methods such as boring and jacking, microtunneling, or horizontal directional drilling may be used. **Figure 3-23**, **Typical Jack-and-Bore Layout**, shows one of these methods. These special construction methods would be used in areas where it is difficult to perform open-cut trenching, such as State highway crossings, stream and drainage crossings, and high utility congestion areas.

Construction activities may involve trenching, spoil handling, equipment and materials lay-down and storage, pipeline installation, backfilling and restoration, and vehicle ingress and egress. Typically, work tasks are anticipated to proceed in the following order:

- Clearing, grubbing and grading the rights-of-way;
- Trenching and hauling of excess spoils;
- Relocating utilities, if required;
- Delivering pipe and pipe bedding material;
- Installing pipe bedding material;
- Installing pipe;
- Backfilling the trench;
- Hydrostatic testing; and
- Restoring the ROW to original condition (pavement replacement, revegetation, etc.).

The width of the disturbance corridor for the pipeline construction would, under typical circumstances, vary from 50 to 100 feet, depending on the size of the pipe being installed. Trenchless technologies may require wider corridors at entry and exit pits.

Typical pipeline installation rates would be up to 250 LF per day. All construction activities would be restricted to the ROW approved by the applicable landowner or agency. All roadways disturbed during pipeline installation would be restored. Generally, trench spoils would be temporarily stockpiled within the construction easement, then backfilled into the trench after pipeline installation.

Some pipeline installation would require construction in existing roadways. Traffic control measures would be implemented as necessary, in coordination with local agencies.

Construction staging for the project would depend upon the contractor and subcontractors. Typically, the pipe would be brought to the site just ahead of construction and staged along the alignment ready for placement. Equipment and other construction materials may require sites for storage, staging, and lay-down.

3.5.3 Subsurface Intake Facilities Construction

Construction of the slant wells that would be part of the North Marina Project would be completed using large drilling machinery modified for angle (slant) wells. Typical drilling equipment to be used onsite consists of a dual wall reverse circulation “Barber” type drilling rig, two pipe trailers, two portable drilling fluid tanks, a 20,000-gallon frac-tank for development water desilting, and miscellaneous support trucks, pumps, air compressors, light plants, driller trailer and engineer’s trailer. An area of 200 feet by 200 feet would typically be necessary for well construction, including area for cutting spoils piles and storage of gravel pack and casings. For each well, approximately 120 cubic yards of drilling spoils would be generated that would require off-site disposal.

Construction, development, and installation of the well head facilities would occur over an approximately 14 to 18 month period, assuming that each well is drilled and developed sequentially. Drilling and development of each well would occur over a two month period. Equipping of well head facilities, electrical connections and system controls would take four to eight months. During peak construction, 25 to 30 construction workers may be employed.

Well development would require pumping of each well for approximately one month. The extracted water from well development would be returned to the ocean by a temporary pipeline to either a connection point with the MRWPCA outfall or a diffuser box on the beach.

During construction, hazardous materials such as gasoline, diesel fuel, lubricants and cleaning solvents would be used to fuel, lubricate and clean vehicles and equipment. The materials would be properly transported and stored in accordance with hazardous materials regulations and in accordance with best management practices to prevent release.

3.5.4 ASR Well Construction

Construction of the new ASR wells would employ standard land-clearing and well-drilling equipment. This equipment would include one drill rig, one water tank, a pipe truck, and several service vehicles. Construction activity would normally extend from 7 a.m. to 7 p.m., 5 days a week; however, brief periods of 24-hour operation would be associated with well completion and initial well testing. All waste material generated by land clearing and drilling that needs to be disposed of off site would be transported to an approved facility. These materials may include bentonite-based drilling fluids.

3.6 Operation and Maintenance Procedures

General operation and maintenance procedures would be developed for the project’s system components, including pipelines, pump stations, and the desalination plant. Examples of typical operation and maintenance procedures are briefly described below.

3.6.1 Pipelines

The following are general pipeline and interconnection operation and maintenance procedures:

- Weekly, visually inspect pipeline alignments;
- Mow grass within pipeline alignments;
- Grade access roads as needed;
- Test and service blowoff valves and air/vacuum relief valve assemblies as needed;
- Annually walk the pipeline alignment and inspect the cathodic protection system; and
- Pressure-test pipeline, paint pipeline appurtenances, repair tunnel entrances, and repair minor leaks in buried pipeline joints or segments (when necessary).

3.6.2 Pump Stations

The following are general pump station operation and maintenance procedures:

- Conduct routine operation maintenance checks;
- Conduct routine general pump station cleaning and maintenance;
- Perform routine maintenance of pump station exteriors;
- Routinely test pumps during non-emergency periods and verify operational readiness under anticipated full emergency project head;
- Annually perform major maintenance and cleanup; and
- Service motor cooling system (emergency pumps), replace pump seals, paint pump station and equipment, and disassemble pump to inspect bearings and impeller (recirculation and emergency pumps) as needed.

The various pumps that would be used during operations at the pump stations in the CWP generally would operate on a seasonal basis as depicted in **Table 3-13**, although during extreme wet or dry conditions facilities could operate continuously throughout the year, or not at all. It may be assumed that when the facilities do operate, they would operate continuously for 24 hours a day.

TABLE 3-13
CWP FACILITY OPERATIONS SCHEDULES

Facility	Operation Schedule
Desalination Plant and DWCS Pump Station	24 hours a day, 365 days per year
Segunda Pump Station Expansion	Wet season (typically December through April)
ASR Pump Station	Wet season (typically December through April)
ASR Wells	Dry season (typically May through November)

SOURCE: CalAm and RBF Consulting, 2005

3.6.3 Desalination Plants

Operation and maintenance personnel at the desalination plant (at any chosen site) would continuously monitor the seawater desalination facility, and would be present at the location 365 days a year, 24 hours per day. Their duties would include:

- Monitor chemical flows to the various processes, water flows into and out of the various processes, equipment operating parameters (e.g., pressure, temperature, and flow rates), and various other continuous operations; maintain, update and order chemicals and equipment to meet operational requirements;
- Prepare monthly records and reports to comply with requirements of local, state, and Federal agencies; and
- Routinely maintain (daily, monthly, and yearly) equipment in accordance with manufacturers' requirements, and provide equipment maintenance for emergency situations and/or breakdowns.

The accumulation of silts or scale on the RO membranes causes fouling, which reduces membrane performance. When this happens, RO membranes must be cleaned to remove the residues.

The cleaning process includes two steps: first, a number of cleaning chemicals are circulated in a predetermined sequence through the membranes; and second, the cleaned membranes are flushed with clean water (permeate) to remove the waste-cleaning solutions and to prepare the membranes for normal operation. (Residuals management at each project is discussed in more detail above, in section 3.2.2 and 3.3.2.)

3.7 Permits, Approvals, and Regulatory Requirements

The CWP, with its myriad distinct components and range of alternatives, is a complex project. Numerous federal, state, and local regulations and permit requirements would apply to construction and operation of the CWP. The environmental review process, of which this EIR is a part, is separate from and preliminary to the permitting processes that will follow if the EIR is certified. Such permitting activities will use the data in this EIR to inform the permit decision-making process. The content and conclusions of the EIR are not dependent upon the individual permitting processes of individual regulatory agencies. **Table 3-14**, Potential Permits and Approvals for the Project, lists the major federal, state, and local permits, approvals, and consultations ~~identified~~ likely to be required for the construction and operation of the Moss Landing and North Marina Projects, and Figure 3-22, Possible Moss Landing Permitting and Construction Schedule, shows a hypothetical permitting timeline. Chapter 1 includes discussion about public scoping and community outreach and stakeholder involvement in identifying issues. Table 3-14 and Figure 3-22 are not intended to be exclusive and exhaustive. Other permits and approvals may be required. If so, the applicant would be bound by law to comply with such requirements.

3.8 References

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Monterey Peninsula Water Management, *Draft District Aquifer Storage and Recovery Project Environmental Impact Report/Environmental Assessment*, prepared by Jones and Stokes, March 2006.

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TABLE 3-14
POTENTIAL PERMITS AND APPROVALS FOR THE CWP

Agency or Department	Permit or Approval	Required for (Project)
Federal Agencies		
U.S. Fish and Wildlife Service (USFWS)	Incidental Take Statement in accordance with Section 7 of the Endangered Species Act of 1973, as amended (ESA) (16 U.S.C. 1531 et seq.)	• The incidental take of a federally-listed species under the jurisdiction of USFWS, when a federal permit such as a Clean Water Act section 404 permit is required, requires the issuance of an Incidental Take Statement under Section 7 of the ESA. (If no federal approval were required, any incidental take of a federally listed species under the jurisdiction of USFWS would require an incidental take permit to be issued and a habitat conservation plan to be approved in accordance with ESA Section 10). **(both projects)**
	Incidental Take Permit in accordance with the Migratory Bird Treaty Act (16 USC 703–711)	• This Act prohibits the take of any migratory bird or any part, nest, or eggs of any such bird without an Incidental Take Permit from USFWS. **(both projects)**.
	Consultation and issuance of a biological opinion in accordance with ESA Section 7	• The need for any federal permit requires the permitting agency to consult with USFWS to determine whether the proposed action is likely to adversely affect a federally-listed terrestrial, freshwater animal or plant species or designated critical habitat for such species, jeopardize the continued existence of such species that are proposed for listing under the ESA, or adversely modify proposed critical habitat. To make this determination, the permitting agency will prepare a Biological Assessment, the outcome of which will determine whether USFWS will conduct "formal consultation" with the agency and issue a Biological Opinion concerning the effects of the proposed action. If USFWS finds that that action may cause jeopardy or critical habitat destruction or modification, it will propose reasonable and prudent alternatives to the action. Alternatively, if USFWS finds no jeopardy, then the action can proceed. **(both projects)**
	Consultation in accordance with the Fish and Wildlife Coordination Act (16 U.S.C. 661-667c)	• This Act requires federal agencies to consult with the USFWS, NOAA Fisheries, and CDFG before they undertake or approve a project that controls or modifies surface water (e.g., by impoundment or diversion). The purpose of such consultation is to prevent loss of and damage to wildlife resources. **(both projects)**
	Consultation with State Historic Preservation Officer (SHPO) and/or Tribal Historic Preservation Officer (THPO) in accordance with Section 106 of the National Historic Preservation Act of 1966 (NHPA)	• The NHPA requires federal permitting agencies to "take into account" the effects of their actions that could affect properties that are included in the National Register of Historic Places or that meet the criteria for the National Register, and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. Thus, whenever there is federal agency involvement (*e.g.*, USFWS issuance of an Incidental Take Statement or Incidental Take Permit) the federal permitting agency (here, USFWS) must consult with the SHPO and/or THPO, as appropriate. **(both projects)**

TABLE 3-14 (Continued)
POTENTIAL PERMITS AND APPROVALS FOR THE PROJECT

Agency or Department	Permit or Approval	Required for (Project)
Federal Agencies (cont.)		
National Oceanic & Atmospheric Administration (NOAA) – Fisheries	Authorization by the Monterey Bay National Marine Sanctuary Superintendant of federal, state and local agencies' permits within the sanctuary in accordance with NOAA's National Marine Sanctuary Program requirements for the MBNMS. (15 Code Fed. Regs. Part 922)	• Authorization by the Monterey Bay National Marine Sanctuary Superintendant of any permit, lease, license, approval or other authorization issued or granted by a federal, state or local agency for activities within the sanctuary. This authorization indicates that the Monterey Bay National Marine Sanctuary Advisory Council does not object to issuance of the permit or other authorization, including the terms and conditions deemed necessary to protect Sanctuary resources and qualities. **(both projects)**
	Incidental Take Permit in accordance with Section 104 of the Marine Mammal Protection Act of 1972 (MMPA) (16 U.S.C. § 1374)	• The MMPA prohibits unauthorized "take" of marine mammals in U.S. waters by any person and by U.S. citizens in international waters. NOAA Fisheries can authorize incidental take that may occur during non-fishery commercial activities. **(both projects)**
	Incidental Take Statement in accordance with ESA Section 7 (16 U.S.C. 1531 et seq.)	• The incidental take of a federally-listed species under the jurisdiction of NOAA Fisheries, when a federal permit such as a Clean Water Act section 404 permit is required, requires the issuance of an Incidental Take Statement under Section 7 of the ESA. (If no federal approval were required, any incidental take of a federally listed species under this agency's jurisdiction would require an incidental take permit to be issued in accordance with ESA Section 10). **(both projects)**
	Consultation and biological opinion in accordance with ESA Section 7	• The need for any federal permit requires the permitting agency to consult with NOAA Fisheries to determine whether the proposed action is likely to adversely affect a federally-listed marine species or designated critical habitat for such species, jeopardize the continued existence of such species that are proposed for listing under the ESA, or adversely modify proposed critical habitat. To make this determination, the permitting agency will prepare a Biological Assessment, the outcome of which will determine whether NOAA Fisheries will conduct "formal consultation" with the agency and issue a Biological Opinion concerning the effects of the proposed action. If NOAA Fisheries finds that that action may cause jeopardy or critical habitat destruction or modification, it will propose reasonable and prudent alternatives to the action. Alternatively, if no jeopardy is found, then the action can proceed. **(both projects)**
	Consultation in accordance with Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act ("the Sustainable Fisheries Act") (16 U.S.C. § 1855(b))	• Whenever a federal or state approval is required for any activity that may adversely affect designated essential fish habitat (EFH), the agency must consult with NOAA Fisheries, similar to the consultation required under the ESA. If it is determined that the activity would adversely affect EFH, then NOAA Fisheries will recommend measures to the agency for conserving that habitat. **(both projects)**

TABLE 3-14 (Continued)
POTENTIAL PERMITS AND APPROVALS FOR THE PROJECT

Agency or Department	Permit or Approval	Required for (Project)
Federal Agencies (cont.)		
National Oceanic & Atmospheric Administration (NOAA) – Fisheries (cont.)	Consultation with the SHPO and/or THPO, as appropriate, in accordance with NHPA Section 106.	• If a NOAA Fisheries permit is required, NOAA Fisheries must consult with the SHPO/THPO, as appropriate. See related discussion provided in the context of USFWS. **(both projects)**
U.S. Army Corps of Engineers (Corps)	Permit in accordance with Clean Water Act Section 404 (33 U.S.C. § 1344)	• Discharge of dredged or fill material into waters of the United States, including wetlands. **(Moss Landing Project-Salinas River** Crossing; both projects-misc. small crossings**)**
	Permit in accordance with Rivers and Harbors Act Section 10 (33 U.S.C. § 403)	• The creation of any obstruction to the navigable capacity of any waters of the United States. Permitting authority includes all structures and work in or over navigable waters of the U.S. that affect the course, location, condition, or capacity of such waters, such as the construction of a wharf, pier, bulkhead, ramp, or pipeline crossing. Other agencies have a consulting and review role in the Section 10 permit process, but issue no separate approval or authorization in connection with this role, *e.g.*: - The U.S. Coast Guard will consult with the Corps and review the Section 10 permit application for marine traffic safety and navigational hazards, including underwater intake and outfall pipelines. - NOAA staff will review and comment on applications affecting National Marine Sanctuaries and sanctuary resources. **(Moss Landing Project-Salinas River Crossing)**
	Consultation under ESA Section 7	• ESA Section 7 requires a federal agency, such as the Corps, to ensure that any action that it authorizes, funds or carries out that may affect a federally-listed species is not likely to jeopardize the continued existence of that species or to destroy or adversely modify designated critical habitat. To do so, the agency (here, the Corps) will prepare a Biological Assessment. If the Biological Assessment concludes that the action is likely to affect such a species, the agency must engage in formal consultation with USFWS or NOAA Fisheries, as appropriate. Alternatively, a determination that the action is not likely to affect such a species would lead to a letter of concurrence from USFWS/NOAA Fisheries (assuming USFWS/NOAA Fisheries agrees with the determination) and the conclusion of the informal consultation process. **(both projects)**

TABLE 3-14 (Continued)
POTENTIAL PERMITS AND APPROVALS FOR THE PROJECT

Agency or Department	**Permit or Approval**	**Required for (Project)**
Federal Agencies (cont.)		
U.S. Army Corps of Engineers (Corps) (cont.)	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	• If the Corps's issuance of any approval may adversely affect designated EFH, the Corps must consult with NOAA Fisheries. For any such action that would adversely affect EFH, NOAA Fisheries will provide conservation recommendations. The Corps then must provide a detailed written response to NOAA Fisheries within 30 days, including a description of measures proposed by the agency for avoiding, mitigating or offsetting the impact of the activity on EFH. If the response is inconsistent with NOAA Fisheries' recommendations, then the Corps must explain its reasons for not following the recommendations. **(both projects)**
	Consultation with the SHPO/THPO in accordance with NHPA Section 106	• If a Corps permit is required, the Corps must consult with the SHPO/THPO, as appropriate. See related discussion provided in the context of USFWS. **(both projects)**
State Agencies		
California Public Utilities Commission (CPUC)	Certificate of Public Convenience and Necessity (PUC Article 1)	• Construction and operation of the project and recovery of costs in connection therewith. **(both projects)**.
	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	• If the CPUC's issuance of any approval may adversely affect designated EFH, the agency must consult with NOAA Fisheries. See related discussion provided in the context of the Corps. **(both projects)**
Fort Ord Reuse Authority (FORA)	Finding of substantial conformance with the Base Reuse Plan and the FORA Master Resolution Chapter 8 consistency criteria	• Applications for local agency legislative land use planning approval (such as a proposed County General Plan amendment) are brought before the FORA Board of Directors for a determination of consistency between the application and the Base Reuse Plan. **(both projects)**
State Water Resources Control Board, Division of Water Rights	Order of approval	• Diversion of the Carmel River for aquifer storage and recovery (ASR) **(both projects)**
	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	• If the State Water Resources Control Board's issuance of any approval may adversely affect designated EFH, the agency must consult with NOAA Fisheries. See related discussion provided in the context of the Corps. **(both projects)**
Regional Water Quality Control Board for the Central Coast Region	Compliance with National Pollutant Discharge Elimination System (NPDES) General Permit For Storm Water Discharges Associated With Construction Activity (WQO No. 99-08-DWQ)	• Any discharge of storm water to surface waters of the United States from a construction project that encompasses five or more acres of soil disturbance requires compliance with the General Permit, including:

TABLE 3-14 (Continued) POTENTIAL PERMITS AND APPROVALS FOR THE PROJECT

Agency or Department	Permit or Approval	Required for (Project)
State Agencies (cont.)		
Regional Water Quality Control Board for the Central Coast Region (cont.)		- Development and implementation of a Storm Water Pollution Prevention Plan (SWPPP) that specifies Best Management Practices (BMPs), which will prevent all construction pollutants from contacting storm water and with the intent of keeping all products of erosion from moving off site into receiving waters; - Elimination or reduction of non-storm water discharges to storm sewer systems and other waters of the U.S.; and - Inspection of all BMPs. **(both projects)**
	National Pollutant Discharge Elimination System (NPDES) Permit in accordance with Clean Water Act Section 402 (33 U.S.C. § 1342)	• The discharge of a pollutant or combination of pollutants (e.g., brine waste or concentrate) into surface waters of the United States, including wetlands, requires NPDES permit approval. **(both projects)**
	Waste Discharge Requirements in accordance with the Porter-Cologne Water Quality Control Act (Water Code § 13000 *et seq.*)	• Any activity that results or may result in a discharge of waste that directly or indirectly impacts the quality of waters of the State (including groundwater or surface water) or the beneficial uses of those waters is subject to WDRs. **(both projects-ASR settling basins)**
	Water Quality Certification in accordance with Clean Water Act Section 401 (33 U.S.C. § 1341)	• Any applicant for a federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into navigable waters, must provide the licensing or permitting agency a certification that the activity meets State water quality standards. **(Moss Landing Project-Salinas River Crossing; both projects-misc. small crossings)**
	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	• If the Regional Board's issuance of any approval may adversely affect designated EFH, the agency must consult with NOAA Fisheries. See related discussion provided in the context of the Corps. **(both projects)**
California State Lands Commission	Amendment of Land Use Lease (Right-of-Way Permit) (Pub. Res. Code § 6000 *et seq.*; 14 Cal. Code Regs. § 1900 *et seq.*)	• Modification of Moss Landing Power Plant (MLPP) Outfall lease **(Moss Landing Project-brine discharge)**
	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	• If the State Lands Commission's issuance of an approval may adversely affect designated EFH, the agency must consult with NOAA Fisheries. See related discussion provided in the context of the Corps. **(both projects)**

TABLE 3-14 (Continued)
POTENTIAL PERMITS AND APPROVALS FOR THE PROJECT

Agency or Department	Permit or Approval	Required for (Project)
State Agencies (cont.)		
California Department of Fish and Game (CDFG)	Incidental Take Permit in accordance with the California Endangered Species Act (CESA) (Fish & Game Code § 2081)	• The "take" of any endangered, threatened or candidate species may be allowed by permit if it is incidental to an otherwise lawful activity and if the impacts of the authorized "take" are minimized and fully mitigated. No permit may be issued if the permit would jeopardize the continued existence of the species. **(both projects)**
	Lake/Streambed Alteration Agreement (Fish & Game Code § 1602)	• Any substantial diversion, obstruction or change to the natural flow, or the bed, channel or bank of any river, stream, or lake in California that supports wildlife resources, and the use of any material from the streambeds without first notifying CDFG of such activity is unlawful. **(Moss Landing Project-Salinas River Crossing; both projects-misc. small crossings)**
	Consultation in accordance with the Fish and Wildlife Coordination Act (16 U.S.C. 661-667c)	• Consultation with CDFG and USFWS prior to the impoundment, diversion, control or modification of the waters of any stream or other body of water in accordance with a federal permit, license or other authorization. The purpose of such consultation is to prevent loss of and damage to wildlife resources. **(both projects)**
	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	• If CDFG's issuance of any approval may adversely affect designated EFH, then the agency must consult with NOAA Fisheries. See related discussion provided in the context of the Corps. **(both projects)**
California Coastal Commission (CCC)	Coastal Development Permit in accordance with the California Coastal Act (Pub. Res. Code § 30000 *et seq.*)	• Development proposed within the Coastal Zone requires a Coastal Development Permit to be issued by the CCC except where the local jurisdiction has an approved Local Coastal Plan (LCP) in place. If an approved LCP is in place, primary responsibility for issuing coastal development permits shifts from the CCC to the local government although the CCC will hear appeals on certain local government coastal development permit decisions. • Regardless of whether a coastal development permit must be obtained from a local agency in accordance with an approved LCP, the CCC retains coastal development permit authority over new development proposed on the immediate shoreline, including intake and outfall structures on tidelands, submerged lands and certain public trust lands, over any development which constitutes a "major public works project." (Pub. Res. Code §§ 30601, 30600(b)(2)). **(both projects)**

TABLE 3-14 (Continued)
POTENTIAL PERMITS AND APPROVALS FOR THE PROJECT

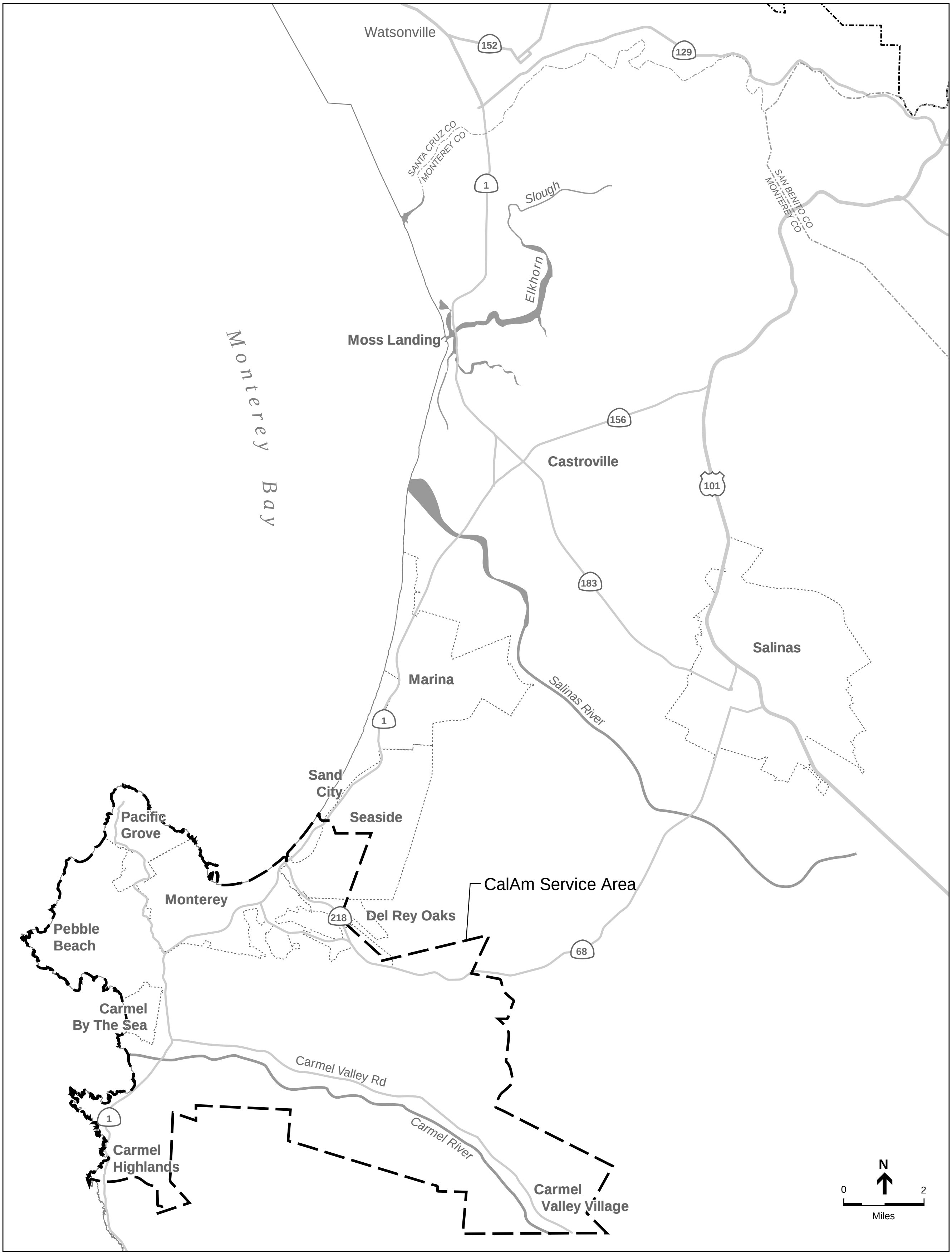
Agency or Department	Permit or Approval	Required for (Project)
State Agencies (cont.)		
California Coastal Commission (CCC) (cont.)	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	• If the issuance of a Coastal Development Permit (or other state approval) may adversely affect designated EFH, the permitting agency must consult with NOAA Fisheries. See related discussion provided in the context of the Corps. **(both projects)**
California Energy Commission (CEC)	Approval of Petition to Amend Application for Certification No. 99-AFC-4 (Moss Landing Unit I & II - Duke)	• To add a desalination plant to the site of the existing CEC-permitted facility. **(Moss Landing Project)**.
	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	• If the CEC's issuance of any approval may adversely affect designated EFH, the agency must consult with NOAA Fisheries. See related discussion provided in the context of the Corps. **(both projects)**
~~California Department of Health Services (CDOHS)~~ California Department of Public Health (CDPH)	Permit to Operate a Public Water System (Health & Safety Code § 116525)	• Operation of a public water system and oversight over the quality of the product water produced. **(both projects)**
	Consultation with NOAA Fisheries in accordance with Section 305(b) of the Sustainable Fisheries Act (16 U.S.C. § 1855(b))	• If the CDOHS's issuance of any approval may adversely affect designated EFH, the agency must consult with NOAA Fisheries. See related discussion provided in the context of the Corps. **(both projects)**
California Department of Transportation (Caltrans)	Encroachment Permit (Streets &Highway Code § 660 *et seq*.)	• Encroachments in, under, or over any portion of a state highway right-of-way, including for state Highway 156, Highway 68 and Highway 1. **(both projects)**
Local Agencies		
Seaside Groundwater Basin Watermaster	Permit for Injection/Extraction	• Injection/extraction activities affecting the Seaside Groundwater Basin require Watermaster approval. **(both projects)**
Monterey County Public Works Department	Encroachment Permit (Monterey County Code (MCC) Chapter 14.04)	• Designated activities within the right-of-way of a County highway require encroachment permit approval from the Public Works Director, whose decisions may be appealed to the County Board of Supervisors. **(both projects)**
Monterey County Health Department Environmental Health Division	Well Construction Permit (MCC Chapter 15.08)	• Construction of new water supply wells requires written permit approval to be issued by Health Officer of the County, whose decisions may be appealed to the County Board of Supervisors. **(both projects)**
	Permit to Construct Desalination Facility (MCC Chapter 10.72)	• The commencement of construction or operation of a desalination treatment facility requires permit approval to be issued by the Director of Environmental Health of the County of Monterey or his or her designee (MCC § 10.72.010), whose permit decisions may be appealed to the Director of Environmental Health within 30 days (MCC § 10.72.080). **(both projects)**

TABLE 3-14 (Continued)
POTENTIAL PERMITS AND APPROVALS FOR THE PROJECT

Agency or Department	**Permit or Approval**	**Required for (Project)**
Local Agencies (cont.)		
Monterey County Planning and Building Inspection Department	Use Permit (MCC Chapter 21.74)	• To conduct a use for which a conditional use permit is required or allowed in a particular zone by the terms of the County Zoning Ordinance, a use permit must be issued by the appropriate planning authority, e.g., the Zoning Administrator or the Planning Commission, the decisions of which may be appealed to the Planning Commission and Board of Supervisors, respectively. **(both projects)**
	Coastal Development Permit in accordance with the California Coastal Act (Pub. Res. Code § 30000 *et seq*.)	• Development proposed within the Coastal Zone where the County has jurisdiction through its existing Local Coastal Plan, except in the instances noted above, where the CCC retains primary permit authority. Where the County is the permitting authority, the CCC retains jurisdiction over appeals. **(both projects)**
	Grading Permit (MCC Chapter 16.08)	• Grading, subject to certain exceptions, requires a permit to be issued by the Building Official, whose grading permit decisions may be appealed to the five-member Board of Appeals, which has been appointed by the Board of Supervisors, and subsequently to the Board of Supervisors. **(both projects)**
	Digging and Excavation Permit (MCC Chapter 16.10)	• Digging, excavation, ground disturbance and development require a separate permit from the county Building Official when they occur within the former Fort Ord military installation; permit decisions may be appealed to the Board of Appeals and subsequently to the Board of Supervisors. **(both projects)**
	Erosion Control Permit (MCC Chapter 16.12)	• Causing or allowing the continued existence of a condition on any site (including, for example, development and related construction activities such as site cleaning, grading, and soil removal or placement) that is causing or is likely to cause accelerated erosion requires a permit to be issued by the Director of Building Inspection; permit decisions may be appealed to the Board of Appeals and subsequently to the Board of Supervisors. **(both projects)**
Monterey Peninsula Water Management District (MPWMD)	Water System Expansion Permit in accordance with Ordinance 96 of the MPWMD Board of Directors	• Expansion of the MPWMD's water delivery system. **(both projects)**
Monterey Bay Unified Air Pollution Control District (MBUAPCD)	Authority To Construct in accordance with Local Rule 3.1	• The building, erection, alteration, or replacement of any article, machine, equipment or other contrivance which may cause the issuance of air contaminants from a stationary source or the use of which may eliminate or reduce or control the issuance of air contaminants requires an Authority to Construct to be issued by the Air Pollution Control Officer. **(both projects)**

TABLE 3-14 (Continued)
POTENTIAL PERMITS AND APPROVALS FOR THE PROJECT

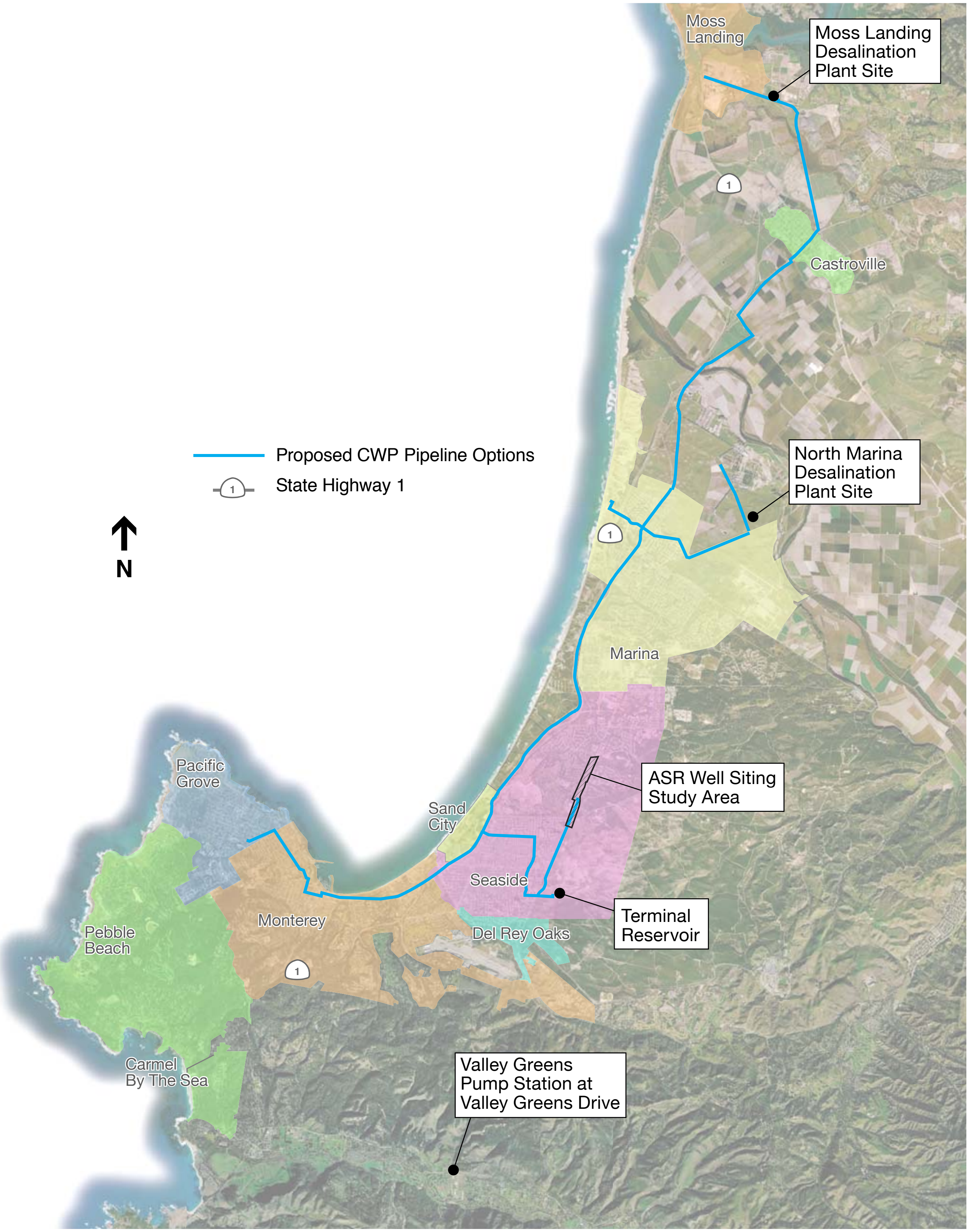
Agency or Department	Permit or Approval	Required for (Project)
Local Agencies (cont.)		
Monterey Bay Unified Air Pollution Control District (MBUAPCD) (cont.)	Permit To Operate in accordance with Local Rule 3.2	• The operation or use of any article, machine, equipment or other contrivance that may emit air contaminants from a stationary source requires a Permit to Operate to be issued by the Air Pollution Control Officer or the District's Hearing Board. **(both projects)**
City of Monterey, City of Seaside, City of Marina, Sand City, Del Rey Oaks, City of Pacific Grove	Land Use (including local Coastal Development Permit(s), as necessary), ~~,~~ Building, Public Health, Public Works and/or similar approvals to those discussed above in the context of the County, each issued in accordance with the applicable city's municipal code.	• See related discussions provided in the context of the County. **(both projects)**
Transportation Agency for Monterey County	Easement	• To have a conveyance pipeline cross Agency property. **(both projects)**



SOURCE: ESA, 2008

CalAm Coastal Water Project . 205335

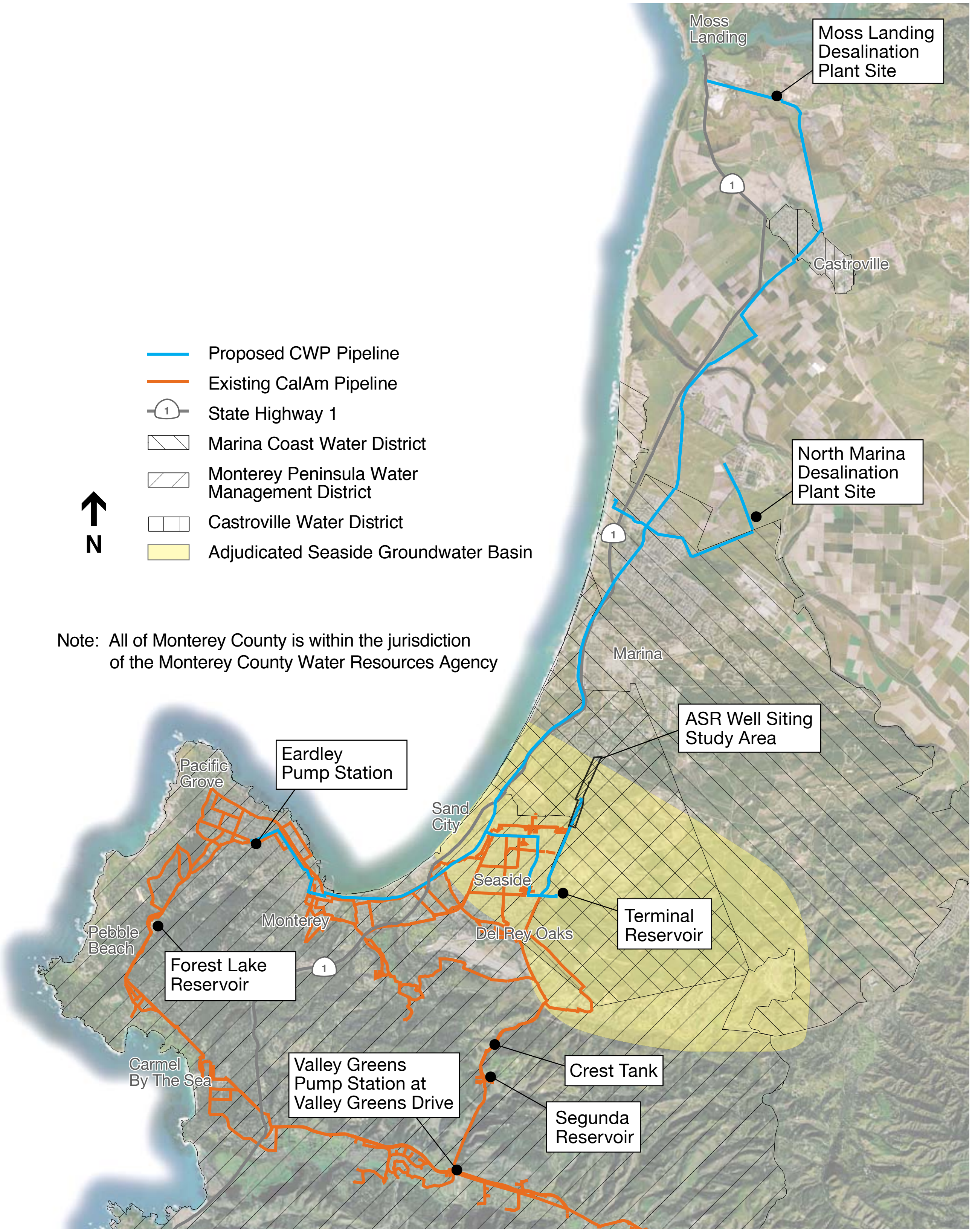
Figure 3-1
Regional Vicinity Map



SOURCE: CalAm and RBF Consulting, 2005

CalAm Coastal Water Project . 205335

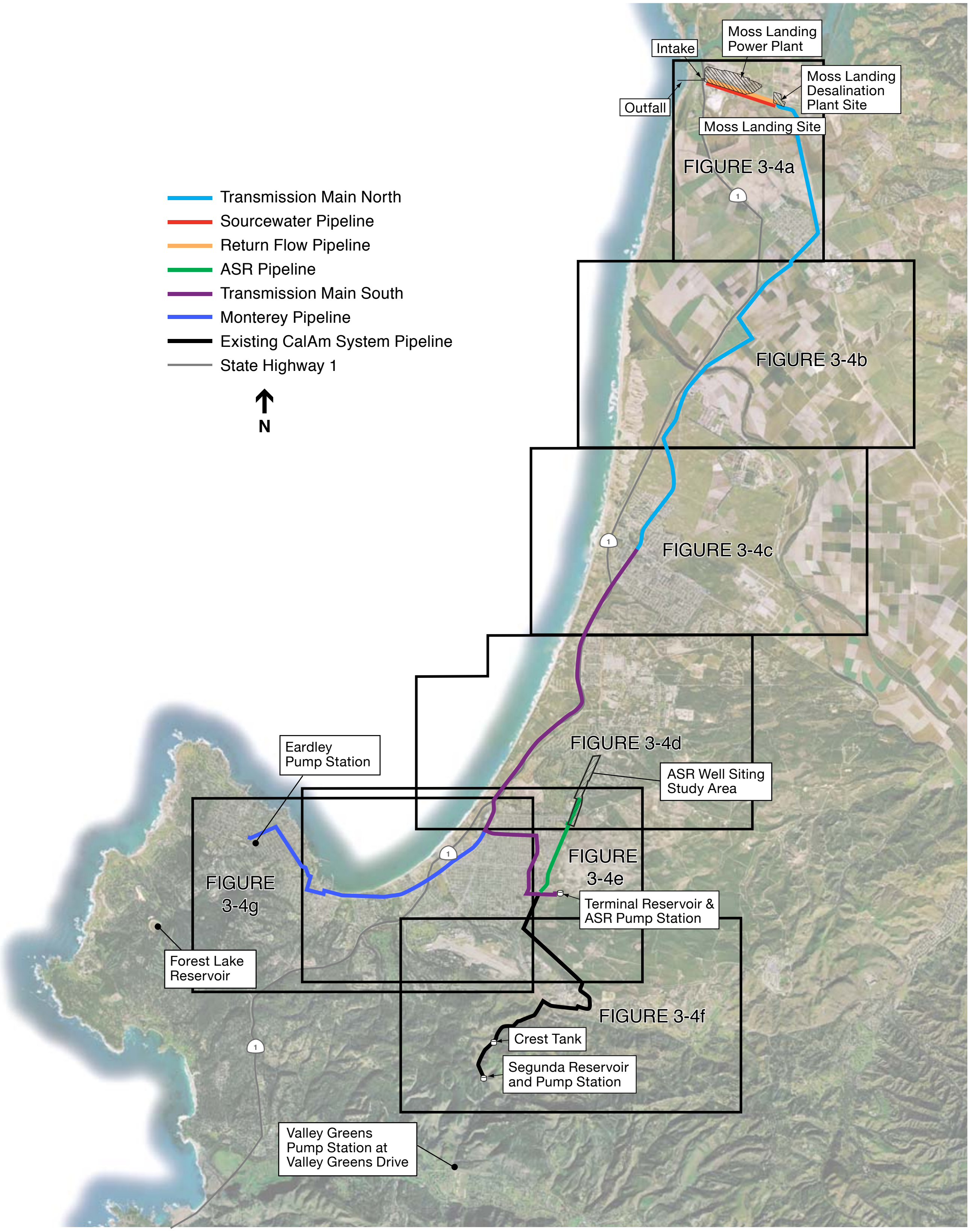
Figure 3-2a
Local Agencies–
Municipalities



Note: All of Monterey County is within the jurisdiction of the Monterey County Water Resources Agency

SOURCE: CalAm and RBF Consulting, 2005

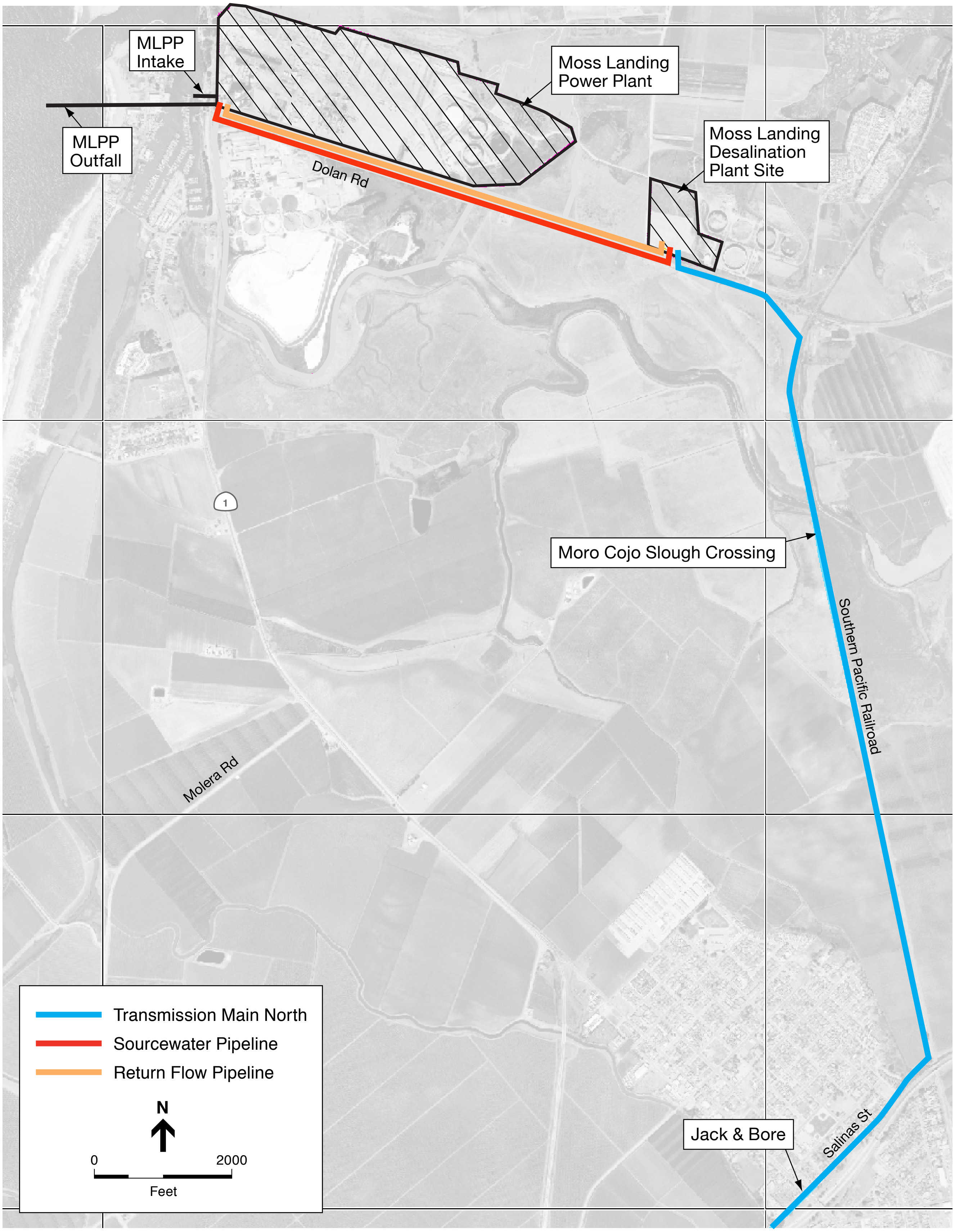
Figure 3-2b
Local Agencies–
Water Districts



SOURCE: CalAm and RBF Consulting, 2005

CalAm Coastal Water Project . 205335

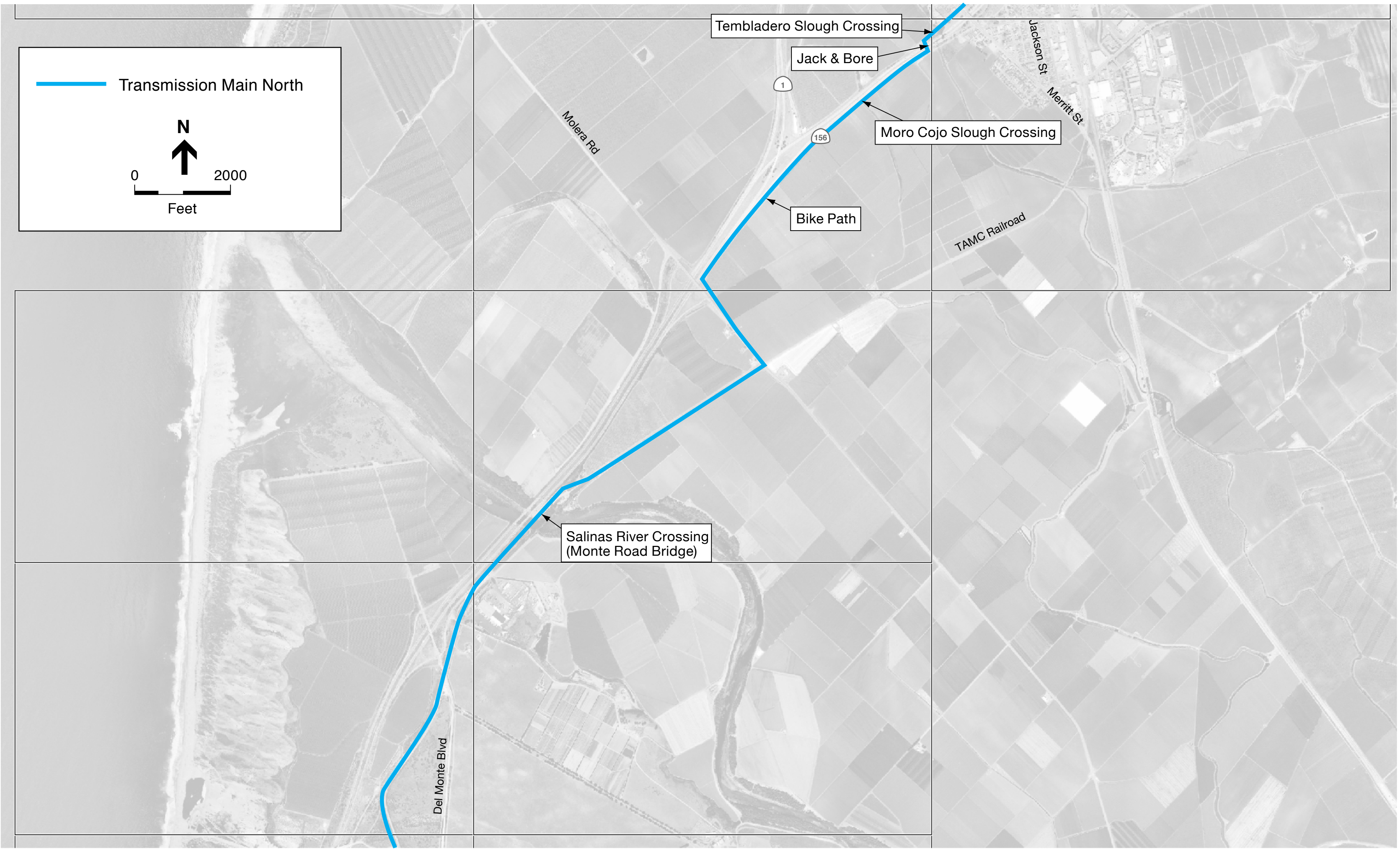
Figure 3-3
Moss Landing Project Facilities
Index Map



SOURCE: CalAm and RBF Consulting, 2005

CalAm Coastal Water Project . 205335

Figure 3-4a
Moss Landing Project Facilities



SOURCE: CalAm and RBF Consulting, 2005

CalAm Coastal Water Project . 205335

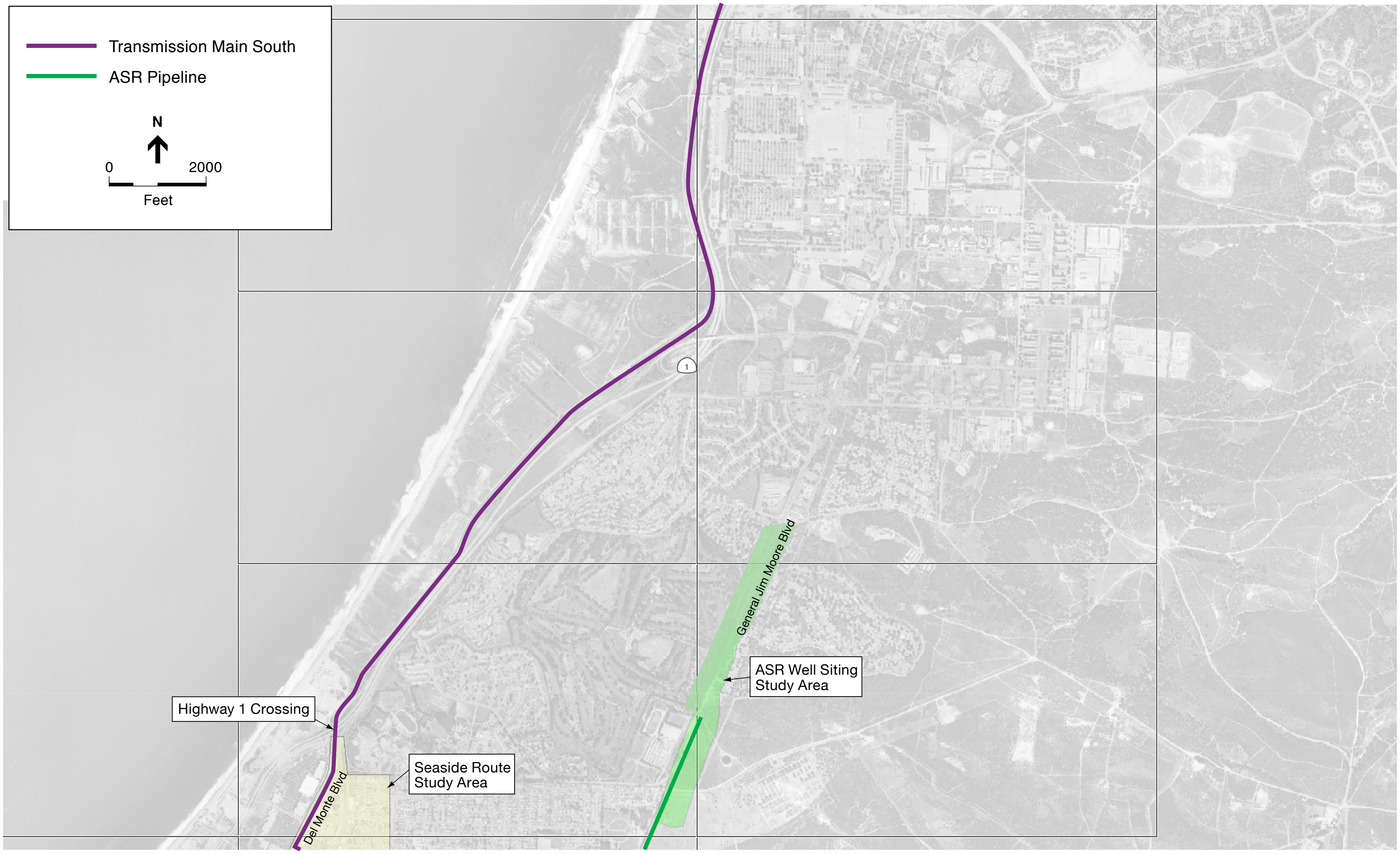
Figure 3-4b
Moss Landing Project Facilities

SOURCE: CalAm and RBF Consulting, 2005

CalAm Coastal Water Project . 205335

Figure 3-4c

Moss Landing Project Facilities

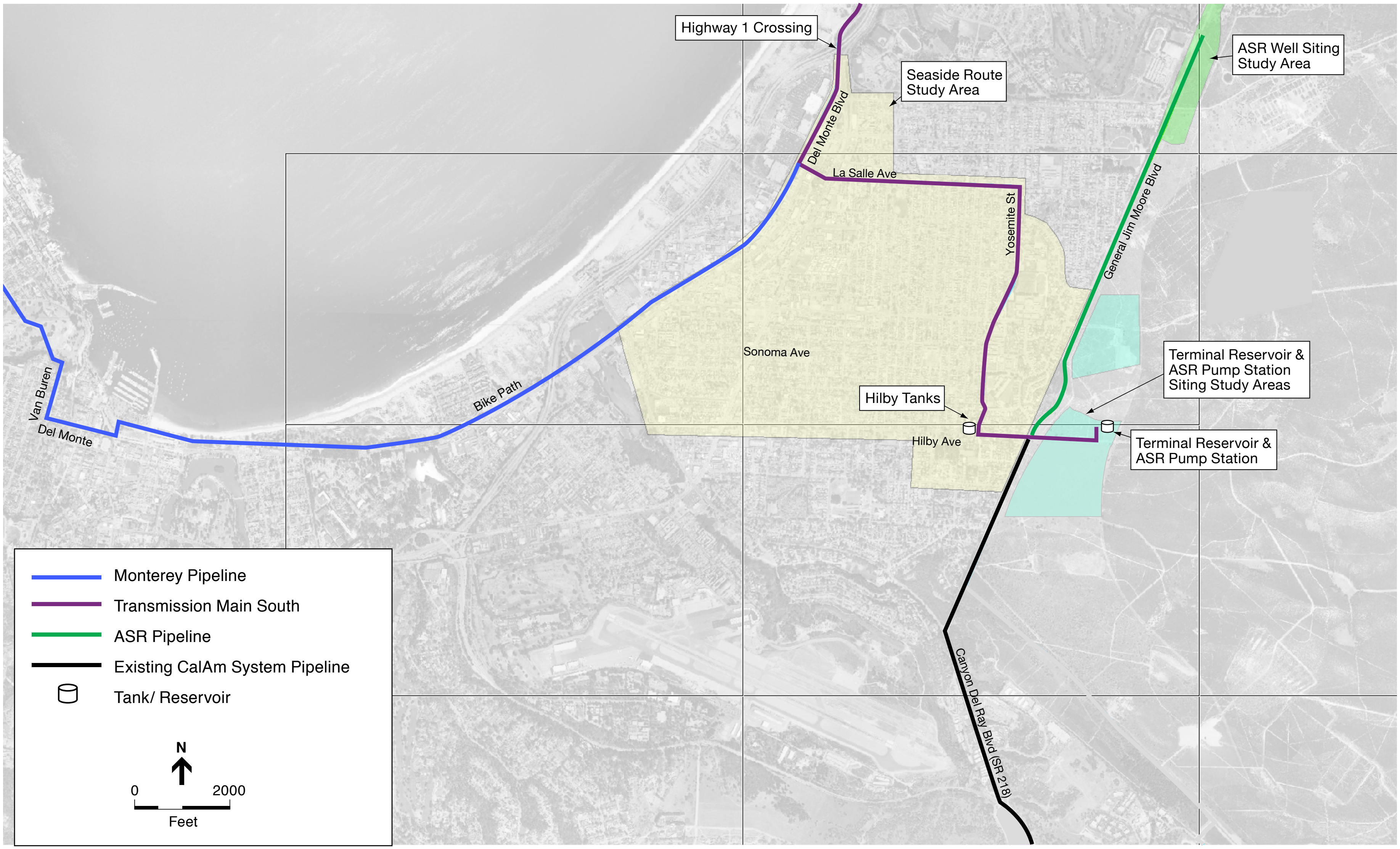


SOURCE: CalAm and RBF Consulting, 2005

CalAm Coastal Water Project . 205335

Figure 3-4d

Moss Landing Project Facilities

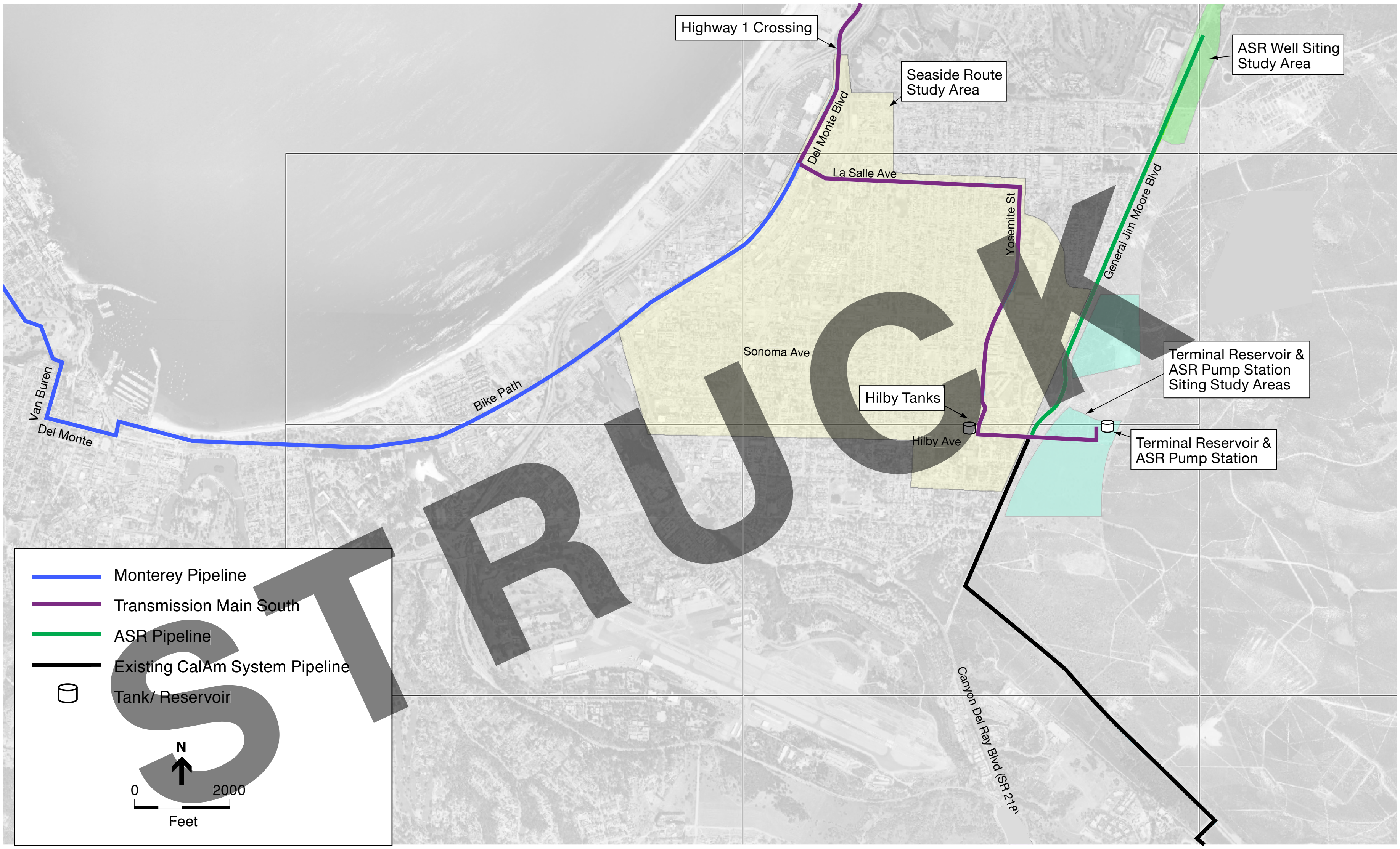


SOURCE: CalAm and RBF Consulting, 2005; RBF Consulting, 2007

CalAm Coastal Water Project . 205335

Revised Figure 3-4e

Moss Landing Project Facilities



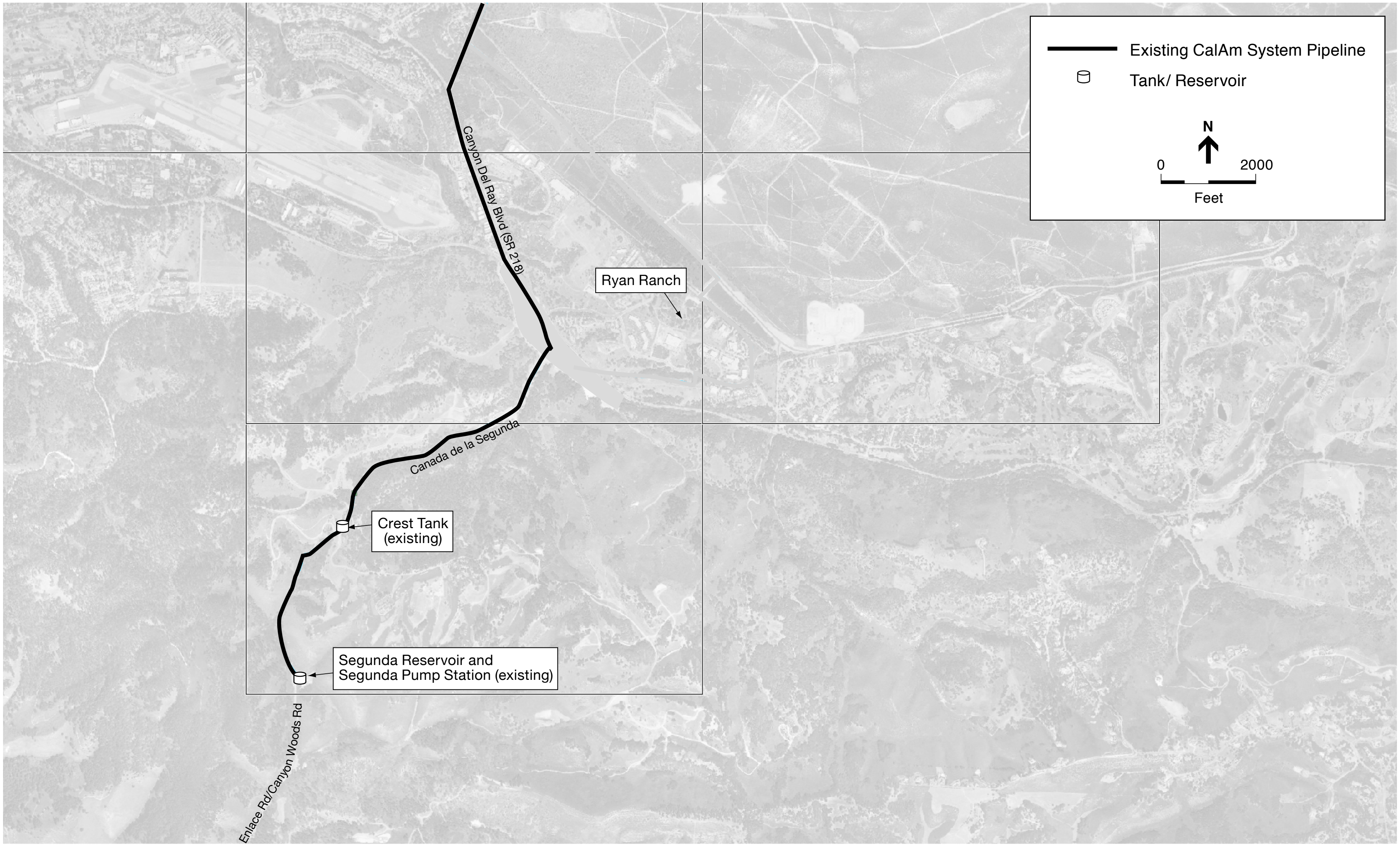
STRUCK

SOURCE: CalAm and RBF Consulting, 2005; RBF Consulting, 2007

CalAm Coastal Water Project . 205335

Figure 3-4e

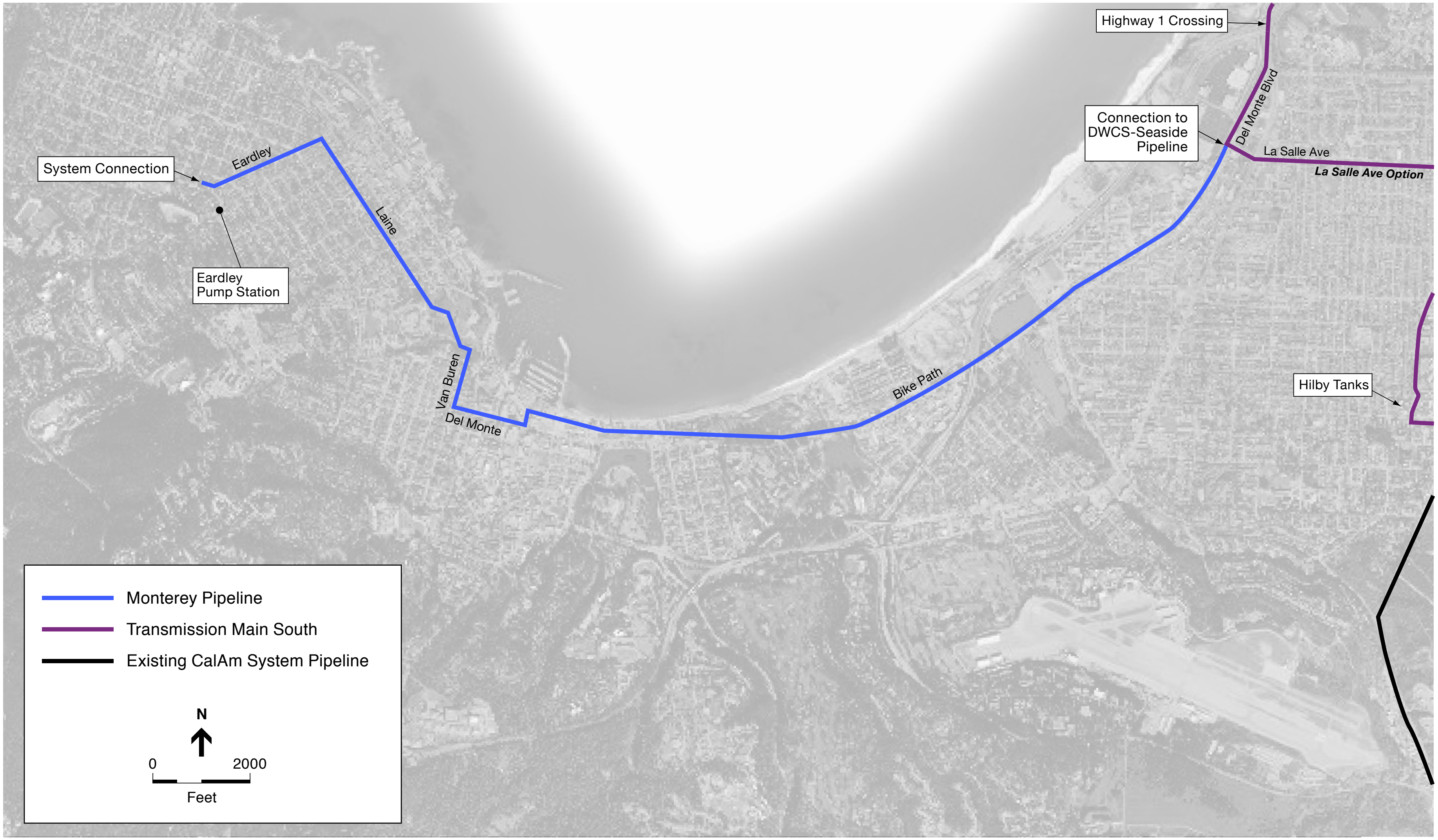
Moss Landing Project Facilities



SOURCE: CalAm and RBF Consulting, 2005

CalAm Coastal Water Project . 205335

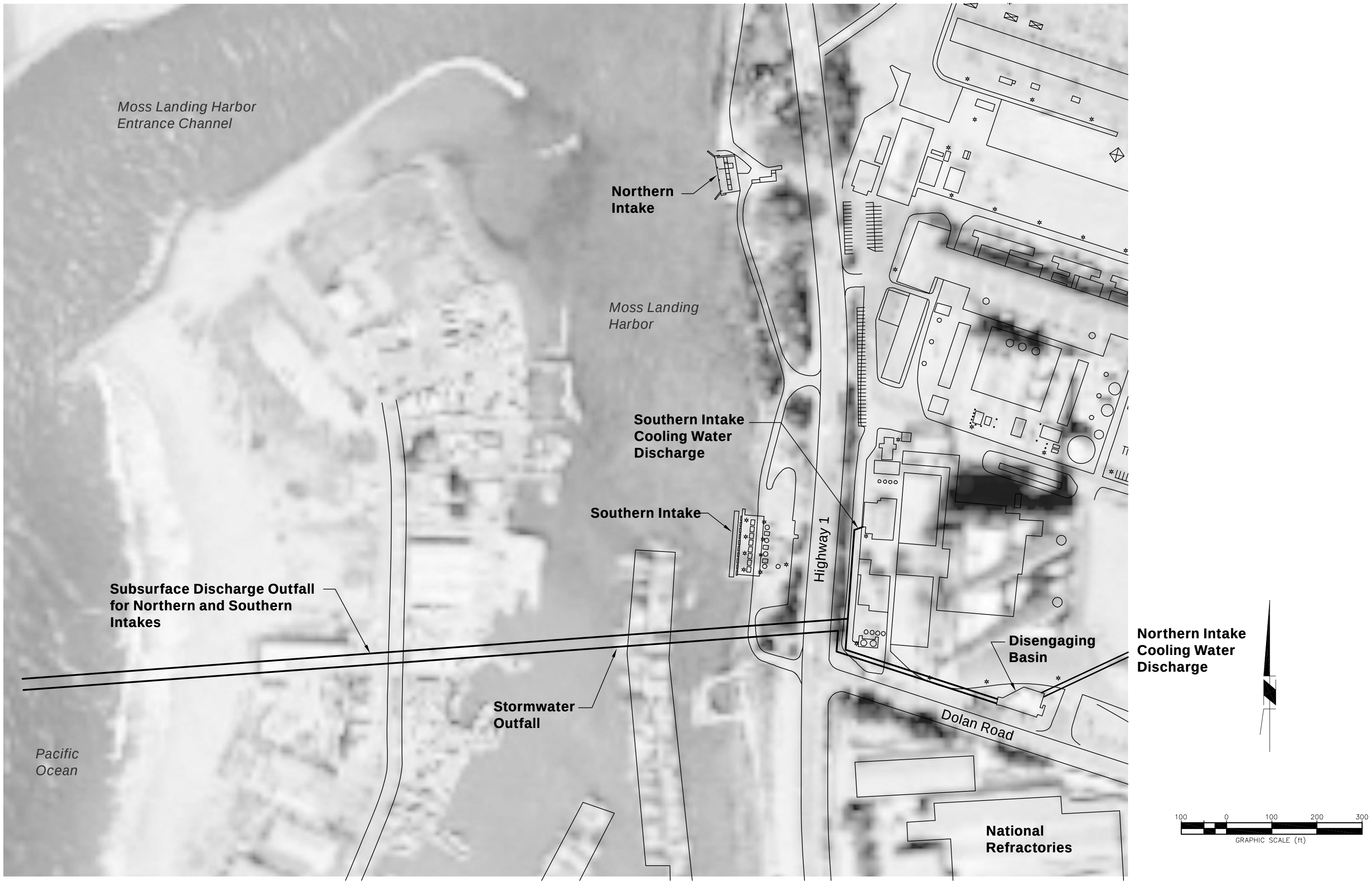
Figure 3-4f
Moss Landing Project Facilities



SOURCE: CalAm and RBF Consulting, 2005; RBF Consulting, 2007

CalAm Coastal Water Project . 205335

Figure 3-4g
Moss Landing Project Facilities



SOURCE: CalAm and RBF Consulting, 2005

CalAm Coastal Water Project . 205335

Figure 3-5
Moss Landing Power Plant
Existing Intakes and Outfalls

SOURCE: CalAm and RBF Consulting, 2005

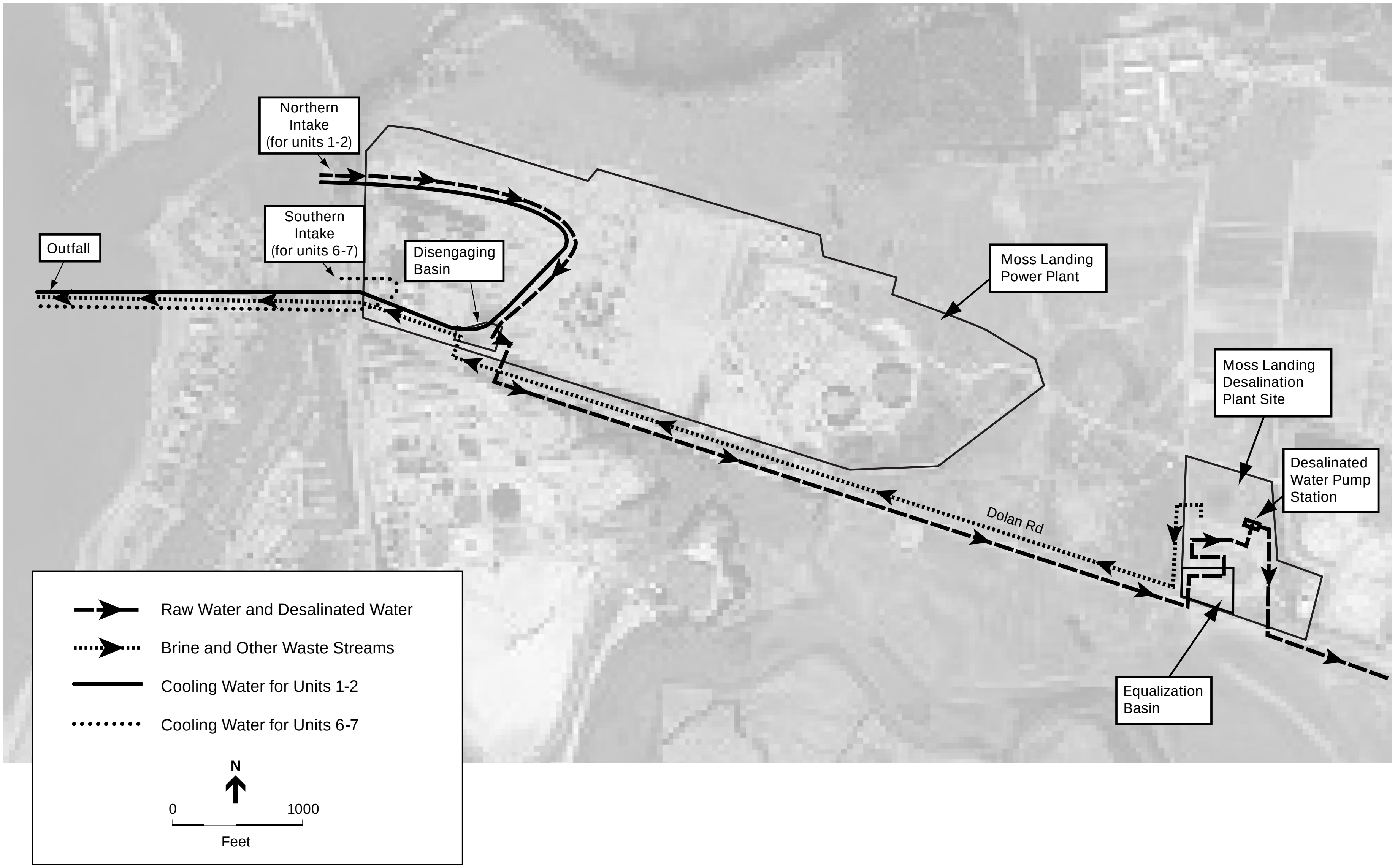
CalAm Coastal Water Project . 205335

Figure 3-6
Moss Landing Power Plant
Northern Intake in
Moss Landing Harbor

SOURCE: Kenneth and Gabrielle Adelman, 2002

CalAm Coastal Water Project . 205335

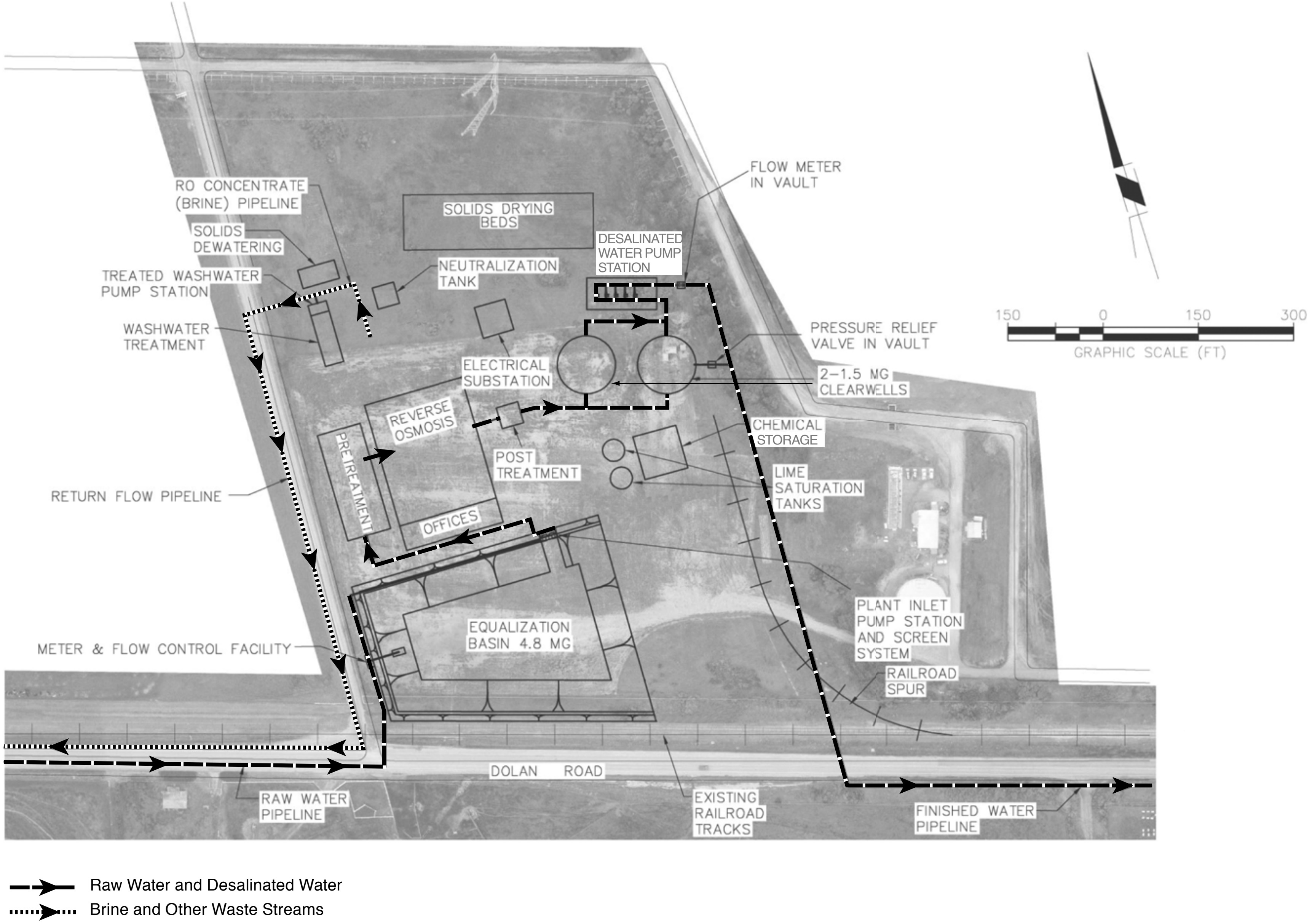
Figure 3-7
Moss Landing Power Plant and Location of Proposed Desalination Plant Facilities



SOURCE: ESA, 2008

CalAm Coastal Water Project . 205335

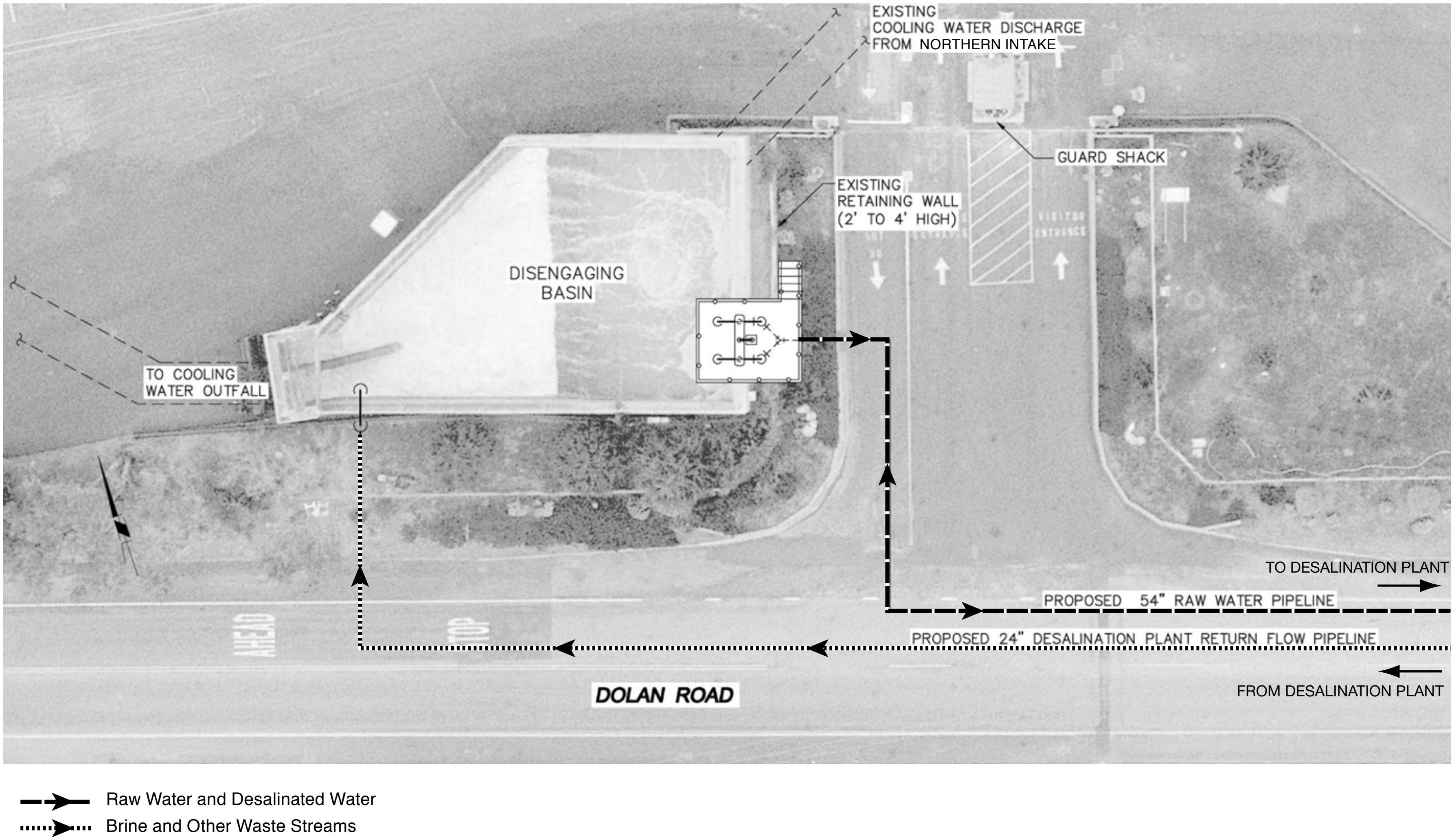
Figure 3-8
Moss Landing Power Plant and the Proposed
Moss Landing Desalination Plant, Intake and Outfall



SOURCE: CalAm and RBF Consulting, 2005

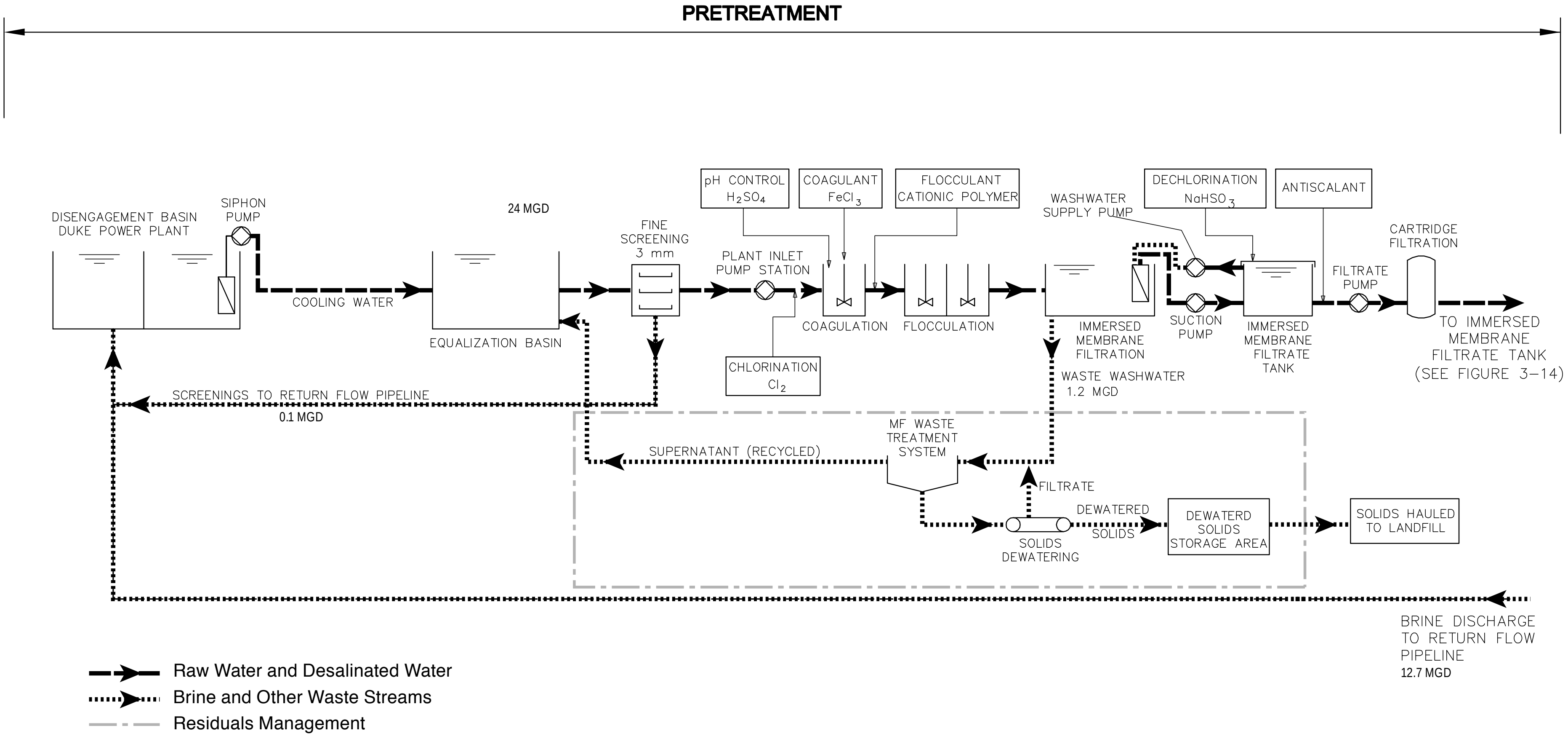
CalAm Coastal Water Project . 205335

Figure 3-9
Desalination Plant Layout
for Moss Landing Project



SOURCE: CalAm and RBF Consulting, 2005

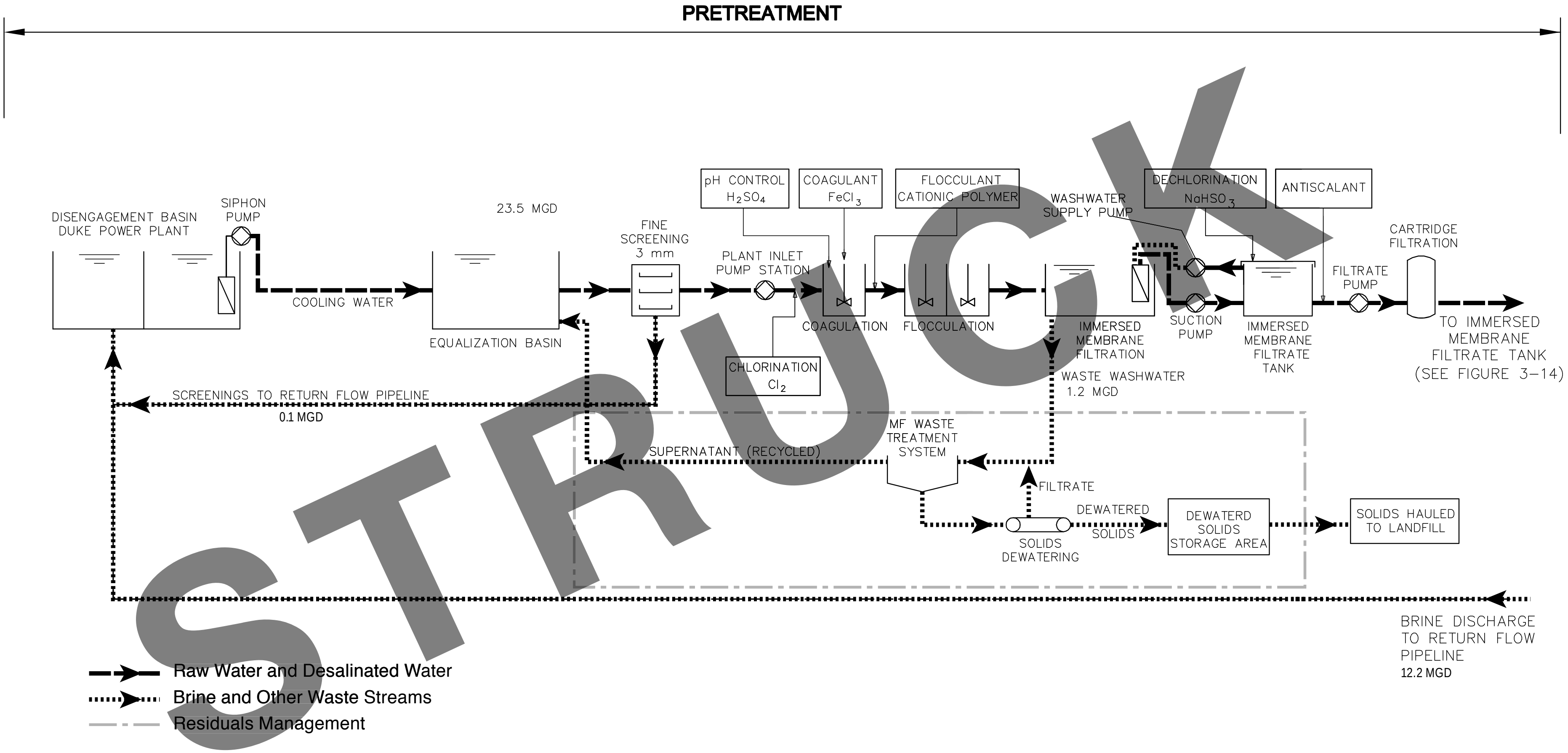
Figure 3-10
Proposed Raw Water and Return Flow Pipeline Facilities at the Existing Disengaging Basin at Moss Landing Power Plant



SOURCE: CalAm and RBF Consulting, 2005

CalAm Coastal Water Project . 205335

Revised Figure 3-11
Moss Landing Project
Desalination Facility
Pre-Treatment Process

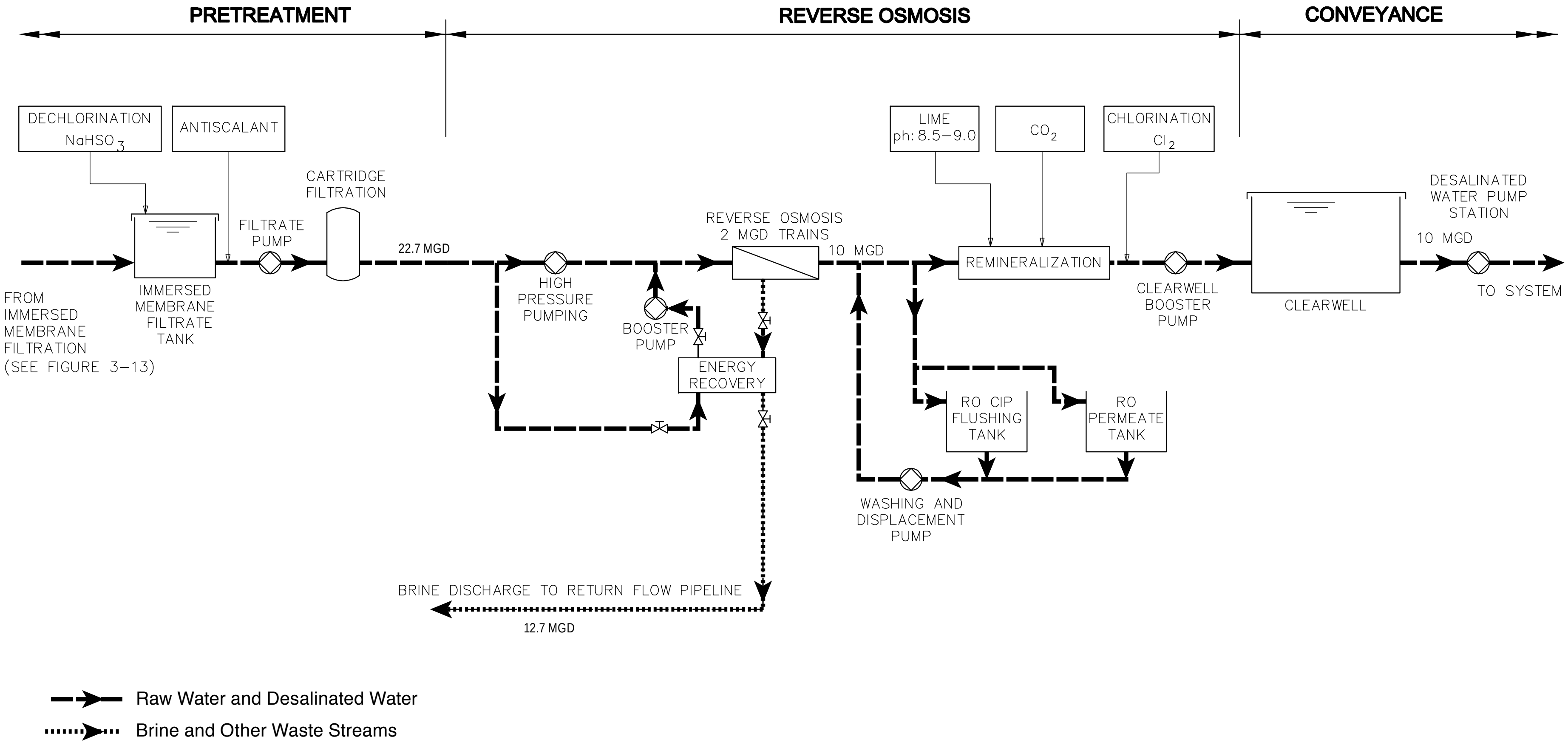


STRUCK

SOURCE: CalAm and RBF Consulting, 2005

CalAm Coastal Water Project . 205335

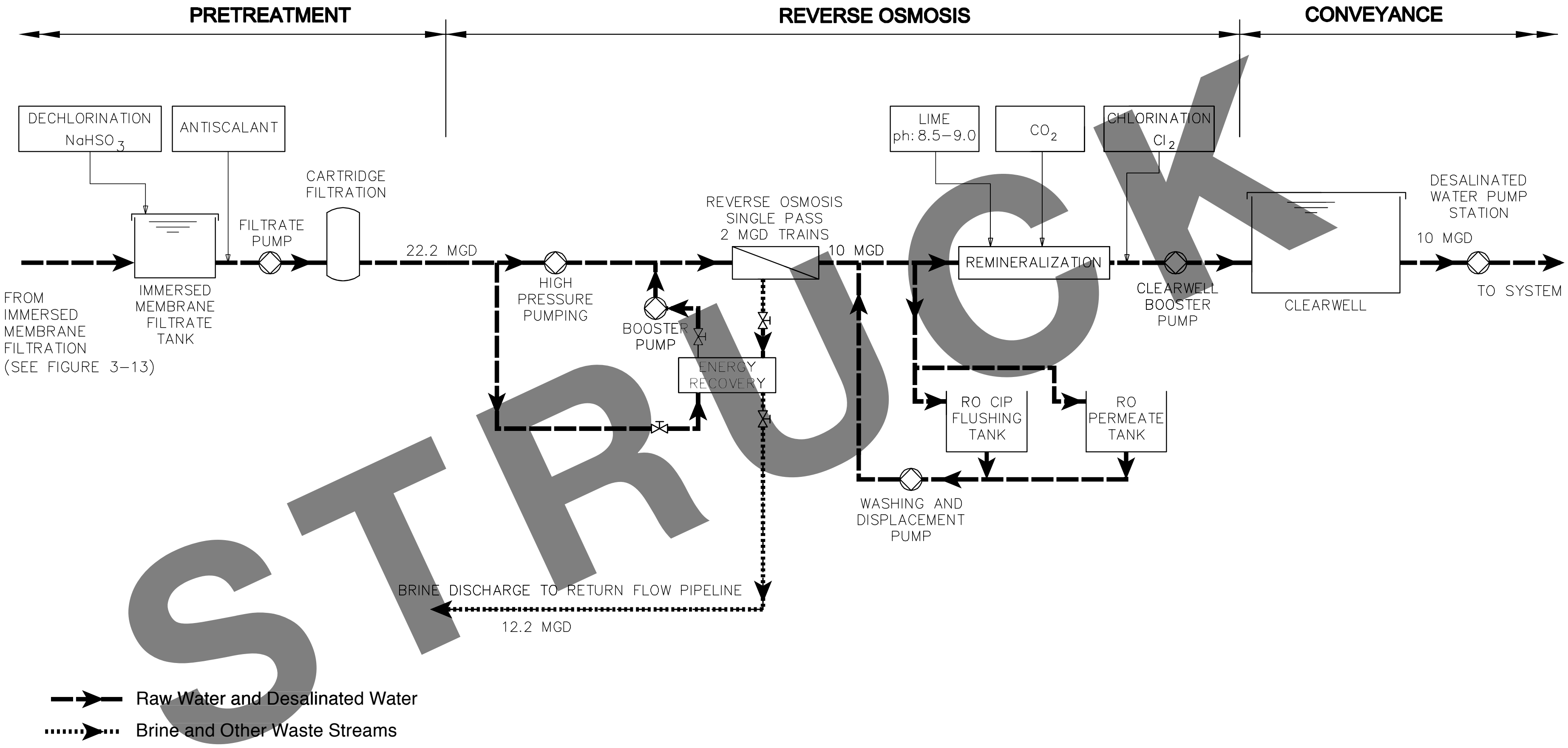
Figure 3-11
Moss Landing Project
Desalination Facility
Pre-Treatment Process



SOURCE: CalAm and RBF Consulting, 2005

CalAm Coastal Water Project . 205335

Revised Figure 3-12
Desalination Process

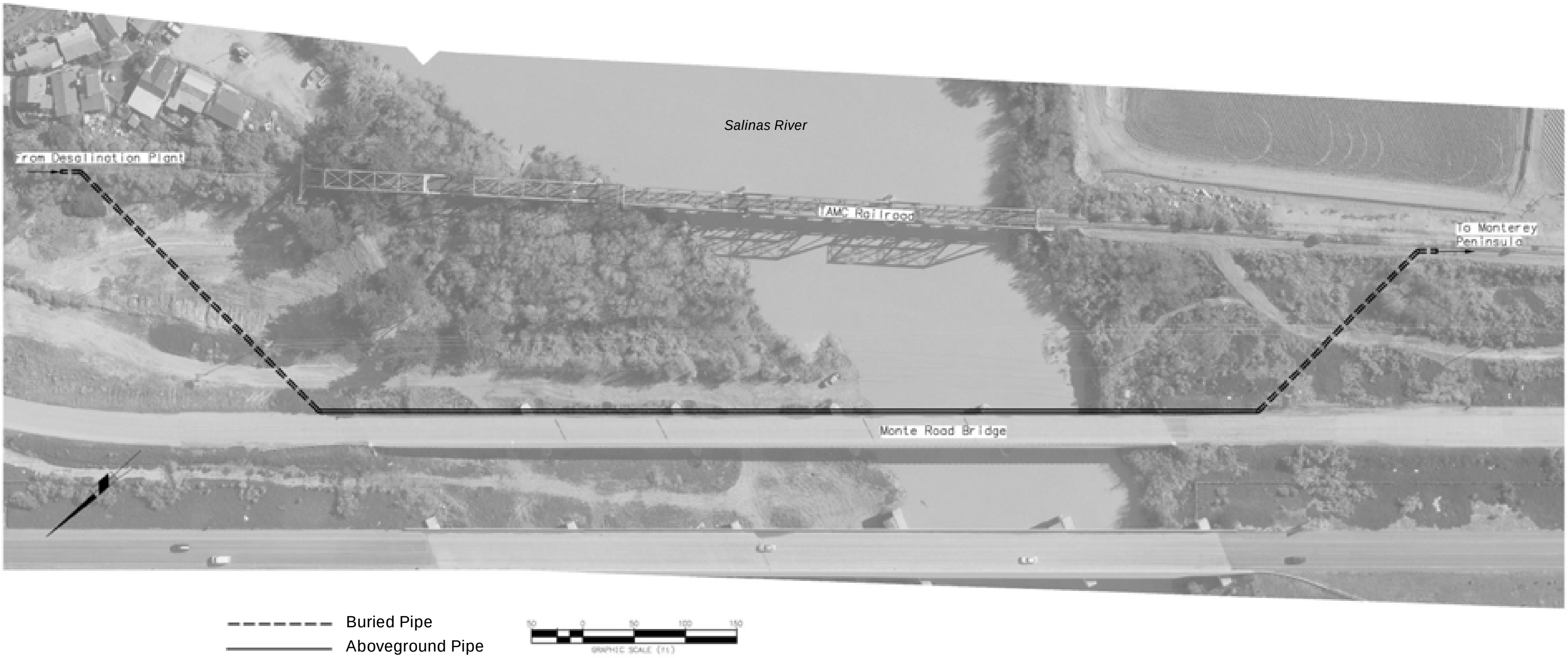


STRUCK

SOURCE: CalAm and RBF Consulting, 2005

CalAm Coastal Water Project . 205335

Figure 3-12
Desalination Process



SOURCE: CalAm and RBF Consulting, 2005

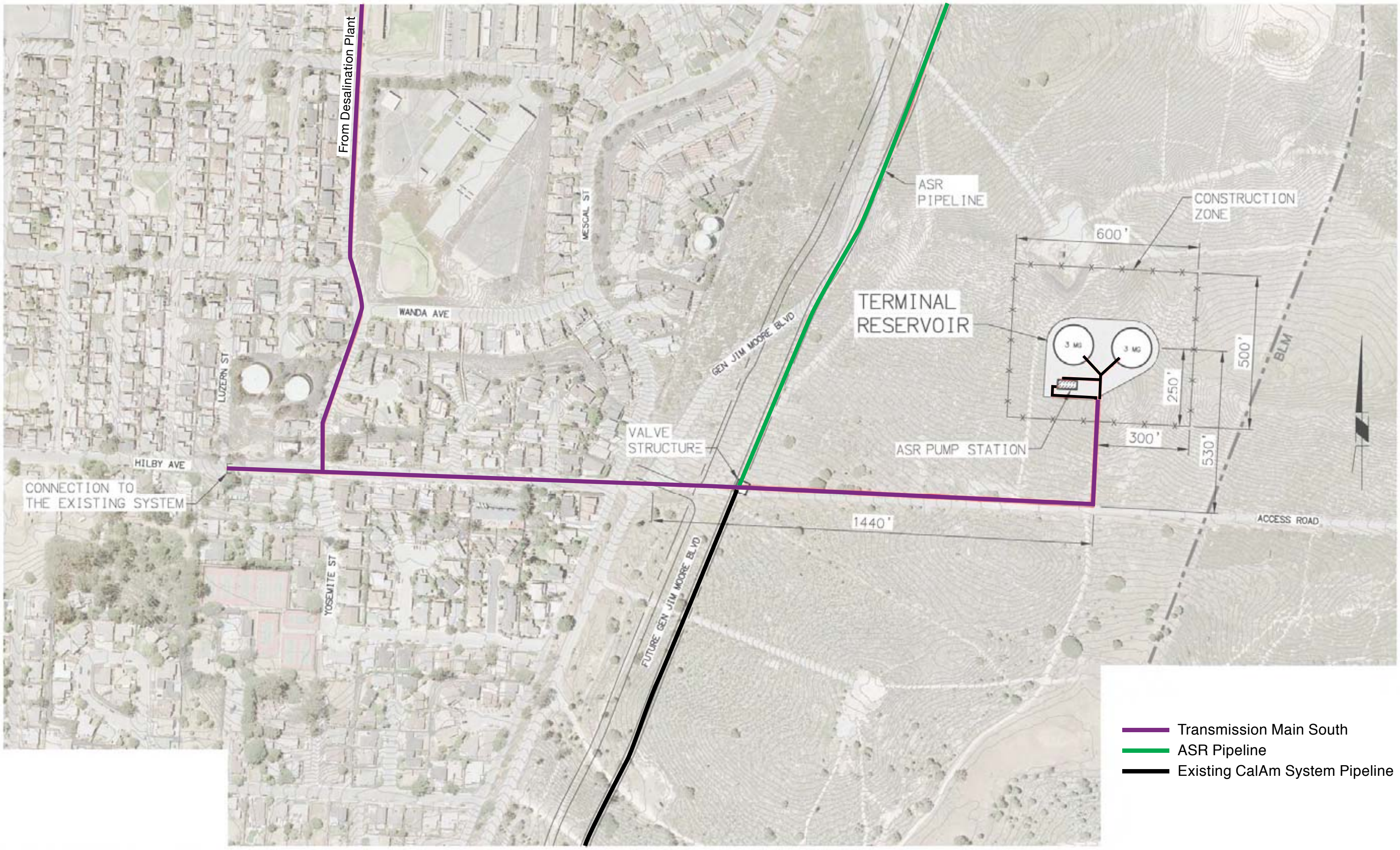
CalAm Coastal Water Project . 205335

Figure 3-13

Salinas River Crossing

SOURCE: CalAm and RBF Consulting, 2005

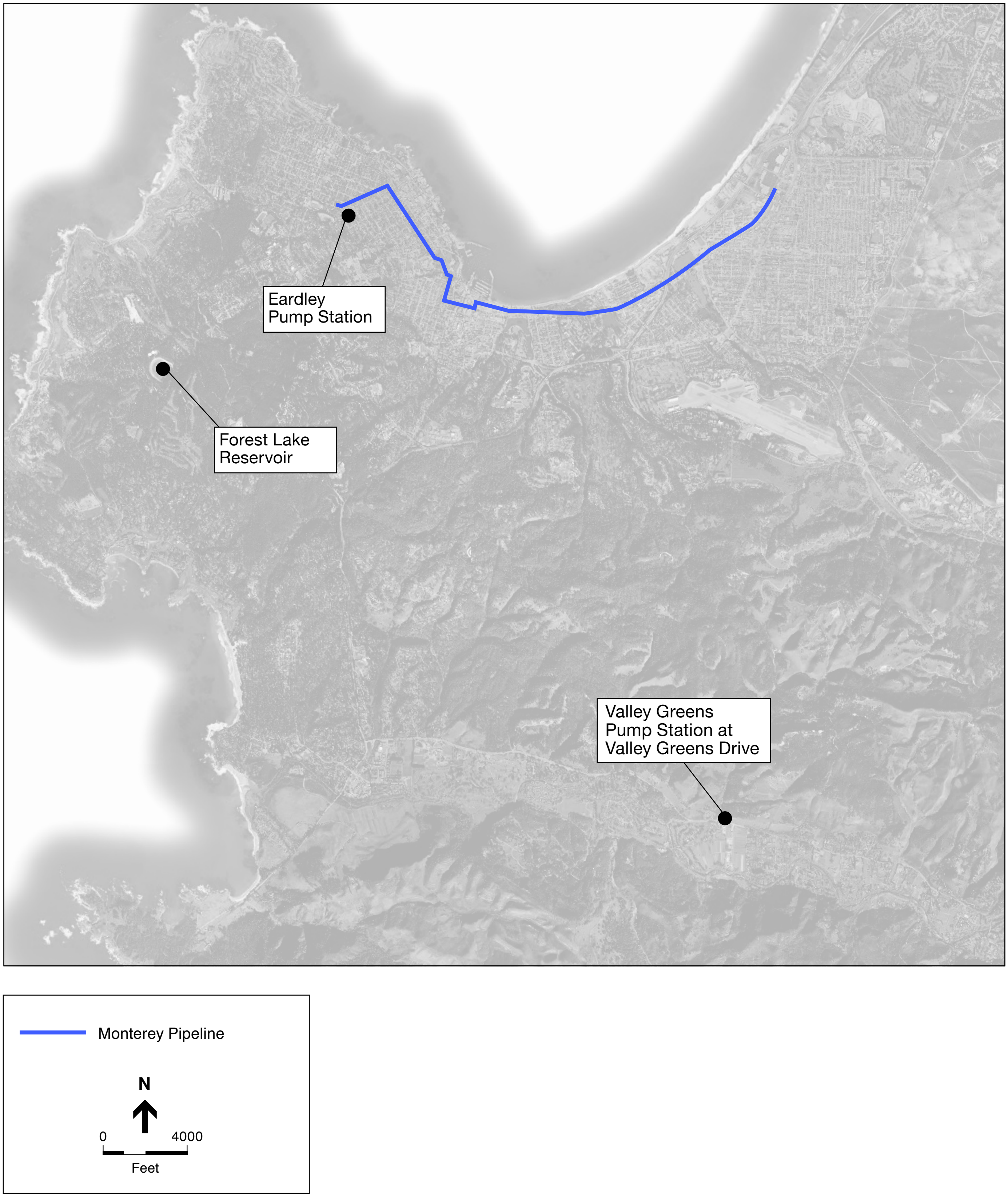
Figure 3-14
Moro Cojo Slough Crossing –
Trenchless Technology



SOURCE: CalAm and RBF Consulting, 2005

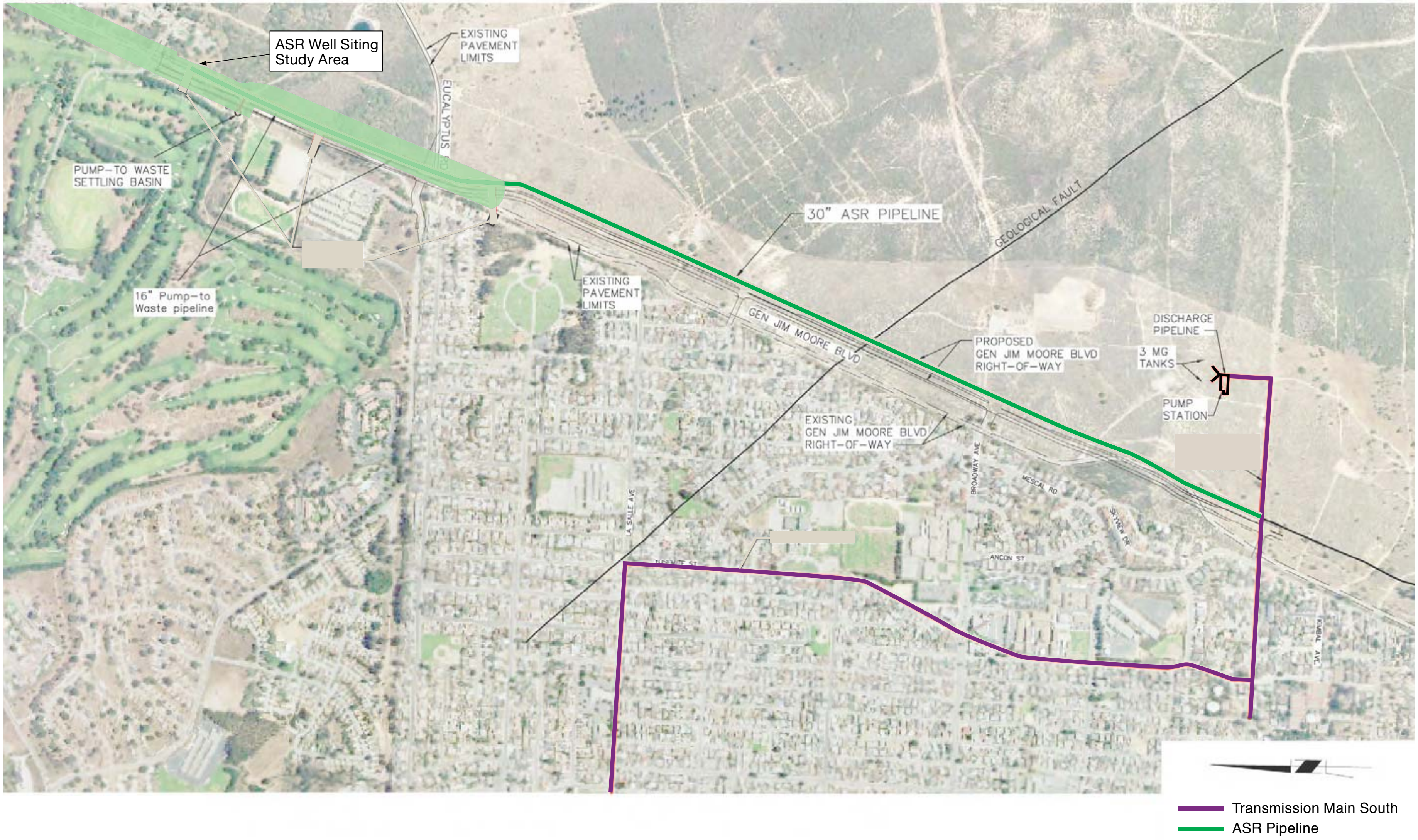
CalAm Coastal Water Project . 205335

Figure 3-15
Terminal Reservoir
and ASR Pump Station Location Map



SOURCE: ESA, 2008

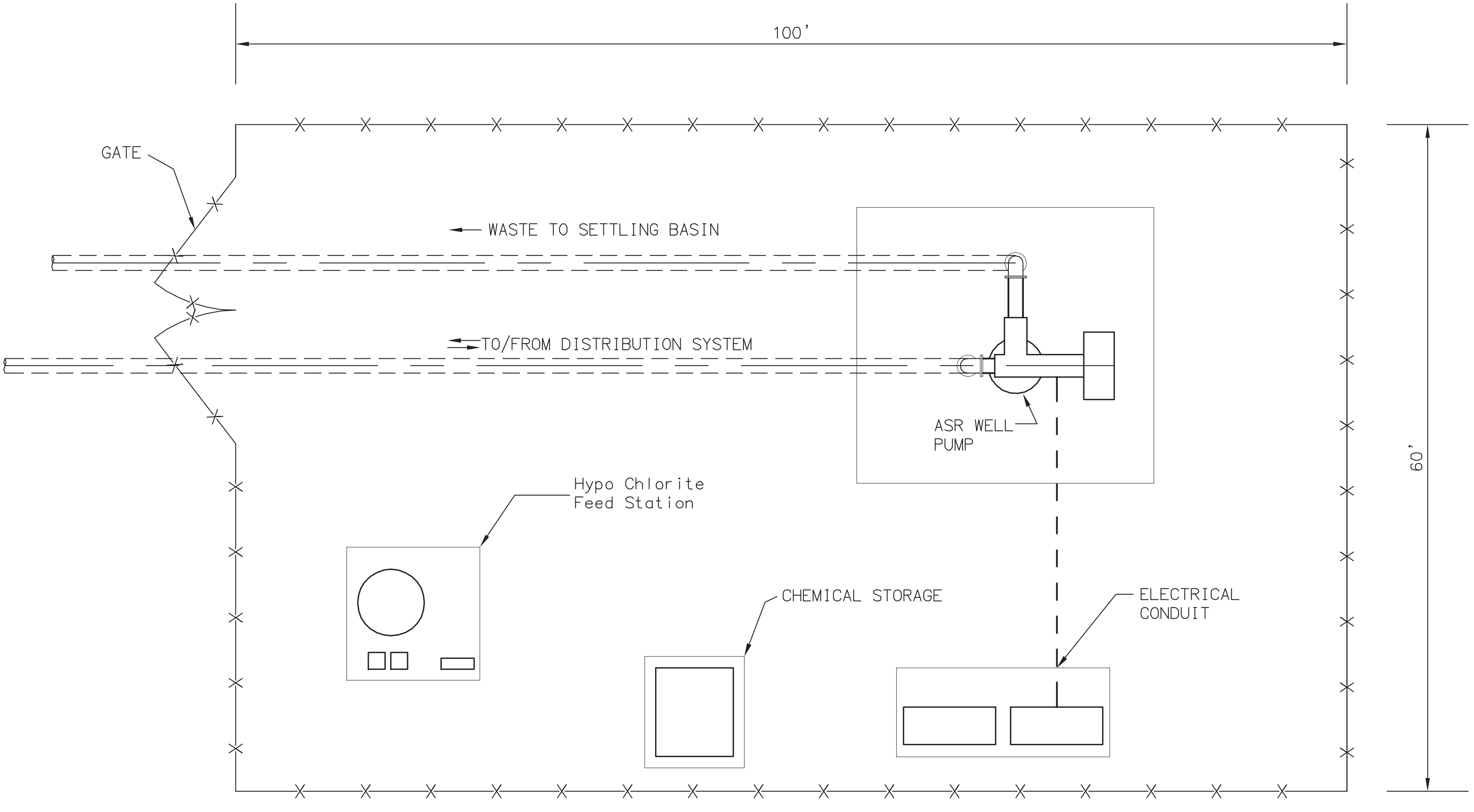
Figure 3-16
Pump Station and Storage Associated
with the Monterey Pipeline



SOURCE: CalAm and RBF Consulting, 2005

CalAm Coastal Water Project . 205335

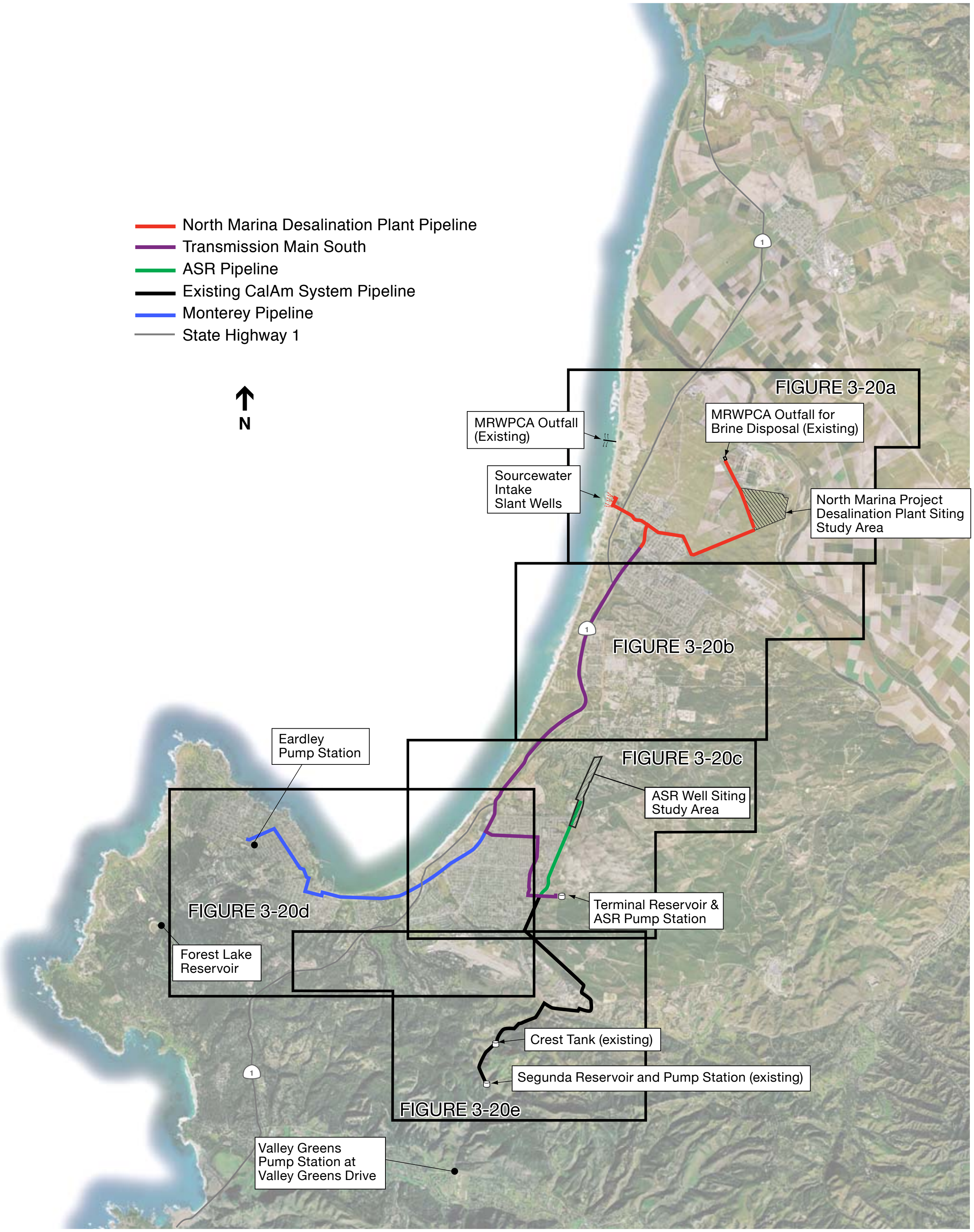
Figure 3-17
Pipeline Alignment from ASR to Terminal Reservoir



SOURCE: CalAm and RBF Consulting, 2005

CalAm Coastal Water Project . 205335

Figure 3-18
ASR Typical Site Layout



SOURCE: CalAm and RBF Consulting, 2005

CalAm Coastal Water Project . 205335

Figure 3-19
North Marina Project Facilities
Index Map

SOURCE: CalAm and RBF Consulting, 2005

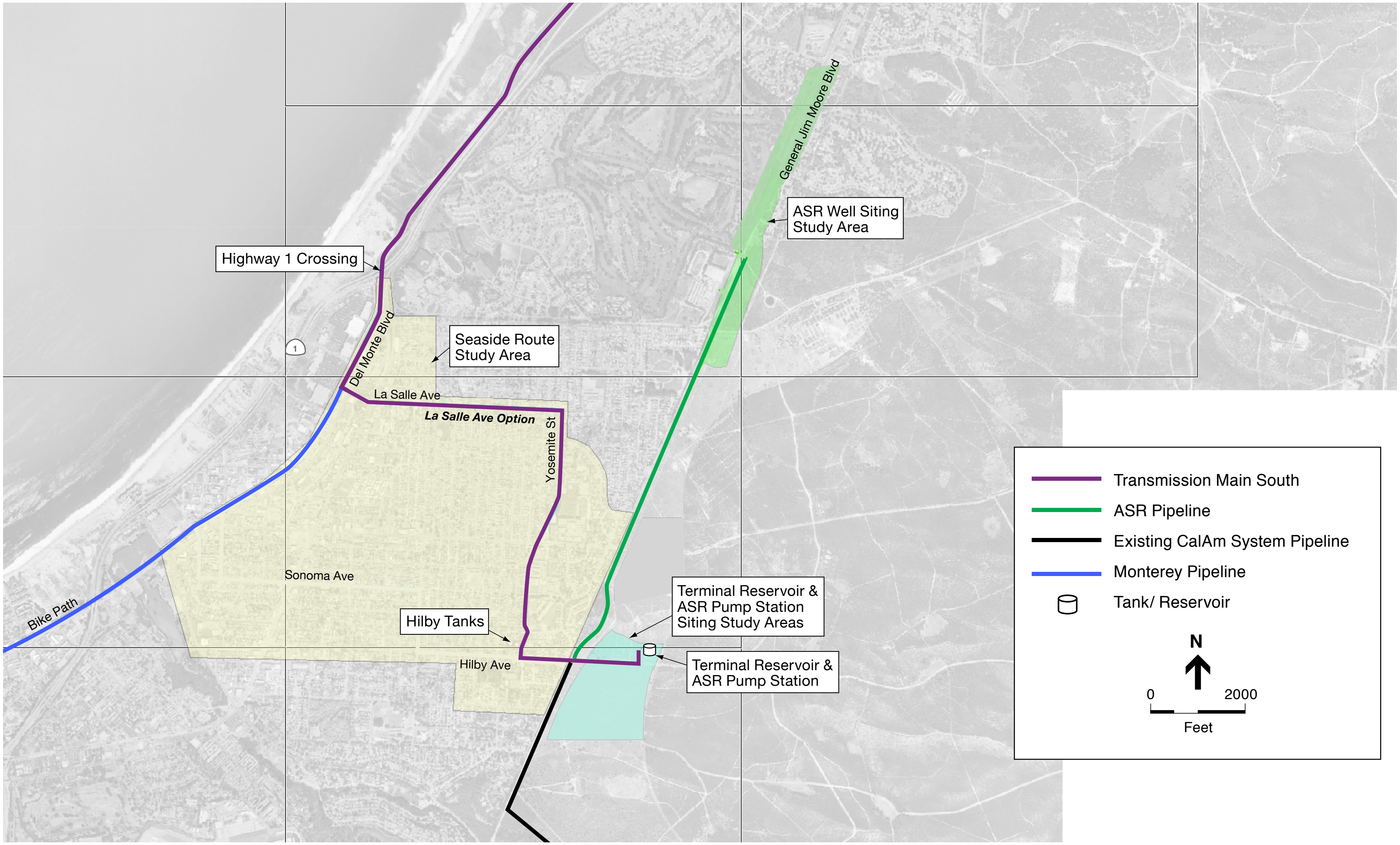
CalAm Coastal Water Project . 205335

Figure 3-20a
North Marina Project Facilities

SOURCE: CalAm and RBF Consulting, 2005

CalAm Coastal Water Project . 205335

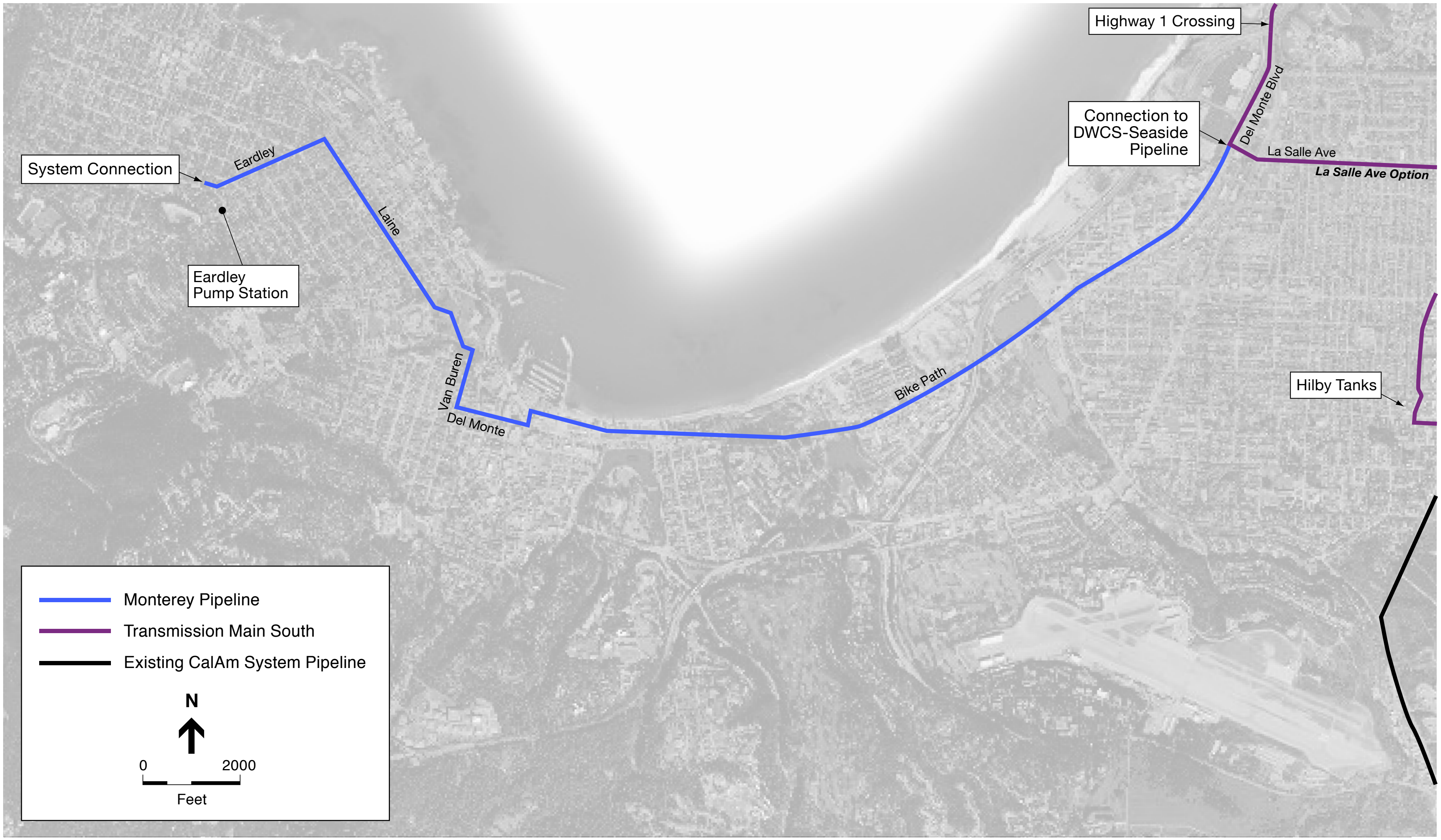
Figure 3-20b
North Marina Project Facilities



SOURCE: CalAm and RBF Consulting, 2005; RBF Consulting, 2007

CalAm Coastal Water Project . 205335

Figure 3-20c
North Marina Project Facilities

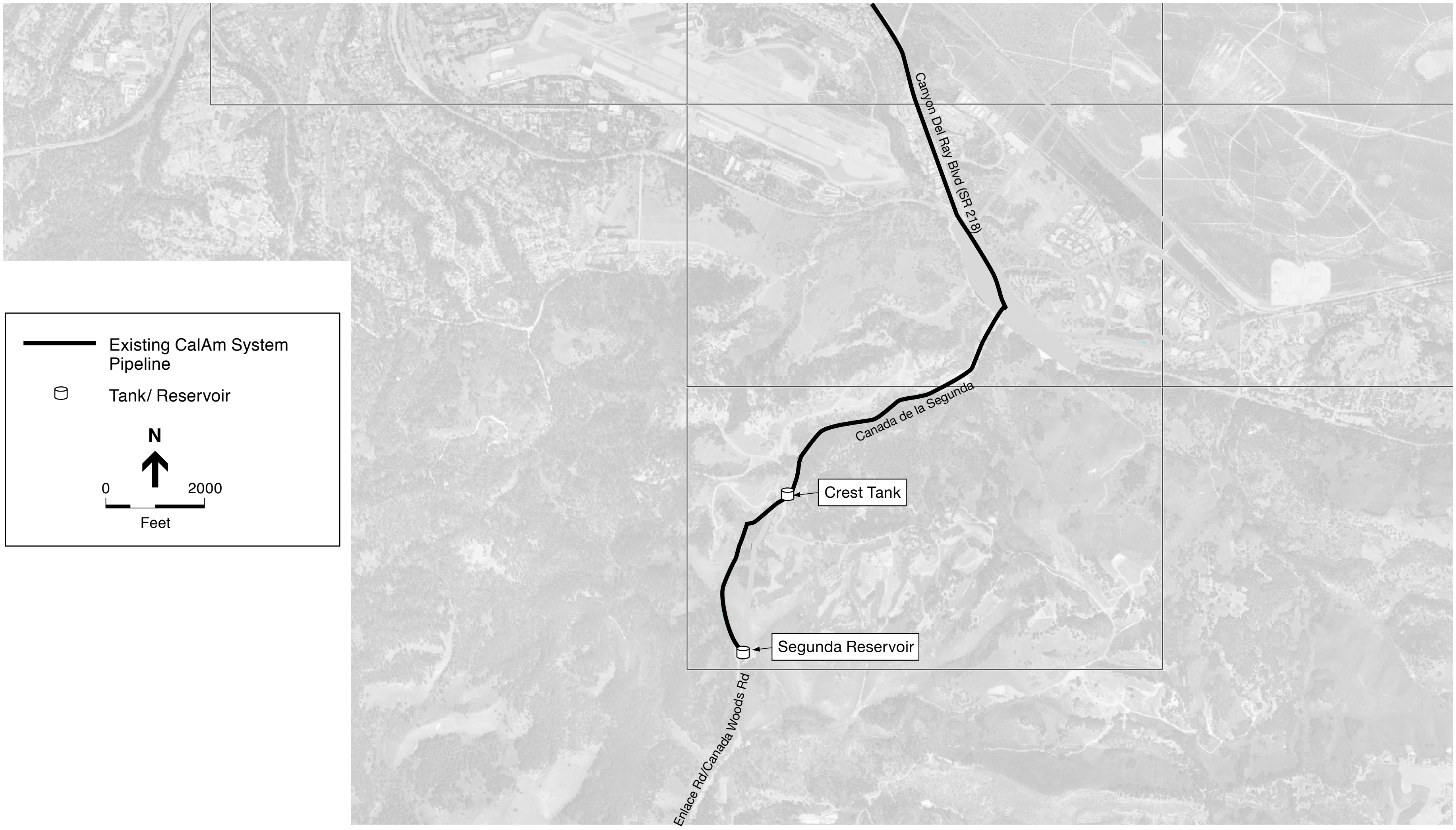


SOURCE: CalAm and RBF Consulting, 2005; RBF Consulting, 2007

CalAm Coastal Water Project . 205335

Figure 3-20d

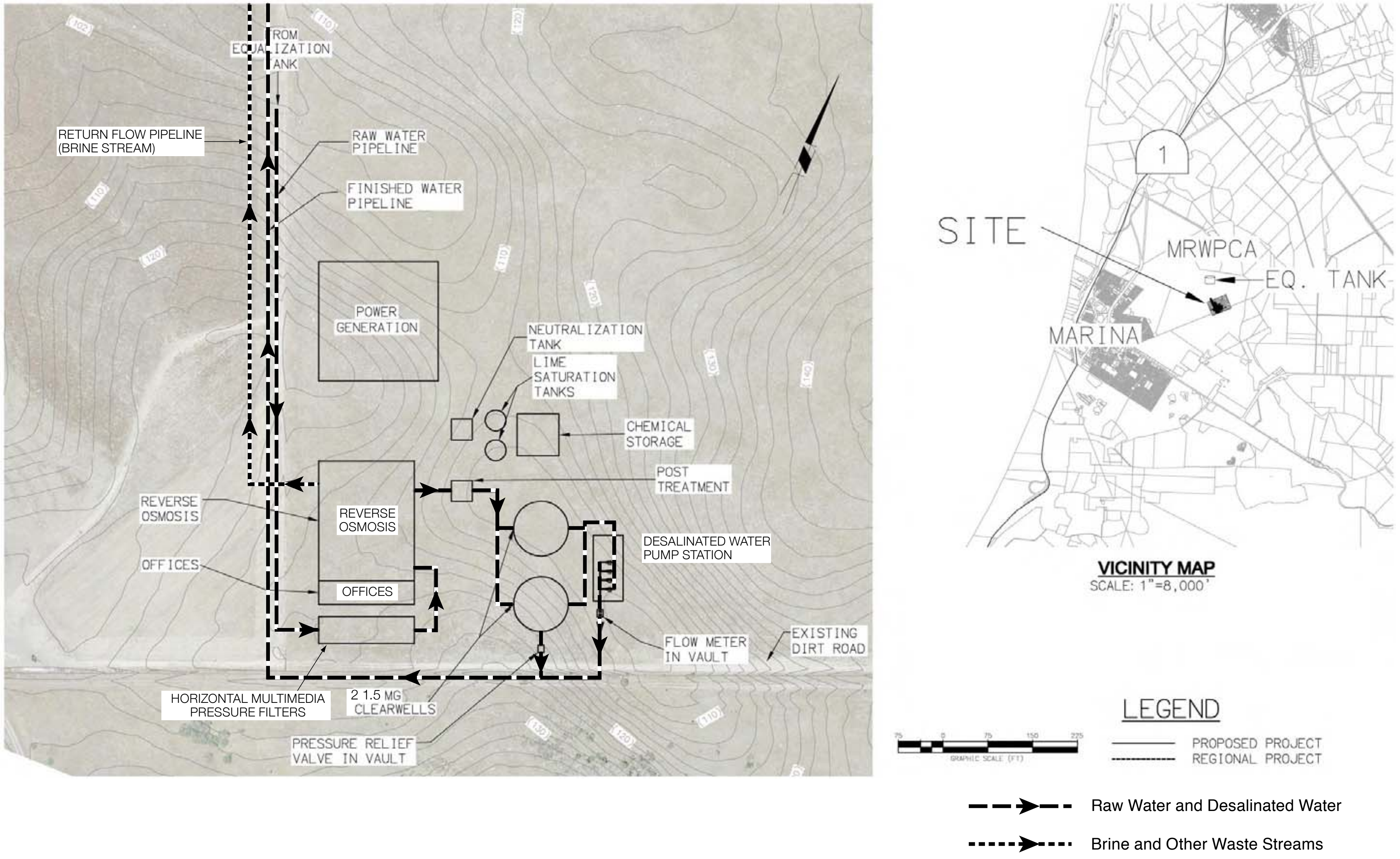
North Marina Project Facilities



Note: The proposed Valley Greens Pump Station
which would be located near the intersection of
Carmel Valley Road and Valley Greens Drive,
is located approximately 1.5 miles south of
Sequnda Reservoir and is not shown in these figures.

SOURCE: CalAm and RBF Consulting, 2005

Figure 3-20e
North Marina Project Facilities

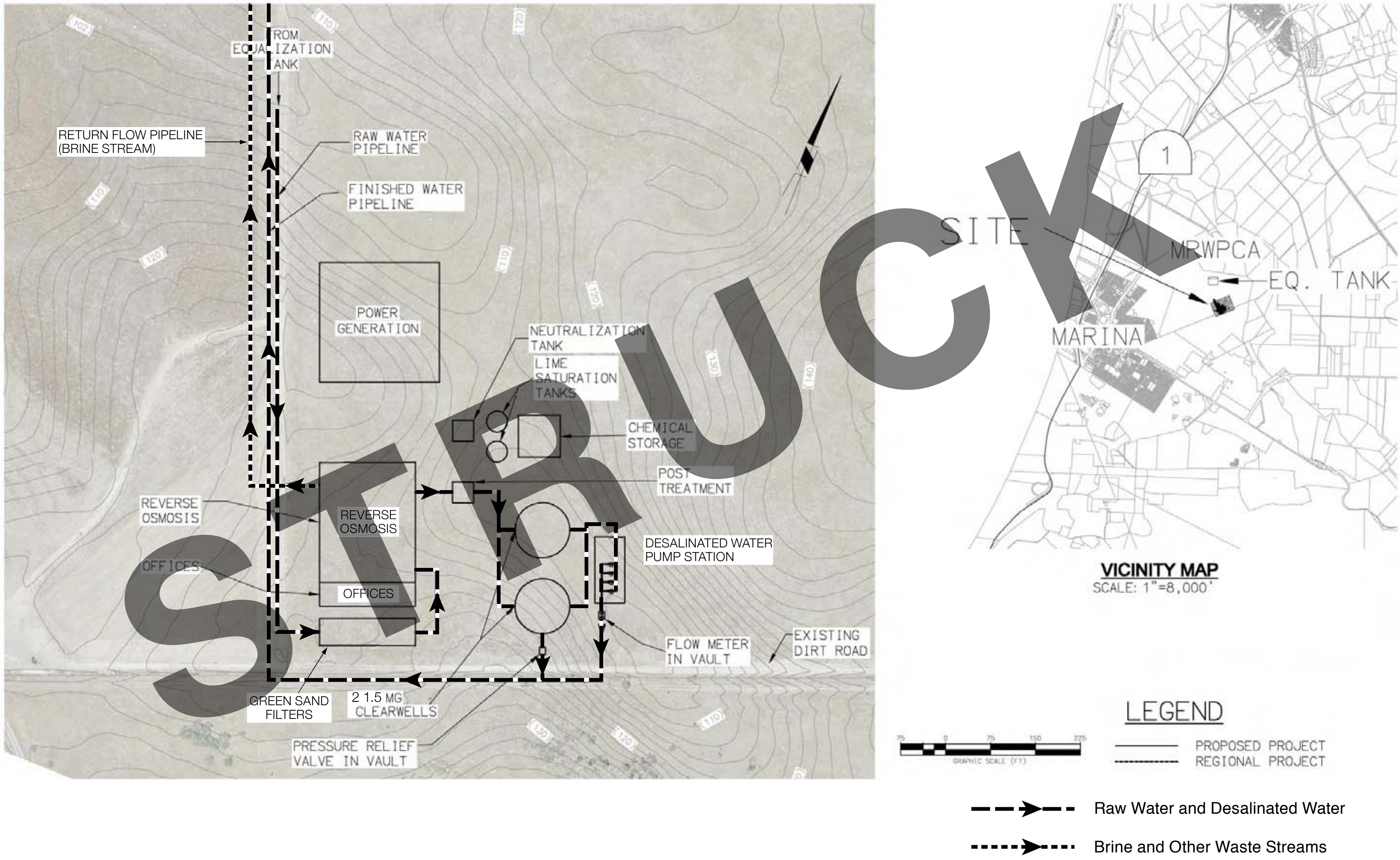


SOURCE: ESA, 2009

CalAm Coastal Water Project . 205335

Revised Figure 3-21

North Marina Desalination Plant Layout



STRUCK

SOURCE: ESA, 2008

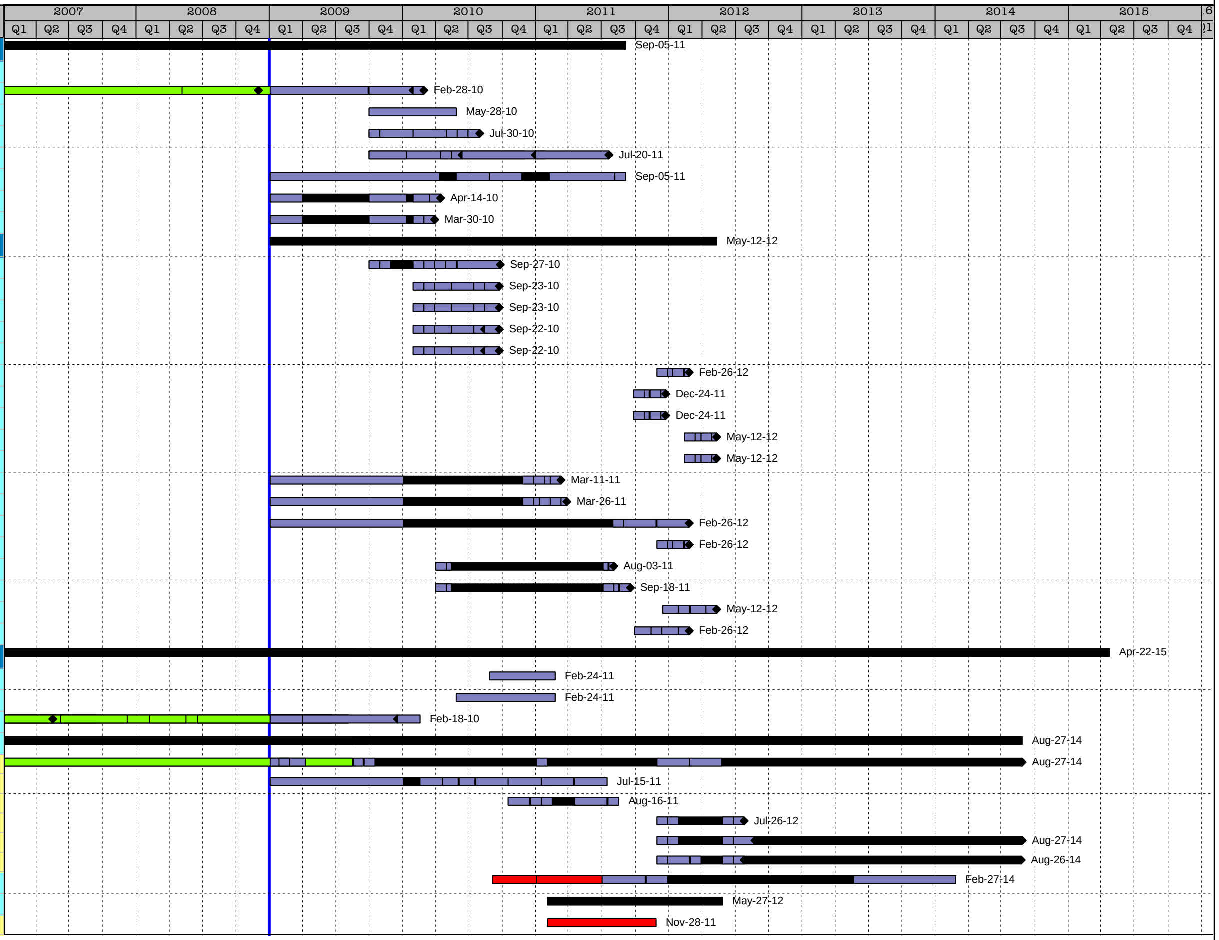
CalAm Coastal Water Project . 205335

Figure 3-21

North Marina Desalination Plant Layout

Coastal Water Project

Activity ID	Activity Name	Original Duration	Start	Finish
	Programmatic Permits	2696	Apr-01-04 A	Sep-05-11
	CPUC - Proponents Environmental Assessment	1055	Apr-01-04 A	Jul-06-05 A
	CPUC - Environmental Impact Report (CEQA)	1087	Jun-01-06 A	Feb-28-10
	CPUC - Certificate of Public Convenience and Ne...	240	Oct-01-09	May-28-10
	USACE Wetlands Delineation (Includes NEPA Co...	304	Sep-30-09	Jul-30-10
	USACE 404 / Section 10 Permit (Includes NEPA C...	659	Sep-30-09	Jul-20-11
	CCC Coastal Development Permit	966	Jan-02-09 A	Sep-05-11
	RWQCB - 401 Certification	457	Jan-02-09	Apr-14-10
	CDFG 1602 Certification	442	Jan-02-09	Mar-30-10
	Facility Permits	1216	Jan-02-09	May-12-12
	Monterey County Coastal Development Permit	362	Oct-01-09	Sep-27-10
	City of Sand City Coastal Development Permit	237	Jan-30-10	Sep-23-10
	City of Seaside Coastal Development Permit	237	Jan-30-10	Sep-23-10
	City of Pacific Grove Coastal Development Permit	236	Jan-30-10	Sep-22-10
	City of Monterey Coastal Development Permit	236	Jan-30-10	Sep-22-10
	Monterey County Encroachment Permit	90	Nov-29-11	Feb-26-12
	City of Sand City Encroachment Permit	90	Sep-26-11	Dec-24-11
	City of Seaside Encroachment Permit	90	Sep-26-11	Dec-24-11
	City of Monterey Encroachment Permit	90	Feb-13-12	May-12-12
	City of Pacific Grove Encroachment Permit	90	Feb-13-12	May-12-12
	CALTRANS Encroachment Permit	788	Jan-02-09	Mar-11-11
	TAMC Utility Encroachment Permit	803	Jan-02-09	Mar-26-11
	US Army Right-of-Entry	1140	Jan-02-09	Feb-26-12
	Monterey County Erosion Control Permit	90	Nov-29-11	Feb-26-12
	City of Seaside Land Use Permit	490	Apr-01-10	Aug-03-11
	City of Seaside Ordnance Remediation Permit	536	Apr-01-10	Sep-18-11
	MPWMD Water System Distribution Permit Amdmt.	150	Dec-15-11	May-12-12
	Seaside Groundwater Basin Watermaster Injecti...	150	Sep-30-11	Feb-26-12
	Desalination Plant	4021	Apr-01-04 A	Apr-22-15
	Utility Service Agreements	181	Aug-28-10	Feb-24-11
	ROW / Land Acquisition	272	May-29-10	Feb-24-11
	Demonstration - Pilot Program	2132	Apr-01-04 A	Feb-18-10
	Facility Permits	2789	Dec-19-06 A	Aug-27-14
	CDHS Domestic Water Supply Permit	2789	Dec-19-06 A	Aug-27-14
	RWQCB Waste Discharge Requirements	914	Jan-02-09	Jul-15-11
	NPDES Permit	303	Oct-18-10	Aug-16-11
	Monterey County Building Permit	240	Nov-30-11	Jul-26-12
	MBUAPC - Permit to Construct and Operate	1002	Nov-29-11	Aug-27-14
	Monterey County Envir Health Permit to Construct	1001	Nov-29-11	Aug-26-14
	Material / Equipment Procurement	1272	Sep-04-10	Feb-27-14
	D/B Construction Contract Procurement	481	Feb-02-11	May-27-12
	D/B Basis of Design	300	Feb-02-11	Nov-28-11



🟩 Actual Work
▭ Remaining Work
🟥 Critical Remaining Work
◆ ◆ Milestone
■ Summary

Note: The original duration period for each activity is based on the best professional judgment of the employees of California American Water and its consultants assisting with development of the Coastal Water Project. Because completion of activities is dependent upon action by staff of and receipt of approvals from federal, state and local agencies, the duration period for each activity is subject to change due to factors outside the control of California American Water.

SOURCE: RBF Consulting, 2009

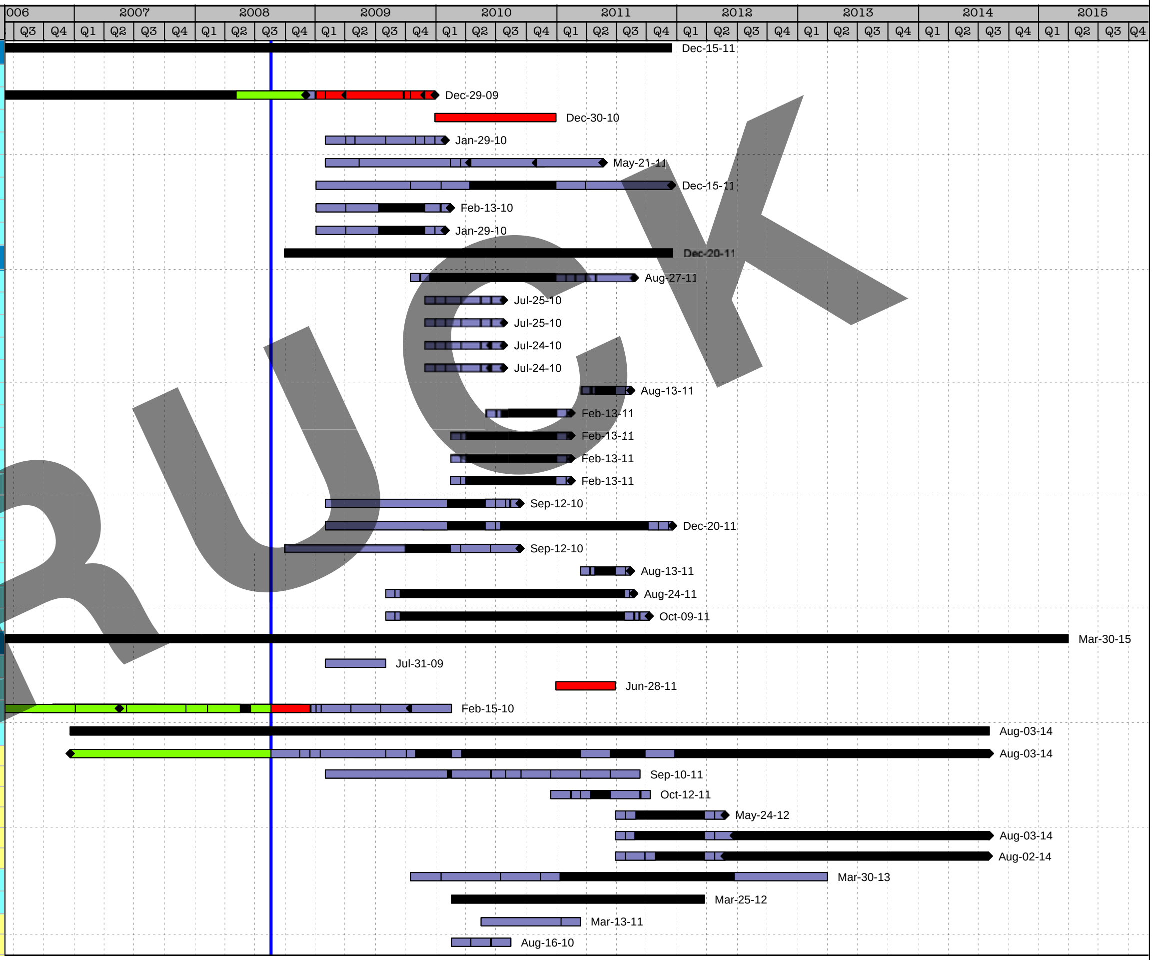
CalAm Coastal Water Project . 205335

Revised Figure 3-22a

Possible Moss Landing Permitting and Construction Schedule

Coastal Water Project

Activity ID	Activity Name	Original Duration	Start	Finish
	Programmatic Permits	2011	Apr-01-04 A	Dec-15-11
	CPUC - Proponents Environmental Assessment	753	Apr-01-04 A	Jul-06-05 A
	CPUC - Environmental Impact Report (CEQA)	746	Jun-01-06 A	Dec-29-09
	CPUC - Certificate of Public Convenience and Necessity	262	Dec-30-09	Dec-30-10
	USACE Wetlands Delineation (Includes NEPA Complia...	260	Jan-31-09	Jan-29-10
	USACE 404 / Section 10 Permit (Includes NEPA Compli...	600	Jan-31-09	May-21-11
	CCC Coastal Development Permit	770	Jan-02-09	Dec-15-11
	RWQCB - 401 Certification	291	Jan-02-09	Feb-13-10
	CDFG 1602 Certification	281	Jan-02-09	Jan-29-10
	Facility Permits	842	Sep-27-08	Dec-20-11
	Monterey County Coastal Development Permit	487	Oct-15-09	Aug-27-11
	City of Marina Coastal Development Permit	170	Nov-29-09	Jul-25-10
	City of Seaside Coastal Development Permit	170	Nov-29-09	Jul-25-10
	City of Pacific Grove Coastal Development Permit	170	Nov-29-09	Jul-24-10
	City of Monterey Coastal Development Permit	170	Nov-29-09	Jul-24-10
	Monterey County Encroachment Permit	110	Mar-14-11	Aug-13-11
	City of Marina Encroachment Permit	185	May-30-10	Feb-13-11
	City of Seaside Encroachment Permit	260	Feb-14-10	Feb-13-11
	City of Monterey Encroachment Permit	260	Feb-14-10	Feb-13-11
	City of Pacific Grove Encroachment Permit	260	Feb-14-10	Feb-13-11
	CALTRANS Encroachment Permit	420	Feb-01-09	Sep-12-10
	TAMC Utility Encroachment Permit	752	Feb-01-09	Dec-20-11
	US Army Right-of-Entry	510	Sep-27-08	Sep-12-10
	Monterey County Erosion Control Permit	110	Mar-14-11	Aug-13-11
	City of Seaside Land Use Permit	538	Aug-01-09	Aug-24-11
	City of Seaside Ordnance Remediation Permit	570	Aug-01-09	Oct-09-11
	Desalination Plant	2868	Apr-01-04 A	Mar-30-15
	Utility Service Agreements	130	Feb-01-09	Jul-31-09
	ROW / Land Acquisition	128	Dec-30-10	Jun-28-11
	Demonstration - Pilot Program	1533	Apr-01-04 A	Feb-15-10
	Facility Permits	1988	Dec-19-06 A	Aug-03-14
	CDHS Domestic Water Supply Permit	1988	Dec-19-06 A	Aug-03-14
	RWQCB Waste Discharge Requirements	680	Feb-01-09	Sep-10-11
	NPDES Permit	217	Dec-14-10	Oct-12-11
	Monterey County Building Permit	236	Jun-29-11	May-24-12
	MBUAPC - Permit to Construct and Operate	808	Jun-28-11	Aug-03-14
	Monterey County Envir Health Permit to Construct	808	Jun-28-11	Aug-02-14
	Material / Equipment Procurement	901	Oct-16-09	Mar-30-13
	D/B Construction Contract Procurement	549	Feb-16-10	Mar-25-12
	D/B Basis of Design	215	May-16-10	Mar-13-11
	D/B Construction RFQ	130	Feb-16-10	Aug-16-10



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- 🟩 Actual Work
- ▬ Remaining Work
- 🟥 Critical Remaining Work
- ◆ ◆ Milestone
- ■ Summary

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SOURCE: RBF Consulting, 2008

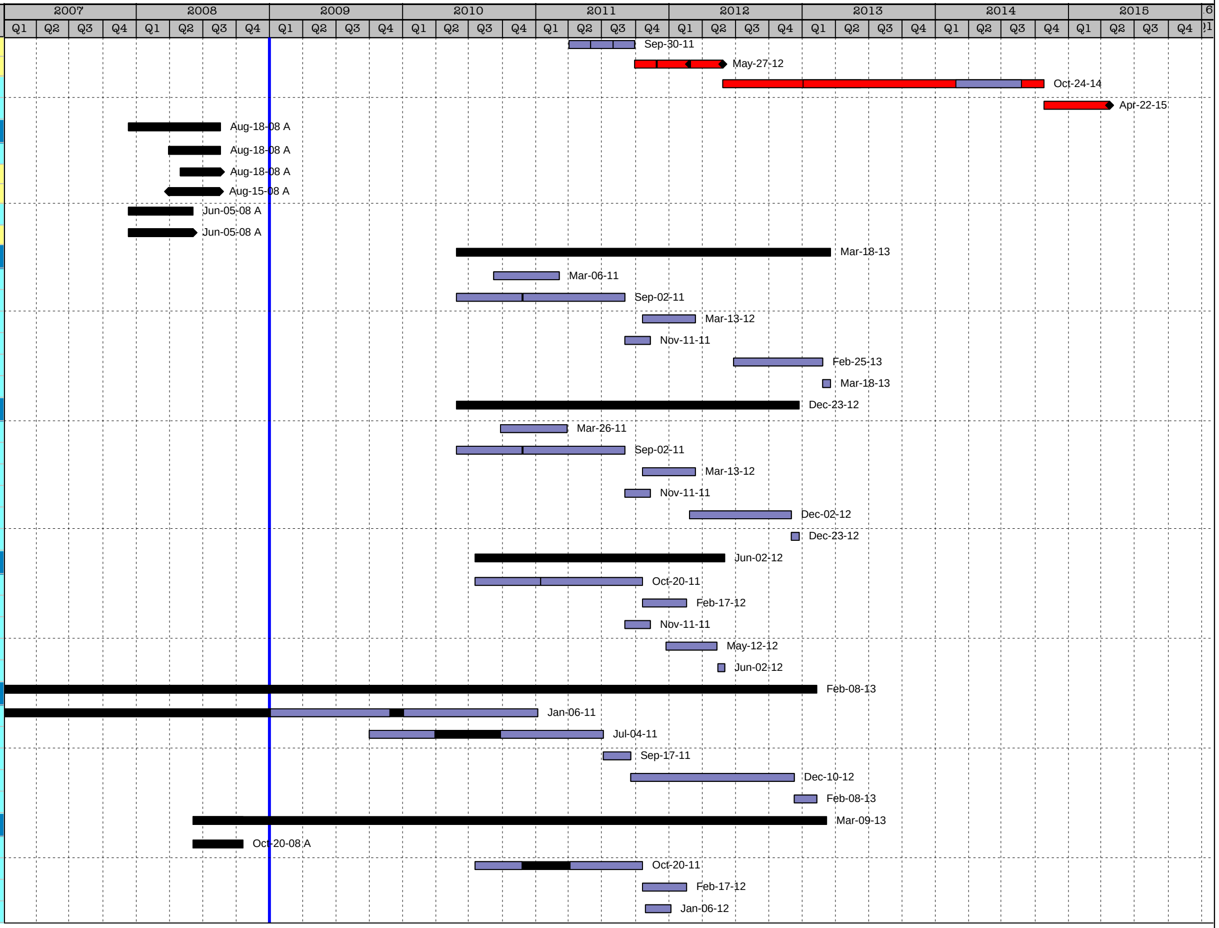
CalAm Coastal Water Project . 205335

Figure 3-22a

Possible Moss Landing Permitting and Construction Schedule

Coastal Water Project

Activity ID	Activity Name	Original Duration	Start	Finish
	D/B Construction RFQ	181	Apr-02-11	Sep-30-11
	D/B Construction RFP	241	Sep-30-11	May-27-12
	Design/ Construction / Installation	880	May-28-12	Oct-24-14
	Start-Up	180	Oct-25-14	Apr-22-15
	North Marina Desalination Plant Investigation	292	Dec-10-07 A	Aug-18-08 A
	CPUC EIR Reporting	143	Mar-28-08 A	Aug-18-08 A
	EIR DR 2.4 Update North Marina Subsurface Intakes Project ...	110	May-01-08 A	Aug-18-08 A
	EIR DR 2.6 Brine Discharge Modeling	140	Mar-28-08 A	Aug-15-08 A
	Hydrogeological Investigation	218	Dec-10-07 A	Jun-05-08 A
	Groundwater Modeling	218	Dec-10-07 A	Jun-05-08 A
	DWCS Pipeline North	1025	May-29-10	Mar-18-13
	ROW / Land Acquisition	181	Sep-07-10	Mar-06-11
	Design	462	May-29-10	Sep-02-11
	Material / Equipment Procurement	145	Oct-21-11	Mar-13-12
	Construction Contract Procurement	70	Sep-03-11	Nov-11-11
	Construction / Installation	245	Jun-26-12	Feb-25-13
	Start-Up	21	Feb-26-13	Mar-18-13
	DWCS Pipeline Middle	940	May-29-10	Dec-23-12
	ROW / Land Acquisition	181	Sep-27-10	Mar-26-11
	Design	462	May-29-10	Sep-02-11
	Material / Equipment Procurement	145	Oct-21-11	Mar-13-12
	Construction Contract Procurement	70	Sep-03-11	Nov-11-11
	Construction / Installation	280	Feb-27-12	Dec-02-12
	Start-Up	21	Dec-03-12	Dec-23-12
	DWCS Pipeline South	687	Jul-17-10	Jun-02-12
	Design	461	Jul-17-10	Oct-20-11
	Material / Equipment Procurement	120	Oct-21-11	Feb-17-12
	Construction Contract Procurement	70	Sep-03-11	Nov-11-11
	Construction / Installation	140	Dec-25-11	May-12-12
	Start-Up	21	May-13-12	Jun-02-12
	Terminal Reservoir / ASR PS	1618	Jun-01-06 A	Feb-08-13
	ROW / Land Acquisition	889	Jun-01-06 A	Jan-06-11
	Design	642	Oct-01-09	Jul-04-11
	Construction Contract Procurement	75	Jul-05-11	Sep-17-11
	Construction / Installation	450	Sep-18-11	Dec-10-12
	Start-Up	60	Dec-11-12	Feb-08-13
	Monterey Pipeline	1721	Jun-05-08 A	Mar-09-13
	Facility Planning	114	Jun-05-08 A	Oct-20-08 A
	Design	459	Jul-19-10	Oct-20-11
	Material / Equipment Procurement	120	Oct-21-11	Feb-17-12
	Construction Contract Procurement	70	Oct-29-11	Jan-06-12



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SOURCE: RBF Consulting, 2009

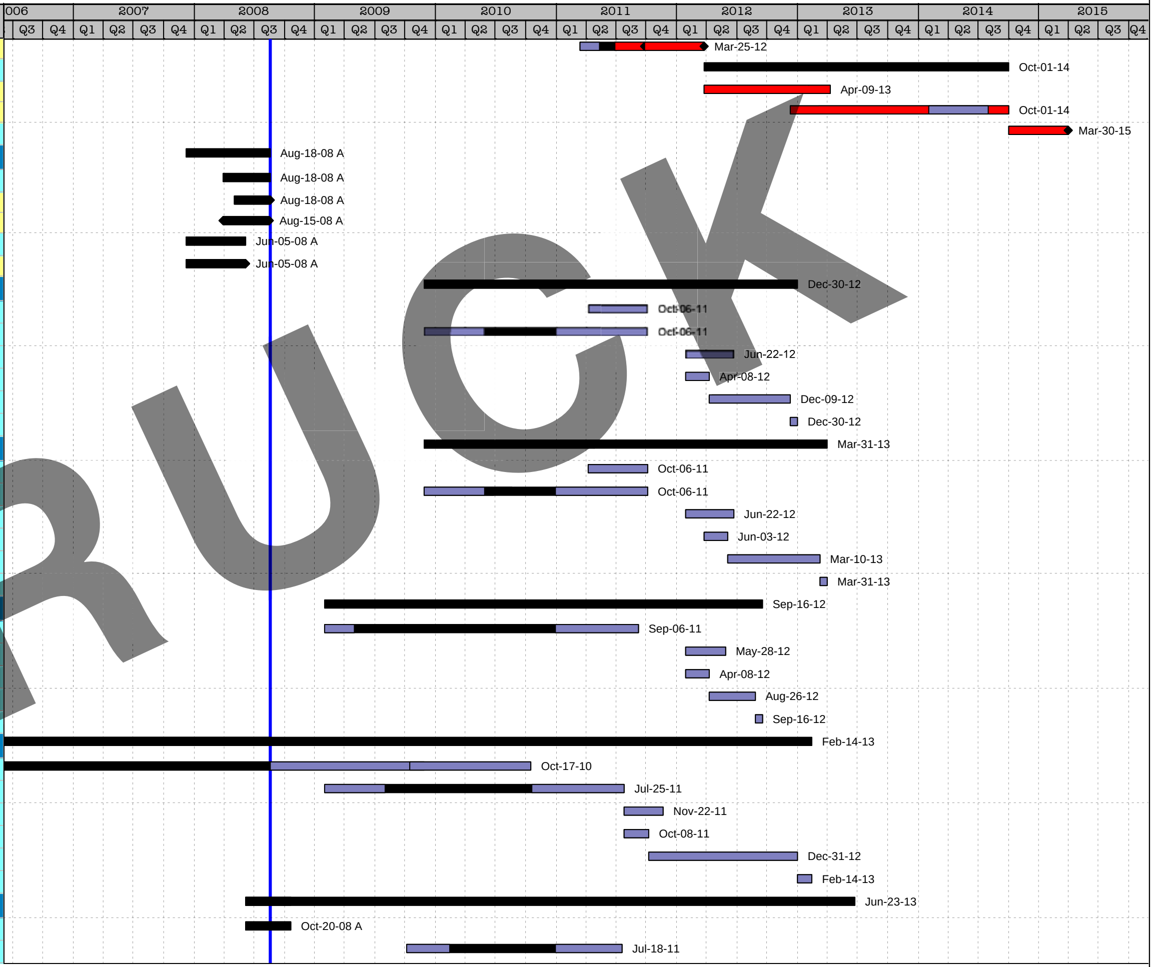
CalAm Coastal Water Project . 205335

Revised Figure 3-22b

Possible Moss Landing Permitting and Construction Schedule

Coastal Water Project

Activity ID	Activity Name	Original Duration	Start	Finish
	D/B Construction RFP	270	Mar-14-11	Mar-25-12
	Design/ Construction / Installation	658	Mar-25-12	Oct-01-14
	Final Design	272	Mar-25-12	Apr-09-13
	Construction/ Installation	472	Dec-10-12	Oct-01-14
	Start-Up	128	Oct-01-14	Mar-30-15
	North Marina Desalination Plant Investigation	208	Dec-10-07 A	Aug-18-08 A
	CPUC EIR Reporting	101	Mar-28-08 A	Aug-18-08 A
	EIR DR 2.4 Update North Marina Subsurface Intakes Project Desc...	78	May-01-08 A	Aug-18-08 A
	EIR DR 2.6 Brine Discharge Modeling	100	Mar-28-08 A	Aug-15-08 A
	Hydrogeological Investigation	156	Dec-10-07 A	Jun-05-08 A
	Groundwater Modeling	156	Dec-10-07 A	Jun-05-08 A
	DWCS Pipeline North	805	Nov-29-09	Dec-30-12
	ROW / Land Acquisition	129	Apr-09-11	Oct-06-11
	Design	484	Nov-29-09	Oct-06-11
	Material / Equipment Procurement	105	Jan-29-12	Jun-22-12
	Construction Contract Procurement	50	Jan-29-12	Apr-08-12
	Construction / Installation	175	Apr-08-12	Dec-09-12
	Start-Up	15	Dec-09-12	Dec-30-12
	DWCS Pipeline Middle	870	Nov-29-09	Mar-31-13
	ROW / Land Acquisition	129	Apr-09-11	Oct-06-11
	Design	484	Nov-29-09	Oct-06-11
	Material / Equipment Procurement	105	Jan-29-12	Jun-22-12
	Construction Contract Procurement	50	Mar-25-12	Jun-03-12
	Construction / Installation	200	Jun-03-12	Mar-10-13
	Start-Up	15	Mar-10-13	Mar-31-13
	DWCS Pipeline South	945	Feb-01-09	Sep-16-12
	Design	677	Feb-01-09	Sep-06-11
	Material / Equipment Procurement	86	Jan-29-12	May-28-12
	Construction Contract Procurement	50	Jan-29-12	Apr-08-12
	Construction / Installation	100	Apr-08-12	Aug-26-12
	Start-Up	15	Aug-26-12	Sep-16-12
	Terminal Reservoir / ASR PS	1174	Jun-01-06 A	Feb-14-13
	ROW / Land Acquisition	649	Jun-01-06 A	Oct-17-10
	Design	646	Feb-01-09	Jul-25-11
	Material / Equipment Procurement	86	Jul-26-11	Nov-22-11
	Construction Contract Procurement	54	Jul-26-11	Oct-08-11
	Construction / Installation	321	Oct-09-11	Dec-31-12
	Start-Up	33	Jan-01-13	Feb-14-13
	Monterey Pipeline	1317	Jun-05-08 A	Jun-23-13
	Facility Planning	82	Jun-05-08 A	Oct-20-08 A
	Design	466	Oct-05-09	Jul-18-11



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SOURCE: RBF Consulting, 2008

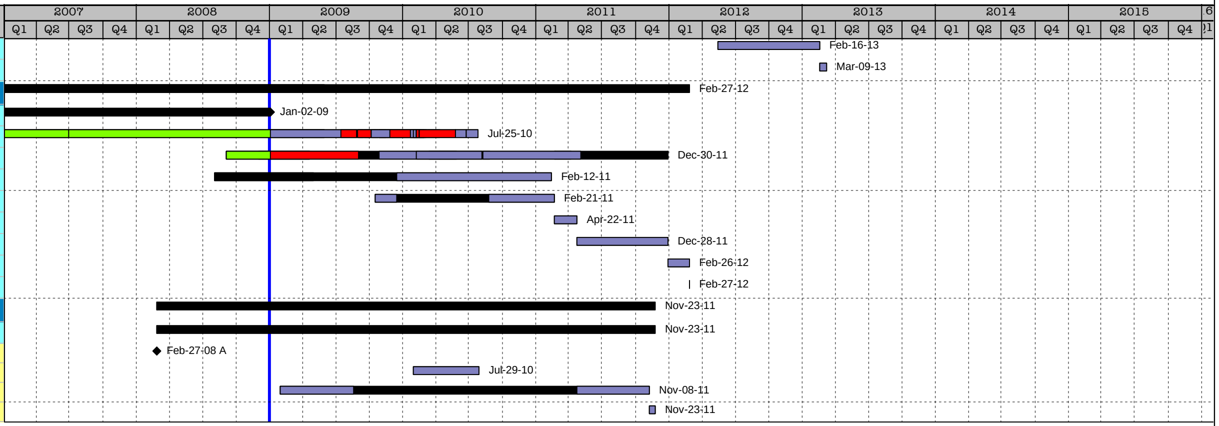
CalAm Coastal Water Project . 205335

Figure 3-22b

Possible Moss Landing Permitting and Construction Schedule

Coastal Water Project

Activity ID	Activity Name	Original Duration	Start	Finish
	Construction / Installation	280	May-13-12	Feb-16-13
	Start-Up	21	Feb-17-13	Mar-09-13
	CWP ASR Wells	1957	Oct-02-06 A	Feb-27-12
	Facility Planning	654	Oct-02-06 A	Jan-02-09
	Test / Monitoring Program	1375	Oct-02-06 A	Jul-25-10
	Facility Permits	1195	Sep-04-08 A	Dec-30-11
	Lease Acquisition	891	Aug-04-08 A	Feb-12-11
	Design	493	Oct-17-09	Feb-21-11
	Construction Contract Procurement	60	Feb-22-11	Apr-22-11
	Construction / Installation	250	Apr-23-11	Dec-28-11
	Start-Up	60	Dec-29-11	Feb-26-12
	Operation	1	Feb-27-12	Feb-27-12
	ASR Pipelines	1348	Feb-27-08 A	Nov-23-11
	CWP ASR Pipelines	1348	Feb-27-08 A	Nov-23-11
	Facility Planning	0	Feb-27-08 A	Feb-27-08 A
	Design	181	Jan-30-10	Jul-29-10
	Construction / Installation	1002	Jan-30-09	Nov-08-11
	Start-Up	15	Nov-09-11	Nov-23-11



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■ Summary

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SOURCE: RBF Consulting, 2009

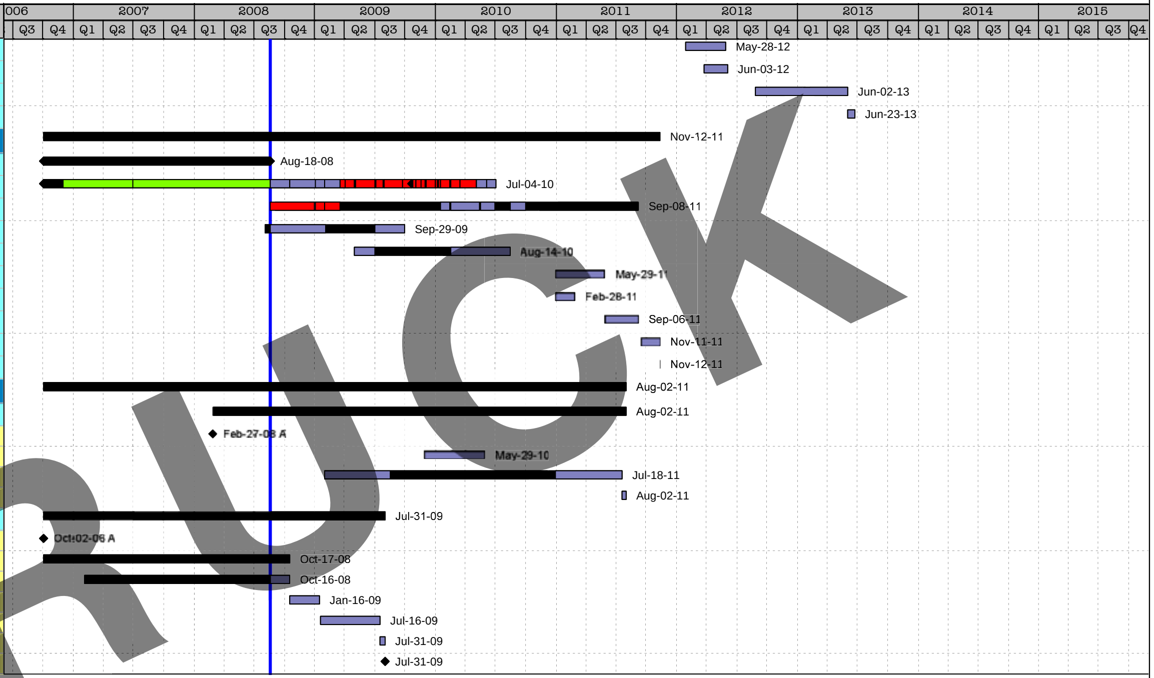
CalAm Coastal Water Project . 205335

Revised Figure 3-22c

Possible Moss Landing Permitting and Construction Schedule

Coastal Water Project

Activity ID	Activity Name	Original Duration	Start	Finish
	Material / Equipment Procurement	86	Jan-29-12	May-28-12
	Construction Contract Procurement	50	Mar-25-12	Jun-03-12
	Construction / Installation	200	Aug-26-12	Jun-02-13
	Start-Up	15	Jun-02-13	Jun-23-13
	CWP ASR Wells	1335	Oct-02-06 A	Nov-12-11
	Facility Planning	374	Oct-02-06 A	Aug-18-08
	Test / Monitoring Program	980	Oct-02-06 A	Jul-04-10
	Facility Permits	786	Sep-04-08 A	Sep-08-11
	ROW / Land Acquisition	292	Aug-04-08 A	Sep-29-09
	Design	335	May-02-09	Aug-14-10
	Material / Equipment Procurement	106	Dec-30-10	May-29-11
	Construction Contract Procurement	42	Dec-30-10	Feb-28-11
	Construction / Installation	72	May-29-11	Sep-06-11
	Start-Up	44	Sep-13-11	Nov-11-11
	Operation	0	Nov-12-11	Nov-12-11
	ASR Pipelines	1157	Oct-02-06 A	Aug-02-11
	CWP ASR Pipeline	895	Feb-27-08 A	Aug-02-11
	Facility Planning	0	Feb-27-08 A	Feb-27-08 A
	Design	130	Nov-29-09	May-29-10
	Construction / Installation	642	Jan-30-09	Jul-18-11
	Start-Up	11	Jul-18-11	Aug-02-11
	ASR Extension Pipeline (Hwy 218 Connection)	635	Oct-02-06 A	Jul-31-09
	Facility Planning	0	Oct-02-06 A	Oct-02-06 A
	Facility Permits	33	Oct-02-06 A	Oct-17-08
	Design	429	Feb-05-07 A	Oct-16-08
	Material / Equipment Procurement	66	Oct-17-08	Jan-16-09
	Construction / Installation	129	Jan-17-09	Jul-16-09
	Start-Up	11	Jul-17-09	Jul-31-09
	Operation	0	Jul-31-09	Jul-31-09



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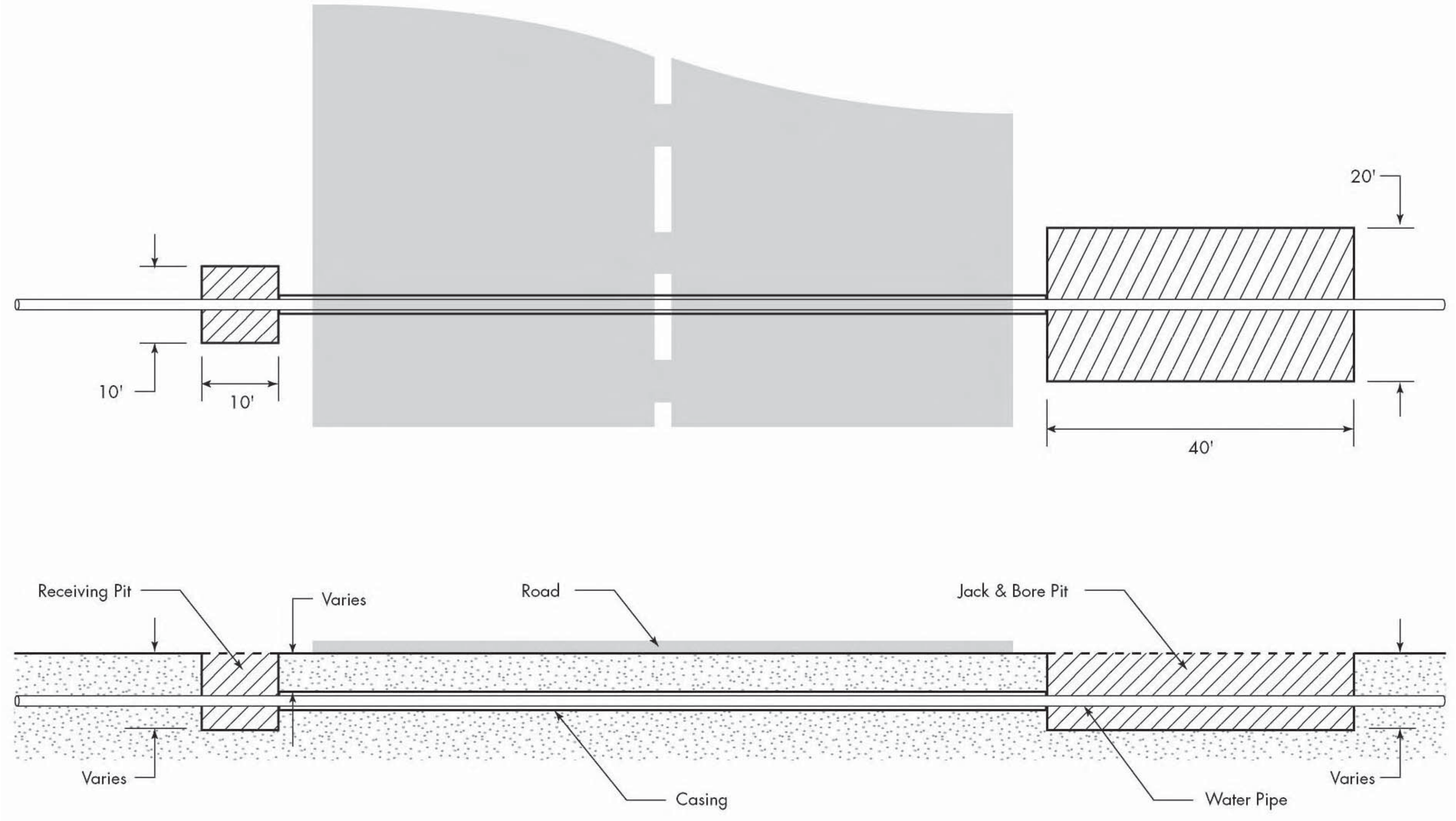
SOURCE: RBF Consulting, 2008

CalAm Coastal Water Project . 205335

Figure 3-22c

Possible Moss Landing Permitting and Construction Schedule



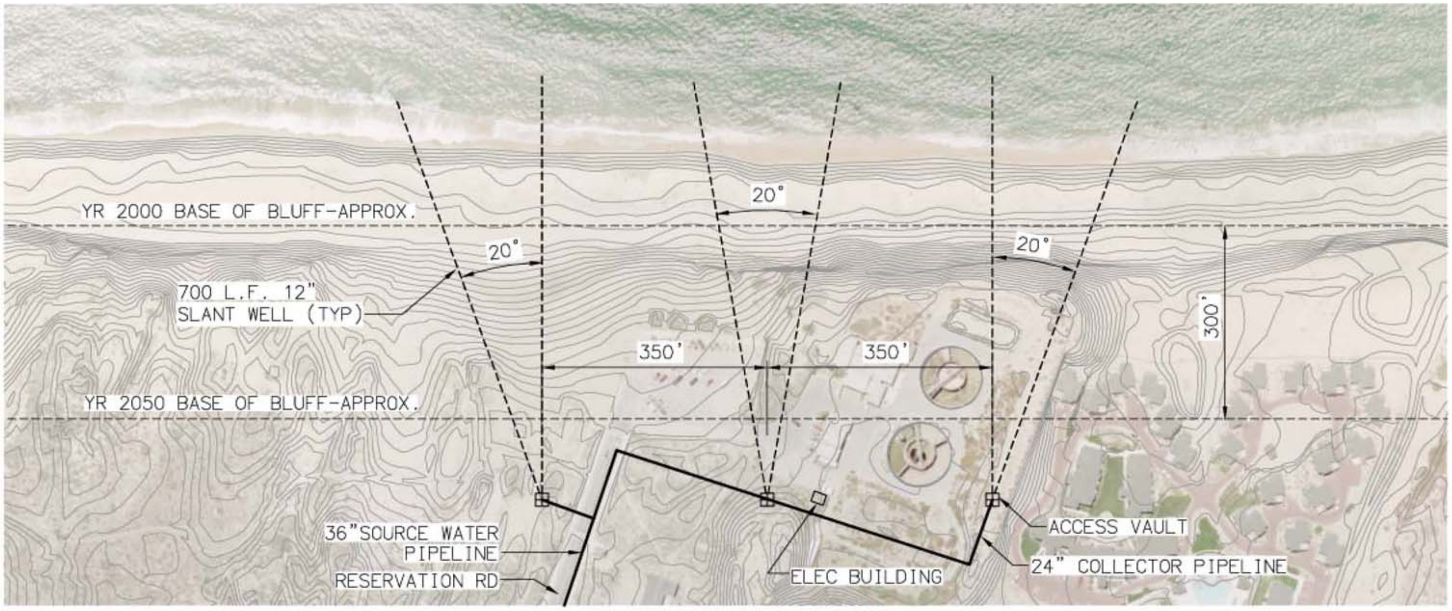
SOURCE: CalAm and RBF Consulting, 2005

CalAm Coastal Water Project . 205335

Figure 3-23

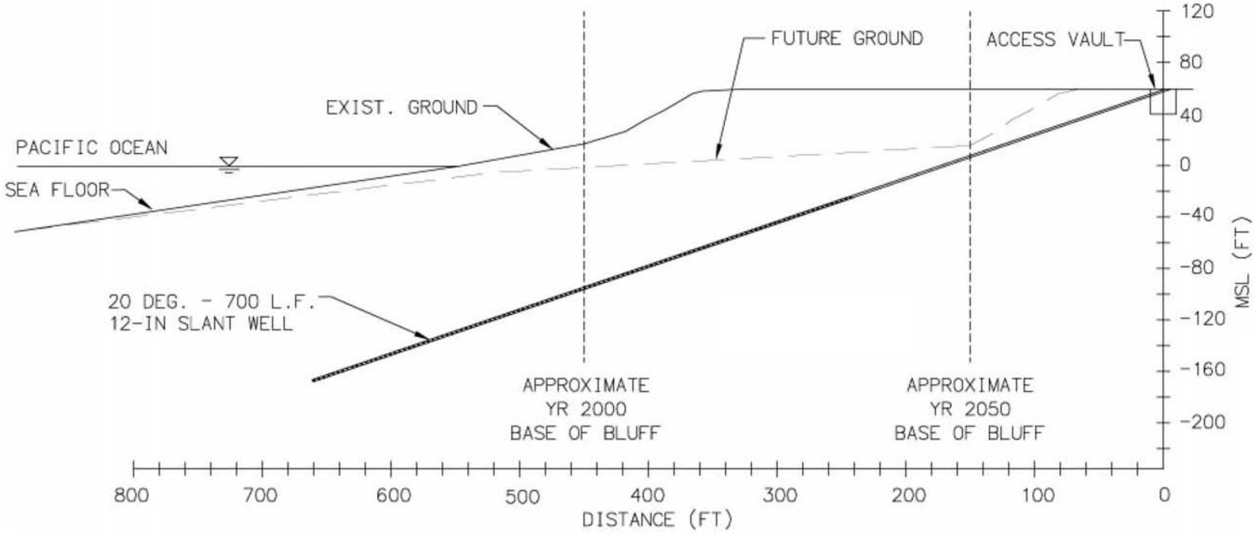
Typical Jack & Bore Layout

This layout was developed after model runs were completed. However, groundwater impacts are not expected to be much different between this layout and the layout modeled.



SLANT WELL LAYOUT

SCALE: 1"=200'



SLANT WELL PROFILE

SOURCE: Geoscience

CalAm Coastal Water Project . 205335

Figure 3-24
Slant Well Layout

CHAPTER 4

Environmental Setting, Impacts and Mitigation Measures: Moss Landing and North Marina Project

4.1 Surface Water Resources

4.1.1 Introduction

This section presents the existing surface water conditions and the applicable regulations on the federal, state, and local levels. The section evaluates potential impacts from construction and operation of the Moss Landing Project and the North Marina Project on surface water resources including fresh, estuarine, and marine water bodies within and adjacent to the project area.

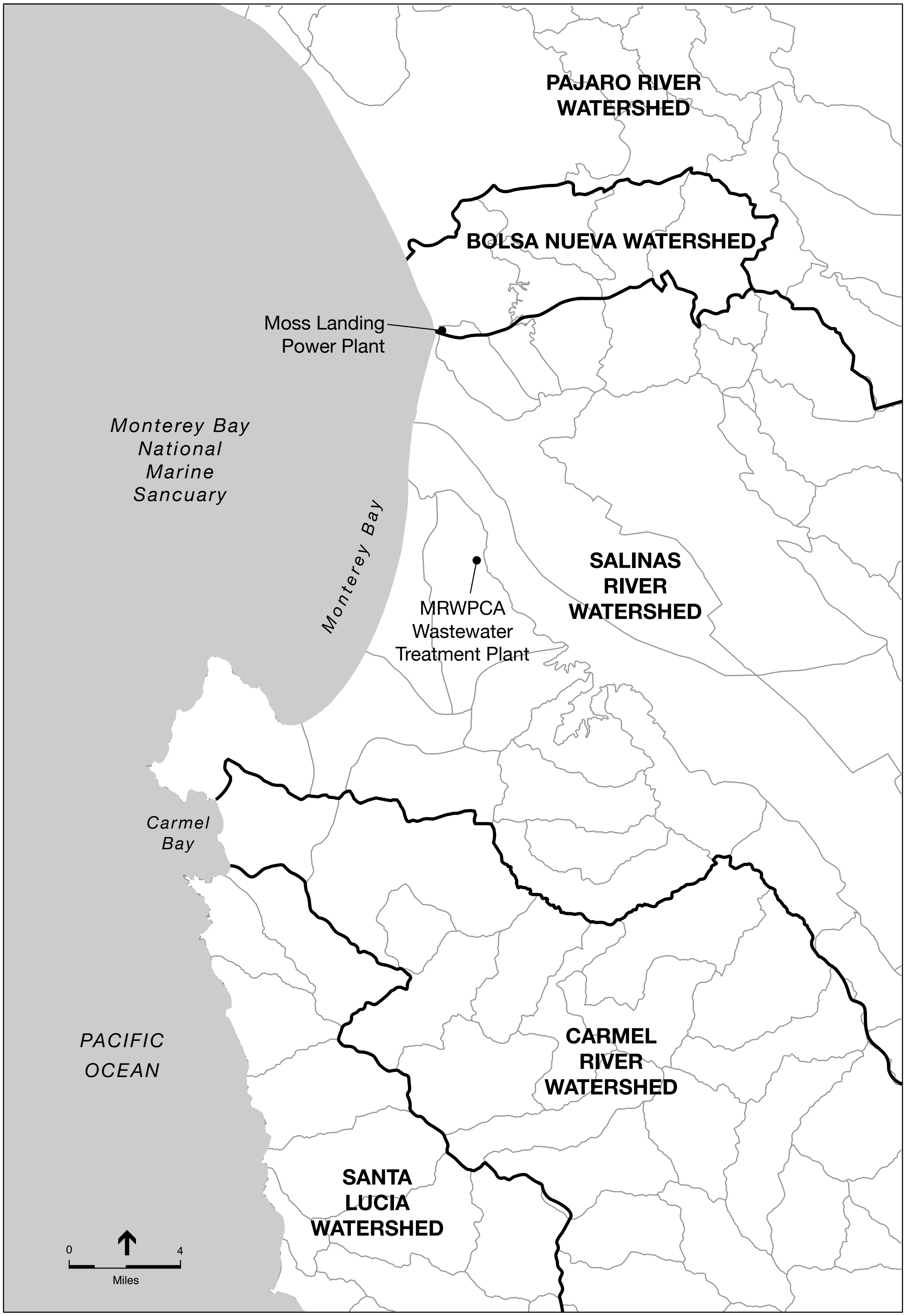
Section 4.1.2 presents the environmental setting related to surface hydrology, water quality, and flooding. Section 4.1.3 provides federal, state, and local regulations that would apply to the Moss Landing Project and North Marina Project. Section 4.1.4 describes the project impacts and identifies mitigation measures to minimize any potentially significant impacts. Refer to Section 4.2, Groundwater Resources, for groundwater-related impacts and Section 4.3, Marine Biological Resources, for impacts to biological resources in marine waters from the project-related discharges.

4.1.2 Environmental Setting

The project area spans portions of several cities (i.e., Castroville, Marina, Sand City, Seaside, Del Rey Oaks, Monterey, and Pacific Grove) and unincorporated areas of Monterey County. The climate in the project area is moderate year-round with warm, dry summers and cool, moist winters. The average temperature is approximately 59 degrees Fahrenheit (Monterey County, 2007). Rainfall occurs primarily between November and April. The average rainfall in the county varies, but is approximately 18 inches per year.

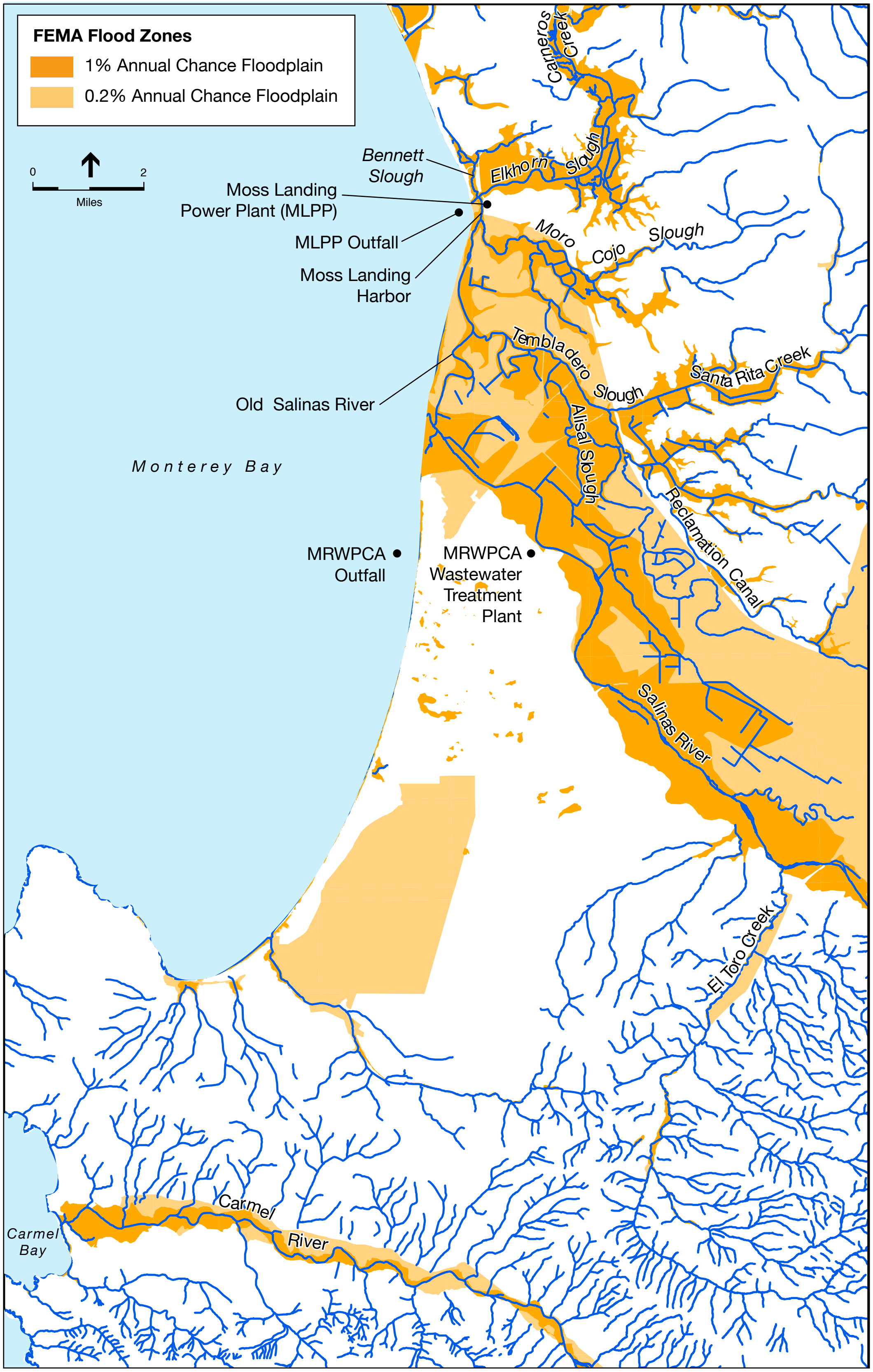
The project area lies within Monterey County, in the southern portion of the Coast Ranges geomorphic province. Topographic features in the basin are dominated by a rugged seacoast and three parallel ranges of the Southern Coast Mountains - the Diablo, Gabilan, and Santa Lucia Ranges, which have peaks of up to 5,844 feet above mean sea level (amsl). The Santa Lucia and Gabilan Mountains are the sources of the primary watercourses in the region.

The project area includes portions of three major watersheds in Monterey County: Bolsa Nueva, Salinas River, and Carmel River (see **Figure 4.1-1**). The major watersheds include several smaller watersheds and surface water bodies such as Elkhorn Slough watershed in the Bolsa Nueva watershed; the Moro Cojo Slough, Reclamation Canal, Laguna Seca, and Canyon del Rey watersheds in the Salinas River watershed; and the Carmel Valley and Carmel Bay watersheds in the Carmel River watershed. The Bolsa Nueva watershed primarily drains into Moss Landing Harbor. The Salinas River watershed drains into Moss Landing Harbor, except for during high flows when the Salinas River watershed drains into Monterey Bay. The Carmel River watershed drains into Carmel Bay (see **Figure 4.1-2**).



SOURCE: DFG, 2004

Figure 4.1-1
Existing Watersheds in the Project Area



SOURCE: FEMA, 2007; USGS, 2008

CalAm Coastal Water Project . 205335

Figure 4.1-2
Waterways and Floodplains

4.1.2.1 Hydrology

Bolsa Nueva Watershed

The Bolsa Nueva watershed is located in the northwestern portion of the county. The Bolsa Nueva watershed drains primarily to Elkhorn Slough and subsequently into Moss Landing Harbor and northern Monterey Bay. The existing intake facility for the Moss Landing Power Plant (MLPP) lies in the Moss Landing Harbor, which borders the Bolsa Nueva and Salinas watershed, and the existing outfall lies in Monterey Bay.

Elkhorn Slough

Elkhorn Slough is a shallow, narrow waterway that extends approximately six miles inland from the Moss Landing Harbor. The Elkhorn Slough watershed includes an area of approximately 225 square miles and drains directly into Monterey Bay via the Moss Landing Harbor channel. Elkhorn Slough is a highly dynamic tidal environment that varies on seasonal and diurnal cycles and the MLPP cooling water is subject to the same variability. Tidal flow out of the slough is generally 6 to 10° Fahrenheit (F) warmer than the ocean receiving water due to solar heating.

Salinas River Watershed

The Salinas River is the largest water system in the county. The Salinas River watershed is bounded by the Santa Lucia Mountains to the west and the Gabilan Mountains to the east. The Salinas River is 155 miles long and roughly bisects the county, terminating in Monterey Bay near Moss Landing. The Salinas River delivers approximately 282,000 acre-feet per year (AFY) of water to the Pacific Ocean at Moss Landing. Most of the water (approximately 90 percent) is delivered during periods of peak precipitation, between mid-December and April. The proposed desalination facilities and the pipelines for the Moss Landing and North Marina projects would lie in the Salinas River watershed. Some of the project components would be located in the subwatersheds discussed below.

Moro Cojo Slough

The Moro Cojo Slough subwatershed lies within the northernmost region of the Salinas River watershed. The watershed includes an area of approximately 17 square miles (CSU Sacramento, 2008) that drains to the south and west through Moro Cojo Slough to Moss Landing Harbor, and Monterey Bay. The desalination facility for the Moss Landing project and the northernmost section of the Transmission Main North pipeline would lie within the Moro Cojo Slough watershed.

Reclamation Canal

A series of ditches, known collectively as the Reclamation Canal, drains the area that stretches from just south of Salinas to Castroville. The Reclamation Canal watershed is composed of urban, rural, and agricultural lands in northern Monterey County and a small portion of southern San Benito County (MCWRA, 2006). The canal flows to Tembladero Slough in the Castroville region and ultimately discharges to the Moss Landing Harbor. A portion of the Transmission Main North pipeline for the Moss Landing Project would lie within this watershed.

Laguna Seca and Canyon del Rey

The Laguna Seca watershed is located between Monterey and Salinas. Surface flows in the watershed drain to the Salinas River or Monterey Bay. The Laguna Seca watershed includes a 7-square mile portion of the Seaside ground water basin. The Canyon del Rey watershed is relatively small and is located in the Seaside/Del Rey Oaks/ Highway 68 Corridor (Monterey County, 2006). Some of the proposed conveyance pipelines would lie within this watershed.

Moss Landing Harbor

The existing north intake of the MLPP lies within the Moss Landing Harbor. Moss Landing Harbor is primarily comprised of shallow open water and is located at the confluence of Monterey Bay, Bolsa Nueva watershed, and Salinas River watershed. The Elkhorn Slough, Moro Cojo Slough, and the Old Salinas River Estuary all drain into Moss Landing Harbor.

During the dry season, a salinity gradient develops with higher salinity at the head of the estuary than in the ocean. This occurs because evaporation is greater than freshwater input and residence time is much greater than a tidal cycle. The MLPP intakes located near the slough are highly affected by tidal flow. Salinity at the intake structure has not been measured regularly, however measurements at the Moss Landing Marine Laboratories boat dock on the south side of the harbor indicate salinity ranging from 12.80 parts per thousand (ppt) to 34.04 with an average of 32.51 ppt from February 2007 to April 2008 (**Appendix C**).

Moss Landing Harbor water quality conditions were recently assessed in the SWAMP Central Coast Harbors report (Marine Pollution Studies Laboratory, 2007). Of six stations sampled for overall water quality, three were ranked good, one fair and two poor. The two poor ranked stations were the result of high total dissolved inorganic nitrogen, low water clarity, and high orthophosphate (one station). Two of the stations had low dissolved oxygen levels and bottom pH levels exceeding 8.3 (pH 7.0 is neutral).

Monterey Bay

Both the proposed Moss Landing and the North Marina project discharges would flow into Monterey Bay. The oceanographic feature affecting waters of Monterey Bay and its adjacent continental shelf is primarily the California Current System, which consists of the California Current, the California Undercurrent, and the Davidson Current. The California Current is a large-scale upper ocean current that transports cold subarctic and North Pacific water south along the North American coast (Bograd et al., 2000; Breaker, 2005). Beneath this near-surface current, and relatively close inshore (within 100 kilometers or 62 miles), is the California Undercurrent that transports warm subtropical water northward. During winter months the California Undercurrent shoals and becomes the inshore countercurrent or Davidson current (Pennington & Chavez, 2000).

The salinity at the MLPP outfall[1] in Monterey Bay has not been measured, but other salinity data have been collected in the vicinity. During January to July 2003, the salinity at a location a few hundred meters south of the MLPP outfall in Monterey Bay ranged from 27.51 ppt to 33.62 ppt with an average of 32.22 ppt (Appendix C).

Bograd and Lynn (2003) compared nearshore salinity and temperatures in Monterey Bay between the period 1950-1976 and 1977-1999. The difference in nearshore salinities between the periods was approximately 0.2 ppt and the difference in nearshore temperatures was approximately 1.4 °F. During 1975, 1976, and 1977, salinity and temperature data were collected in the vicinity of the Monterey Regional Water Pollution Control Agency outfall and diffuser prior to completion of the facilities (**Appendix D**). The salinity near the MRWPCA diffuser ranged from 33.9 to 35.0 ppt and near the surface ranged from 33.0 to 34.0 ppt (Appendix D). The temperature near the diffuser varied from 48 to 59 °F and near the surface varied from 53.6 to 62.6 °F (Appendix D).

Carmel River Watershed

The Carmel River watershed covers an area of 255 square miles. The headwaters of the Carmel River are in the Santa Lucia Mountains. The river flows for 36 miles and drains into the Pacific Ocean at Carmel River State Beach in Carmel Bay (Monterey County, 2006). The larger tributaries of the Carmel River include Garzas Creek, San Clemente Creek, Tularcitos Creek, Pine Creek, Danish Creek, Cachagua Creek, and the Miller Fork.

Carmel River Flow

Stream flow in the Carmel River occurs in direct response to rainfall. Annual rainfall in the upper watershed at San Clemente Dam averages 20.4 inches, with more than 90 percent of this average occurring between November and April. Typically, the first winter rains replenish soils that have dried out during summer. Consequently, there is little runoff before December. CalAm owns and operates San Clemente and Los Padres dams on the Carmel River. Early runoff from the upper watershed refills Los Padres and San Clemente Reservoirs, which have been drawn down during the preceding months. After the reservoirs have filled, usually by mid-December, water overflows into the lower Carmel River. By mid-December, groundwater pumping has lowered the water level in the alluvial aquifer subunits below the lower river. Therefore, most of the early runoff percolates into the ground recharging the aquifer and adds little flow to the river. As groundwater levels rise, the period of highest stream flow begins, usually from January through April. Average monthly flows in the lower Carmel River during January through April are between 180 and 380 cubic feet per second (cfs). Usually, the river dries up in the lower valley by July. From July until the onset of rains, the only water remaining in the lower Carmel River is in isolated pools that gradually dry up as the water table declines in response to pumping (JSA, 2003). Currently, CalAm procures water primarily from the Carmel River Aquifer through wells located along the Carmel River and from wells located in the Seaside Groundwater Basin.

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[1] The total water depth at the MLPP outfall is approximately 40 feet and the cooling water is released approximately 20 feet below the surface.

Carmel River Hydrology

The riverbed and stream banks of the Carmel River are generally composed of non-cohesive silts, sands, and gravels. In the lower 15 miles of the river, this sediment ranges in thickness from 150 feet near the mouth of the river to about 60 feet at a point 15 miles upstream. Frequent flow events carry sediment from the watershed and scour sediment from the riverbed and stream banks. In a balanced system, frequent flows shape the basic channel form and result in a complex ecosystem that provides opportunities for diversification of aquatic and plant species, while maintaining a balance between the flow of water and sediment. In the Carmel River, diversions beginning in the 1960s along with gravel mining, agricultural development, residential development, and routine removal of vegetation and gravel bars have affected the stream bank stability (Hampson, 2008a). Other activities affecting the river are past floodplain development practices, existing water diversions, trapping of sediment behind the main stem dams, and past gravel extraction practices (Hampson, 2008b).

4.1.2.2 Water Quality

Water quality is primarily a function of land uses in the project area. Pollutants and sediments are transported via runoff from the watershed into surface water features such as streams, rivers, storm drains, and reservoirs. Local land uses influence the quality of the surface water through point source discharges (i.e., discrete discharges such as an outfall) and nonpoint source discharges (e.g., storm runoff). Land uses in the project area include industrial, agricultural, rural, and urban. Some of the water bodies are designated as impaired for pollutants such as pathogens, pesticides, and nutrients (See the federal Regulatory Setting section for more details). Data from local monitoring programs are used to discuss water quality in the project area for the pertinent watersheds and water bodies.

~~Changes to ambient salinity due to brine discharge are among the primary concerns associated with coastal desalination projects (Damitz et al, 2006). The changing salinity levels affect the marine biological habitat. Numerous studies have been performed to evaluate the effects of elevated salinity on marine organisms. Broad generalizations tend to be inaccurate because different methods have been used and salinity effects are species-specific (see Section 4.3, Marine Biological Resources).~~

Bolsa Nueva Watershed

The majority of water from the Bolsa Nueva Watershed discharges into Elkhorn Slough, then Moss Landing Harbor, and eventually into Monterey Bay. Based on the Elkhorn Slough National Estuarine Research Reserve sampling results from Elkhorn Slough and Bolsa Nueva watershed (ESNERR, 2008), the seasonal pattern and magnitude of nutrient concentrations are fairly consistent throughout both watersheds (ESNERR, 1997). In the Bolsa Nueva watershed, the nitrate concentrations were highest during the rainy season, between January and March (ESNERR, 1997). The Central Coast Ambient Monitoring Program (CCAMP) indicated occurrence of eutrophication[2] due to high levels of chlorophyll and variable dissolved oxygen in

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[2] Eutrophication is a process in which water bodies, such as lakes or slow-moving streams, receive excess nutrients that stimulate excessive plant growth (algae, nuisance plants weeds), which reduces dissolved oxygen in the water, resulting in decomposition of dead plant material.

the Elkhorn Slough area[3] (CCAMP, 2000). Pesticides and priority organics were found at high levels throughout both Bolsa Nueva and Salinas River watersheds (CCAMP, 2000).

Salinas River Watershed

Nine of the ESNERR sampling locations are located in the northwestern Salinas River watershed. The pollutants in the watershed include unionized ammonia, low dissolved oxygen, nitrate, and pesticides. The ESNERR water quality monitoring efforts from 1988 to 1996 reported extraordinarily high nitrate concentrations in the lower Salinas River (ESNERR, 1997). The CCAMP monitoring indicates that eutrophication from high levels of chlorophyll and variable dissolved oxygen occurs at Old Salinas River and Tembladero Slough (CCAMP, 2000). Fecal coliforms were found at excessive levels in the Tembladero Slough, the Reclamation Canal, and the Salinas River (CCAMP, 2000). Similar to the Bolsa Neuva watershed, pesticides and priority organics were found at high levels in the Salinas River watershed. The Central Coast Watershed Studies (CCoWS) program monitored the lower Salinas watershed before and during a storm event in March 2003 and found DDT[4]s and dieldrin (Kozlowski et al., 2004). The lower Salinas River flows into Moss Landing Harbor.

Moss Landing Harbor

The water quality of Moss Landing Harbor is affected by the flows from the Bolsa Nueva and Salinas River Watersheds in addition to the surrounding land use and activities, such as use and docking of commercial fishing vessels and private recreational boats in the harbor. Moss Landing Harbor water quality conditions were recently assessed in the Surface Water Ambient Monitoring Program Central Coast Harbors report (RWQCB, 2007).

Contaminants of concern in the Moss Landing Harbor sediments include dieldrin, chlordanes, DDT and total Polychlorinated Biphenyls (PCBs). Fish tissue sample quality from Moss Landing Harbor was ranked low for 12.5 percent of the samples. Mussel tissue quality was ranked poor for half of the samples. Both tissue categories exceeded the California Office of Environmental Health Hazard Assessment and U.S. Environmental Protection Agency screening values for total PCB Aroclors (RWQCB, 2007). DDT and many other organic contaminants in the water are mostly adsorbed to the surfaces of fine suspended particles (Leatherbarrow et al., 2005; Schoellhamer et al, 2007; Turner and Millward, 2002). Kozlowski et al., (2004) reported a suspended sediment concentration in Moss Landing Harbor during a storm event of 188 mg/L.

Chloride and sulfate, which would be found in the project discharge from the Moss Landing desalination facility are the most concentrated constituents in the ocean at approximately 19,000 mg/L and 2,700 mg/L respectively (Pilson, 1998). No data were available on the concentrations of chloride or sulfate in either Moss Landing Harbor or nearshore regions of eastern Monterey Bay, in the vicinity of the MRWPCA outfall.

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[3] At Carneros Creek above Elkhorn Slough.

[4] DDT - Dichloro-Diphenyl-Trichloroethan, a synthetic pesticide banned in the US in 1972.

Monterey Bay

Numerous legacy pesticides[5] and currently used contaminants such as dieldrin, DDTs, pesticides, polynuclear aromatic hydrocarbons (PAHs), PCBs, and bacteria are found in Monterey Bay. The largest sources of the contaminants are agricultural runoff into the San Lorenzo, Pajaro, Salinas, and Carmel rivers. Seasonal data, collected by the Central Coast Long-term Environmental Assessment Network (CCLEAN), demonstrate that most of the contaminants wash into Monterey Bay during the wet season when the river flows are the greatest (CCLEAN, 2007). From 2001 to 2006, numerous exceedances of water quality criteria and human health alert levels were observed in Monterey Bay due to contaminants (CCLEAN, 2007). Nearshore waters of Monterey Bay exceeded the California Ocean Plan (discussed below in Regulatory Setting) standards for PCBs and have been listed as “impaired.” There are no background data available for concentrations in Monterey Bay for most of the chemicals that could be used in the desalination process. ~~Ferric chloride, ferric sulfate, and aluminum polychloride are examples of coagulation and flocculation agents used to remove solids from raw source water (Kinnetic Laboratories, 2005).~~

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Carmel River Watershed

The Carmel River Watershed Conservancy monitors the health of the Carmel River watershed resources including creeks, streams, and wildlife habitat (Carmel River Watershed Conservancy, 2008). The Carmel River Watershed Conservancy reported that excess sediment in the Carmel River occurs due to various land uses and road designs (The Watershed Institute, 2004). Carmel Bay is impaired[6] for bacteria, nutrients, and pesticides (Coastal Conservancy, 2006). The potential source of these pollutants is from urban runoff/storm sewers and golf course activities.

4.1.2.3 Flooding

Federal Emergency Management Agency (FEMA) has designated areas in Monterey County that have a 1 percent chance of flooding in any given year (100-year flood) and areas that have a 0.2 percent chance of flooding in any given year (500-year flood). The areas along the coast designated with a 1 percent chance of flooding include coincident flooding and high tide event/and or storm surge. The Monterey County Water Resources Agency (MCWRA) is responsible for issuing permits within designated flood zones in the project area (see discussion under Local Regulatory Setting). Local cities in the county are responsible for permitting development within their floodplains.

The 100-year floodplain in the project area follows the course of the Salinas River and includes marshes and sloughs in the vicinity of Moss Landing and throughout the Bolsa Nueva and

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[5] Legacy pesticides are pesticides that are no longer registered for use.
[6] See regulatory section below.

northwestern Salinas River watersheds (see Figure 4.1-2). The 500-year floodplain identified in the project area is adjacent to smaller marshes, sloughs, and creeks, as well as low-lying areas adjacent to smaller waterways. The areas susceptible to flooding in the project area are those near the proposed Transmission Main North route, the proposed Moss Landing desalination facility site, and portions of Moss Landing, Castroville, and other properties in the lower portion of the Salinas River watershed. Underground portions of the proposed Transmission Main North pipeline would cross the 100-year and 500-year floodplains, especially in areas adjacent to or crossing water bodies (FEMA, 2007). Floodplain regulations in the county extend to areas within two hundred (200) feet of rivers or within fifty (50) feet of watercourses (Monterey County, 2008).

Historically, significant flooding events have occurred in Monterey County. Three of the largest events in the last 15 years include January 1995, March 1995, and February 1998 (MCWRA, 2008). During these events, major water bodies, including the Salinas River and Carmel River, experienced flooding and Monterey County was declared a federal disaster area. Additional areas could flood due to dam failure, tsunamis, or sea level rise. Dams located within the project vicinity include Los Padres and San Clemente Dams, in the Carmel Watershed, and Nacimiento and San Antonio Dams in the Salinas Watershed. Flooding hazards related to tsunamis and sea level rise are discussed in the following sections.

Tsunami

The project area is subject to the risk of tsunamis due to its location on the Pacific Coast. A tsunami is a large wave or series of waves usually generated by an earthquake, volcanic eruption or coastal landslide. Tsunami damage is typically confined to low-lying coastal areas. The Monterey County Office of Emergency Services is responsible for developing and maintaining a state of readiness in preparation of any emergency, including tsunamis that could adversely affect any part of Monterey County (OES, 2008a). According to the Tsunami Incident Response Plan prepared by the Monterey County Office of Emergency Services and incorporated cities, a locally generated tsunami may occur if a large enough earthquake occurs in or near Monterey Bay (OES, 2008b). Such an earthquake could produce a tsunami that reaches shore in a matter of minutes. The plan states that within Monterey County there is a low likelihood of experiencing a tsunami. The most likely tsunami cause, though still relatively unlikely compared to other hazards, is a distant event, where there would be more than one hour to respond to a tsunami warning. The plan lists individual response areas from the northern areas in the county to the Big Sur Coast Area in the south and outlines the response agencies, evacuation routes, routes to avoid, safe areas, special considerations to some areas for each annex. The Moss Landing Harbor area, which includes the proposed Moss Landing desalination facility, must be evacuated if there is a tsunami warning.

Sea Level Rise

Global climate change will likely result in sea level rise and could affect the timing and amount of precipitation, and, in turn, affect water quality. Climate change is expected to result in more extreme weather events; both heavier precipitation events that can lead to flooding as well as more extended drought periods. According to a report by the Intergovernmental Panel on Climate Change, the average global mean sea level increased by approximately 5.9 inches during the past 100 years (IPCC, 2007). Based on monthly mean sea level data from 1973 to 2006, the mean sea level in Monterey Bay increased by approximately 0.053 inches per year (NOAA, 2008a). This is equivalent to a change of approximately 5.3 inches during the past 100 years (NOAA, 2008b). The IPCC report (2007) projects global mean sea level could increase by 7 to 23 inches by 2099. Recent research by climate scientists indicates that sea-level rise has outpaced previous projections. The Pacific Institute report (2009) projects that sea level rise along the California coast could increase by 55 inches by 2100. This~~ese~~ projection~~s~~ may be an underestimate~~s~~ because the climate models used did not include ice-melt from Antarctica and Greenland (Pacific Institute, 2009). Additionally, sea level rise ~~will~~likely would be accompanied by an increased rate of coastal erosion and related coastal hazards.

4.1.3 Regulatory Setting

4.1.3.1 Federal

Clean Water Act

Under the Clean Water Act (CWA) of 1977, the U.S. Environmental Protection Agency (USEPA) seeks to restore and maintain the chemical, physical, and biological integrity of the nation's waters by implementing water quality regulations. The National Pollutant Discharge Elimination System (NPDES) permit program under section 402(p) of the CWA controls water pollution by regulating sources that discharge pollutants into waters of the United States. The USEPA has delegated authority of issuing NPDES permits in California to the State Water Resources Control Board (SWRCB), which has nine regional boards. The Central Coast Regional Water Quality Control Board (RWQCB) regulates water quality in the project area.

Section 303(d)

Section 303(d) of the CWA requires that each state identify water bodies or segments of water bodies that are "impaired" (i.e., do not meet one or more of the water quality standards established by the state). These waters are identified in the Section 303(d) list as waters that are polluted and need further attention to support their beneficial uses. Once the water body or segment is listed, the state is required to establish a Total Maximum Daily Load (TMDL) for the pollutant. The TMDL is the maximum amount of a pollutant that a water body can receive and still meet the water quality standards. Typically, a TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. **Table 4.1-1** lists the impaired water bodies in the project area.

Safe Drinking Water Act

Pursuant to the federal Safe Drinking Water Act, the USEPA sets national standards for drinking water to protect public health. The USEPA has delegated the enforcement of national drinking water standards to the California Department of Public Health (CDPH) within the state. California's Safe Drinking Water Act authorizes CDPH to promulgate regulations relating to drinking water quality and the operation of public water systems that are a part of Title 22 of the California Code of Regulations (CCR).

TABLE 4.1-1
IMPAIRED WATER BODIES IN THE PROJECT AREA

Impaired Water Bodies	Pollutants/Sources that cause the Impairment
Elkhorn Slough	Pathogens, pesticides, sedimentation/siltation
Moro Cojo Slough	Low dissolved oxygen (DO), pesticides, sedimentation/siltation
Salinas Reclamation Canal	Fecal coliform, low DO, nitrate, pesticides, priority organics
Tembladero Slough	Ammonia, fecal coliform, low DO, nutrients, pesticides
Old Salinas River estuary	Fecal coliform, low DO, nutrients, pesticides,
Salinas River (lower, estuary to near Gonzales River Road crossing)	Fecal coliform, nitrate, nutrients, pesticides, salinity/TDS/chlorides, toxaphene
Moss Landing Harbor	Pathogens, pesticides, sedimentation/siltation
Monterey Harbor	Metals, unknown toxicity
Carmel Bay	Bacteria, nutrients, pesticides

SOURCE: RWQCB, 2006a; Coastal Conservancy, 2006.

The CDPH is responsible for ensuring that all public water systems are operated in compliance with drinking water regulations. Current drinking water regulations include both primary and secondary standards. The primary standards define maximum concentration levels (MCLs) that cannot be exceeded by any public water system. All standards except turbidity are applicable at the point of delivery. Compliance with primary standards is mandatory, because these standards are based on potential health effects on water users. Secondary standards are parameters that may adversely affect the aesthetic quality of drinking water, such as taste and odor; these standards are not federally enforceable, although CDPH reserves the right to enforce the standards as warranted. The project sponsor (CalAm) would be required to amend the existing permit to operate a public water system to incorporate the proposed project (CalAm and RBF Consulting, 2005)[7] or acquire a new permit for the project. The product water would be subject to USEPA's primary and secondary drinking water standards (USEPA, 2003).

4.1.3.2 State

California Coastal Act

The California Coastal Act, established in 1976, defines the “coastal zone” as the area of the state that extends generally 3000 feet inland and three statute miles seaward (California Wetlands Information System, 2008). The California Coastal Act includes policies intended to protect water quality and established the California Coastal Commission. Almost all development within the

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[7] CalAm already has a permit to operate its Monterey Public Water System issued by CDPH pursuant to California Health & Safety Section 116525. Because the proposed project would modify and change a substantial portion of the system's source water, which would have a different method of treatment than the existing water supply, CalAm must apply to CDPH to amend its existing permit. (California Health & Safety Code Section 1165509(a).)

coastal zone requires a coastal development permit from the California Coastal Commission or a local agency with a certified Local Coastal Program.

Monterey County and the cities of Marina, Seaside, Sand City, and Monterey have adopted Local Coastal Programs to implement the California Coastal Act. By adopting a Local Coastal Program, the local jurisdiction assumes the authority and responsibility to implement the CCA.
Section 4.10, Land Use, includes all applicable Local Coastal Programs policies and regulations.

Ocean Plan

The *Water Quality Control Plan for Ocean Waters of California* (or Ocean Plan) adopted by the SWRCB (2005) establishes water quality objectives and beneficial uses for waters of the Pacific Ocean adjacent to the California Coast outside of estuaries, coastal lagoons, and enclosed bays. The plan establishes effluent quality requirements and management principles for specific waste discharges. The water quality requirements and objectives are incorporated into all NPDES permits. The Ocean Plan objectives relevant to the proposed project include:

- Marine communities, including vertebrate, invertebrate, and plant species shall not be degraded;
- Waste management systems that discharge into the ocean must be designed and operated in a manner that will maintain the indigenous marine life and a healthy and diverse marine community; and
- Waste discharged to the ocean must be essentially free of substances that will accumulate to toxic levels in marine waters, sediments or biota.
- The Ocean Plan establishes objectives for many bacterial, physical, chemical, biological, and radioactive parameters. There is no Ocean Plan objective specifically applicable to the waste discharges from desalination facilities. The SWRCB has expressed concern about potential harmful effects of exposing benthic marine life to a dense, highly saline plume (SWRCB, 2007). The SWRCB has proposed to amend the Ocean Plan to include a narrative water quality objective for salinity where the salinity should not exceed a percentage of natural background or numeric water quality objective.

Thermal Plan

The *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* (or Thermal Plan) adopted by the SWRCB in 1995 establishes temperature requirements for existing and new discharges in California coastal waters, interstate waters, enclosed bays, and estuaries. Water quality objectives for existing discharges into coastal waters require that elevated temperature wastes comply with limitations necessary to assure protection of the beneficial uses and areas of special biological significance. The plan establishes the following temperature requirements for all new discharges (SWRCB, 1995a):

- Elevated temperature wastes shall be discharged to the open ocean away from the shoreline to achieve dispersion through the vertical water column;

- Elevated temperature wastes shall be discharged at a sufficient distance from areas of special biological significance to assure the maintenance of natural temperature in these areas;
- The maximum temperature of thermal waste discharges shall not exceed the natural temperature of receiving waters by more than 20°F;
- The discharge of elevated temperature wastes shall not result in increases in the natural water temperature exceeding 4°F at the shoreline, the surface of any ocean substrate, or the ocean surface beyond 1,000 feet from the discharge system. The surface temperature limitation shall be maintained at least 50 percent of the duration of any complete tidal cycle; and
- Additional limitations shall be imposed when necessary to assure protection of beneficial uses.

The MLPP existing NPDES permit meets the standards discussed above.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Act (Division 7 of the California Water Code) provides the basis for water quality regulation within California and defines water quality objectives as the limits or levels of water constituents that are established for reasonable protection of beneficial uses. The Porter-Cologne Act allows the SWRCB to adopt statewide water quality control plans or basin plans, which serve as the legal, technical, and programmatic basis of water quality regulation for a region. The act also authorizes the NPDES program under the CWA, which establishes effluent limitations and water quality requirements for discharges to waters of the state. The Basin Plan for the Central Coast is discussed in the local regulatory section below.

California Toxics Rule

Under the California Toxics Rule (CTR), the USEPA has proposed water quality criteria for priority toxic pollutants for inland surface waters, enclosed bays, and estuaries. These federally promulgated criteria create water quality standards for California waters. The CTR satisfies CWA requirements and protects public health and the environment. The USEPA and the SWRCB have the authority to enforce these standards, which are incorporated into the NPDES permits (discussed in the local regulatory section) that regulate the current discharges in the project area. The standards would be included in the NPDES permits for the project discharges associated with the Moss Landing Project and North Marina Project.

California Health and Safety Code

As discussed under the federal Safe Drinking Water Act, the project sponsor would be required to obtain a water supply permit from the CDPH. Because the project sponsor operates its Monterey Public Water System under an existing permit, the CDPH may modify or update the existing permit in accordance with the California Health and Safety Sections 116525 and 116550.

General Construction Permit

Construction activities on one acre or more are subject to the permitting requirements of the NPDES General Permit for Discharges of Stormwater Runoff Associated with Construction Activity (General Construction Permit). The SWRCB established the General Construction Permit program to reduce surface water impacts from construction activities. The proposed project would be required to comply with the permit requirements to control stormwater discharges from the construction sites. The General Construction Permit requires the preparation and implementation of a stormwater pollution prevention plan (SWPPP) for construction activities. The SWPPP must be prepared before the construction begins. The SWPPP must include specifications for best management practices (BMPs) that would need to be implemented during project construction. BMPs are measures that are undertaken to control degradation of surface water by preventing soil erosion or the discharge of pollutants from the construction area. Additionally, the SWPPP must describe measures to prevent or control runoff after construction is complete and identify procedures for inspecting and maintaining facilities and other project elements. Required elements of a SWPPP include:

1. Site description addressing the elements and characteristics specific to the site;
2. Descriptions of BMPs for erosion and sediment controls;
3. BMPs for construction waste handling and disposal;
4. Implementation of approved local plans;
5. Proposed post-construction controls; and
6. Non-stormwater management.

Examples of typical construction BMPs include scheduling or limiting activities to certain times of year, installing sediment barriers such as silt fence and fiber rolls, and maintaining equipment and vehicles used for construction. Non-stormwater management measures include installing specific discharge controls during certain activities, such as paving operations, vehicle and equipment washing and fueling. The RWQCB has identified BMPs in the *California Storm Water Best Management Practice Handbook* (California Stormwater Quality Association, 2003) to effectively reduce degradation of surface waters to an acceptable level.

Dewatering Requirements

Excavation and trenching activities in areas with shallow groundwater would require dewatering (the removal of groundwater by pumping), which would be subject to the state dewatering requirements. Dewatering operations are regulated under state requirements (General Order WQ-2003-0003-DWQ) for water quality control. Discharge of non-stormwater from a trench or excavation that contains sediments or other pollutants to sanitary sewer, storm drain systems, creek beds (even if dry), or receiving waters is prohibited. Small/temporary dewatering activities that could be a part of project construction are listed as one of the categories of low threat discharges (i.e., discharges that could degrade water quality without violating the water quality objectives). Discharge of uncontaminated groundwater from dewatering is a conditionally exempted discharge by the RWQCB. The RWQCB requires the extracted groundwater to be tested for possible pollutants; the tests are generally based on the source of the water, land use history of the construction site, and potential impacts to the quality of the receiving water. The extracted groundwater from project construction activities could be contaminated with hazardous materials that may be present in subsurface soil and/or groundwater or inadvertently released from construction equipment. Therefore, disposal of dewatering discharge could require coverage under the General Order for discharge to surface creeks and groundwater or from local agencies for discharge to storm or sanitary sewers. Refer to Section 4.6, Hazards and Hazardous Materials, for potential areas of contamination in the project area and the vicinity and how that would affect the project-related impacts.

State Water Resources Control Board Anti-degradation Policy

The SWRCB Anti-~~d~~Degradation Policy, formally known as the Statement of Policy with Respect to Maintaining High Quality Water in California (SWRCB Resolution No. 68-16), restricts degradation of surface and ground waters. In particular, this policy protects water bodies where existing quality is higher than necessary for the protection of beneficial uses.

Under the Anti-~~d~~Degradation Policy, any actions that can adversely affect water quality in all surface and ground waters must: (1) be consistent with maximum benefit to the people of California; (2) not unreasonably affect present and anticipated beneficial use of the water; and (3) not result in water quality less than that prescribed in water quality plans and policies. Furthermore, any actions that can adversely affect surface waters are also subject to the Federal Anti-degradation Policy (40 CFR § 131.12) developed under the CWA. Discharges from the proposed project that could affect surface water quality would be required to comply with the Anti-Degradation Policy, which also forms a part of the NPDES permits for point discharges discussed below. Discharges from the proposed project that could affect surface water quality would be required to comply with the Anti-~~d~~Degradation Policy, which also forms a part of the NPDES permits for point discharges discussed below.

4.1.3.3 Local

Basin Plan

The *Water Quality Control Plan* for the Central Coast (or Basin Plan) prepared by the Central Coast RWQCB identifies beneficial uses of surface waters within the Central Coast region, establishes quantitative and qualitative water quality objectives for protection of beneficial uses, and establishes policies to guide the implementation of these water quality objectives (RWQCB, 2006b). **Table 4.1-2** lists the beneficial uses for water bodies in the project area. Definitions of the beneficial uses are provided in **Table 4.1-3**.

TABLE 4.1-2
BENEFICIAL USE DESIGNATIONS FOR SURFACE WATER IN PROJECT AREA

	Beneficial Uses[1]																		
Water Bodies	**MUN**	**AGR**	**GWR**	**IND**	**COMM**	**SHELL**	**COLD**	**EST**	**MIGR**	**RARE**	**SPWN**	**BIOL**	**WARM**	**WILD**	**REC-1**	**REC-2**	**NAV**	**MAR**	**ASBS**
Elkhorn Slough					X	X	X	X	X	X	X	X	X	X	X	X	X		
Moro Cojo Slough			X		X	X	X	X		X	X	X	X	X	X	X			
Salinas Reclamation Canal													X	X	X	X			
Tembladero Slough					X	X		X		X	X		X	X	X	X			
Old Salinas River Estuary					X	X	X	X	X	X	X	X	X	X	X	X			
Salinas River Lagoon (North)					X	X	X	X	X	X	X	X	X	X	X	X			
Moss Landing Harbor			X		X	X				X				X	X	X	X	X	
Monterey Harbor			X		X	X				X					X	X	X	X	
Carmel River	X	X		X	X		X		X	X	X	X	X	X	X	X			
Carmel River Estuary			X		X	X	X	X	X	X	X	X		X	X	X			
Carmel Bay						X				X				X	X	X		X	X

[1] Definitions of beneficial uses are provided in **Table 4.1-3**.

SOURCE: RWQCB, 2006b

NPDES General Permit

The NPDES General Permit No. CAS000004 regulates stormwater discharges from Small Municipal Separate Storm Sewer Systems (MS4)[8] that include the County of Monterey and cities in the project area. Operation of the proposed facilities that would affect stormwater runoff and quality such as the desalination facilities at MLPP and North Marina would be subject to the stormwater control requirements in the permit. To comply with the stormwater permit and develop a permit application, the County of Monterey and the cities of Carmel-by-the-Sea, Del Rey Oaks, Marina, Monterey, Pacific Grove, Sand City, and Seaside formed the Monterey Regional Stormwater & Education Alliance (SEA) group in 2001 and developed the Monterey Regional Stormwater Management Program (MRSWMP) in 2006. The MRWPCA acts as the administrative agent for the MRSWMP. The purpose of the MRSWMP is to implement and enforce a series of BMPs to reduce the discharge of pollutants from the MS4s to the “maximum extent practicable,” to protect water quality, and to satisfy the appropriate water quality requirements of the CWA. The SEA group developed the Model Urban Runoff Program (MURP), which is a comprehensive guide developed for the local agencies to address polluted runoff in the urban environment. The MURP provides options to help small municipalities

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[8] USEPA promulgated regulations, known as Phase II, requiring permits for stormwater discharges from Small MS4s (that serve a population of up to 100,000) and from construction sites disturbing between one and five acres of land (discussed under General Construction Permit above).

TABLE 4.1-3
DEFINITIONS OF BENEFICIAL USES OF SURFACE WATERS

Beneficial Use	Description
Municipal and Domestic Supply (MUN)	Uses of water for individual, community, or military water supply systems including, but not limited to drinking water supply.
Agricultural Supply (AGR)	Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
Groundwater Recharge (GWR)	Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting saltwater intrusion into freshwater aquifers.
Industrial Service Supply (IND)	Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization.
Ocean, Commercial, and Sport Fishing (COMM)	Uses of water for commercial or recreational collection of fish, shellfish, or other organisms in oceans, bays, and estuaries, including, but not limited to, uses involving organisms intended for human consumption or bait purposes.
Shellfish Harvesting (SHELL)	Uses of water that support habitats suitable for the collection of crustaceans and filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sport purposes.
Cold Freshwater Habitat (COLD)	Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Estuarine Habitat (EST)	Uses of water that support estuarine ecosystems, including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds), and the propagation, sustenance, and migration of estuarine organisms.
Migration of Aquatic Organisms (MIGR)	Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.
Preservation of Rare and Endangered Species (RARE)	Uses of waters that support habitats necessary for the survival and successful maintenance of plant or animal species established under state and/or federal law as rare, threatened, or endangered.
Spawning, Reproduction, and/or Early Development (SPWN)	Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.
Preservation of biological Habitats of Special Significance (BIOL)	Uses of water that support designated areas or habitats, such as established parks, refugees, sanctuaries, ecological reserves, where the enhancement or preservation of natural resources requires protection.
Warm Freshwater Habitat (WARM)	Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Wildlife Habitat (WILD)	Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
Water Contact Recreation (REC 1)	Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white-water activities, fishing, or use of natural hot springs.
Non-Contact Water Recreation (REC 2)	Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
Navigation (NAV)	Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.
Marine Habitat (MAR)	Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).
Areas of Special Biological Significance (ASBS)	Areas designated by the State Water Resources Control Board as requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable.

SOURCE: RWQCB, 2006b

develop individual urban runoff programs. Each member or the permittee is responsible for complying with the NPDES permit conditions (Monterey Regional Stormwater and Education Alliance, 2008). The local municipalities would require the proposed project to comply with the stormwater control requirements in their individual jurisdictions under the Countywide permit and require implementation of erosion and stormwater control measures to reduce any long term runoff from the facilities.

NPDES Permit for Moss Landing Power Plant

The NPDES permit held by Dynegy (owner and operator of the MLPP) allows for a maximum cooling water flow of 1,226 million gallons per day (mgd) at the MLPP (RWQCB, 2000). The cooling water is discharged through two existing 144-inch-diameter ocean outfalls. These upward discharging outfalls terminate approximately 1,000 feet offshore from the Moss Landing Harbor inlet in Monterey Bay at approximately 20 feet above the seabed, in a total water depth of 40 feet. The cooling water commingles with the industrial wastewater discharge and stormwater runoff from the MLPP prior to discharge from the outfalls.

The NPDES permit for MLPP approved in October 2000 included Waste Discharge Requirements Order No. 00-41 that lists thermal effluent limitations on the MLPP generating units (**Table 4.1-4**):

TABLE 4.1-4
MAXIMUM TEMPERATURE OF THE MLPP EFFLUENT ABOVE THE RECEIVING WATERS

MLPP Unit	Maximum Temperature of the Effluent above the Natural Temperature of Receiving Waters
Southern units (Unit 6 and 7)	28° F as a daily average 34° F as an instantaneous maximum (hourly average)
Northern units (Unit 1 and/or 2)	20° F as a daily average 26° F as an instantaneous maximum;
Southern units (Unit 6 and/or 7) and northern units (Unit 1 and/or 2)	26° F as a daily average 32° F as an instantaneous maximum.

SOURCE: RWQCB, 2000.

The NPDES permit also states that during heat treatment to remove mussels and other biofouling organisms from cooling water system conduits, conducted every one to four months, the hourly average temperature of the discharge shall not exceed the temperature of the receiving water by more than 40°F.

In March 2001, SWRCB concurred with the permit thermal effluent limitations (SWRCB, 2001) in the NPDES permit, which expired in 2005. The permit is on an administrative extension until the SWRCB adopts a statewide once-through cooling policy for existing power plants (von Langen, 2008). Once-through cooling is discussed in more detail in Section 4.3, Marine Biological Resources.

NPDES Permit for MRWPCA Wastewater Treatment Plant

The NPDES permit for the MRWPCA Wastewater Treatment Plant (WWTP) regulates the treated wastewater discharge from the WWTP into Monterey Bay (MRWPCA, 2008). The permit allows for ~~a peak~~ an average dry weather flow capacity of 29.6 mgd and peak wet weather flow of 75.6 mgd. The minimum dilution requirement is 145:1 (parts seawater to effluent). The permit defines the effluent limitations, consistent with the Ocean Plan requirements. A monitoring and reporting program is included for both influent and effluent monitoring.

National Marine Sanctuary Program Regulations

NOAA has entered into a Memorandum of Agreement with the state of California, Environmental Protection Agency, and the Association of Monterey Bay Area Governments regarding the Monterey Bay National Marine Sanctuary (MBNMS) regulations relating to water quality within state waters within the sanctuary (MBNMS, 2008a). With regard to permits, the MOA encompasses:

- National Pollutant Discharge Elimination System permits issued by the State of California under Section 13377 of the California Water Code

- Waste Discharge Requirements issued by the State of California under Section 13263 of the California Water Code.

The MOA specifies how the review process for applications for leases, licenses, permits, approvals, or other authorizations will be administered within State waters within the Sanctuary in coordination with the State permit program.

The MBNMS implements the Water Quality Protection Program for the sanctuary and tributary waters. The program is a partnership of 27 local, state, and federal government agencies (MBNMS, 2008b). The program calls for education, funding, monitoring, and development of treatment facilities and assessment programs to protect water quality. The goal of the program is to enhance and protect the chemical, physical, and biological integrity of the sanctuary.

Monterey Peninsula Water Management District

The Monterey Peninsula Water Management District (MPWMD) is responsible for the MPWMD law with the integrated management of the groundwater and surface water resources in the Monterey Peninsula area. ~~responsible forwater~~MPWMD is authorized to establish a written permit system for regulation of water distribution systems. Ordinance 96 of the MPWMD Board of Directors revises the definition and regulation of water distribution systems. The ordinance requires obtaining a written permit from MPWMD prior to expanding or extending a water distribution system. The proposed treated conveyance pipeline under the proposed project would be subject to Ordinance 96 and therefore, would require a permit from MPWMD.

County and City Regulations

Table 4.1-5 provides the applicable regulations and general plan goals and policies for Monterey County and the individual cities in the project area.

TABLE 4.1-5
APPLICABLE CITY AND COUNTY REGULATIONS IN THE PROJECT AREA

Agency	Municipal Code or General Plan	Applicable Regulation or Policy
Monterey County[1]	Monterey County General Plan (1982)	***Chapter 5 Water Resources*: To conserve and enhance the water supplies in the County and adequately plan for the development and protection of these resources and their related resources for future generations. *Policy 5.1.2*: Land use and development shall be accomplished in a manner to minimize runoff and maintain groundwater recharge in vital water resource areas ***Chapter 16 Flood Hazards*:** To minimize the risk from the damaging effects of flooding and erosion. *Policy 16.2.4*: All new development, including filling, grading, and construction, within designated 100-year floodplain areas shall conform to the guidelines of the National Flood Insurance Program and policies established by the County Board of Supervisors, with the advice of the Monterey County Flood Control and Water Conservation District. *Policy 16.2.5*: All new development, including filling, grading, and construction, proposed within designated floodplains shall require submission of a written assessment prepared by a qualified hydrologist/engineer on whether the development will significantly contribute to the existing flood hazard. Development shall be conditioned on receiving approval of this assessment by the County Flood Control and Water Conservation District. ***Chapter 21 Water Quality*:** To ensure the County's water quality is protected and enhanced to meet all beneficial uses, including domestic, agricultural, industrial, recreational, and ecological. *Policy 21.2.1*: The County shall require all new and existing development to meet federal, state, and County water quality regulations.
Monterey County[1]	Monterey County Code (2008)	***Chapter 16.12 Erosion Control*:** Requires that specific design considerations be incorporated into projects to reduce the potential of erosion and that an erosion control plan be approved by the County prior to initiation of grading activities. ***Chapter 16.16 Development of Floodplains*:** Establishes methods of reducing flood losses such as controlling the alteration of natural floodplains and requiring new construction in the floodplain to incorporate floodproofing measures
City of Monterey	City of Monterey General Plan (2005)	**Conservation Element** ***Goal b. Water Quality*:** Protect creeks, lakes, wetlands, beaches, and Monterey Bay from pollutants discharged to the storm drain system. *Policy b.2*: Minimize particulate matter pollution with erosion and sediment control in waterways and on construction sites and with regular street sweeping on City streets. *Policy b.3*: Minimize development or removal of vegetation on areas particularly susceptible to erosion, such as steep slopes, and require programs to minimize erosion when development occurs in these areas. *Policy b.4*: Retain and restore wetlands, riparian areas, and other habitats, which provide remediation for degraded water quality. **Open Space Element** ***Goal a. Monterey Bay*:** Preserve the Monterey Bay as the City's most significant natural resource. *Policy a.2*: Protect the marine habitats of Monterey Bay in cooperation with state and federal agencies. ***Goal e. Streams*:** Ensure streams continue to function as natural flood control channels and habitat for native plants and animals. *Policy e.1*: Maintain the City's streams by controlling erosion. **Safety Element *Goal c. Flood Hazards*:** Protect against flood hazards from the bay, lakes, and streams. *Policy c.1*: Consider and mitigate the potential hazards from storm waves, tsunami, high tidal conditions and flooding for projects along the Bay shoreline. Program c.1.a. Review all development proposals planned for areas within a 100-year flood hazard zone consistent with FEMA National Flood Insurance Program (NFIP) standards. Development proposed within these areas must be mitigated as needed to ensure conformance with NFIP standards.

TABLE 4.1-5 (Continued)
APPLICABLE CITY AND COUNTY REGULATIONS IN THE PROJECT AREA

Agency	Municipal Code or General Plan	Applicable Regulation or Policy
City of Monterey (cont.)	City of Monterey General Plan (2005) (cont.)	*Policy c.4*: Design projects to: (1) maximize the amount of natural drainage that can be percolated into the soil, and (2) minimize direct overland runoff onto adjoining properties, water courses, and streets. This approach to handling stormwater reduces the need for costly storm drainage improvements, which are often miles downstream. Building coverage and paved surfaces must be minimized and incorporated within a system of porous pavements, ponding areas, and siltation basins.
City of Monterey	Municipal Code (2008)	**CHAPTER 9. Building Regulations ARTICLE 7 Flood Damage Prevention** ***Section 9-70.1 Establishment of Development Permit.*** A Development Permit shall be obtained before construction or development begins within any area of special flood hazards established in Section 9-69. Application for a Development Permit shall be made on forms furnished by the Floodplain Administrator and may include, but not be limited to plans prepared by a registered civil engineer in duplicate drawn to scale showing the nature, location, dimensions, and elevation of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities; and the location of the foregoing. **CHAPTER 31. Storm Water Management Utility ARTICLE 2.Urban Storm water Quality Management and Discharge Control** ***Section 31.5-15. Requirement to Prevent, Control, and Reduce Storm Water Pollutants.*** (b) New Development and Redevelopment. The City may require any owner or person developing real property to identify appropriate BMPs to control the volume, rate, and potential Pollutant load of storm water runoff from new development and redevelopment projects as may be appropriate to minimize the generation, transport and discharge of Pollutants. The City shall incorporate such requirements in any land use entitlement and construction or building-related permit to be issued relative to such development or redevelopment. The owner and developer shall comply with the terms, provisions, and conditions of such land use entitlements and building permits as required in this Article and the City Storm Water Utility Ordinance, Chapter 31.5, Article 1. These requirements may include a combination of structural and non-structural BMPs, and shall include requirements to ensure the proper long-term operation and maintenance of these BMPs.
Pacific Grove	General Plan (1994)	**Natural Resources** ***Goal 4*** Protect Pacific Grove's water and marine resources. **Public Facilities-Storm Drainage** ***Goal 3*** Accommodate runoff from existing and future development ***Goal 4*** Prevent property damage caused by flooding
Pacific Grove	Municipal Code (2007)	**Chapter 11.97 Community Floodplain** ***11.97.120 Standards of construction*.** If a proposed building site is in a flood-prone area, all new construction and substantial improvements, including manufactured homes, shall: (a) Be designed (or modified) and adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy; and (b) Be constructed: (1) With materials and utility equipment resistant to flood damage; (2) Using methods and practices that minimize flood damage; and (3) With electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding. (Ord. 97-52 § 1 (Exh. A, part), 1997).
Carmel by-the-Sea	General Plan and Coastal Land Use Plan (2003)	**Water Quality, Drainage and Marine Resources** ***Objective O5-43*** Protect and enhance the water quality and biological productivity of local creeks, wetlands, and Carmel Bay through the prevention of point- and non-point-source water pollution. ***Objective O5-46*** Use alternative building designs, which improve filtration of water through landscaping and natural areas. Ensure that all development includes appropriate water quality Best Management Practices (BMPs).

TABLE 4.1-5 (Continued)
APPLICABLE CITY AND COUNTY REGULATIONS IN THE PROJECT AREA

Agency	Municipal Code or General Plan	Applicable Regulation or Policy
Carmel by-the-Sea	Municipal Code (2008)	**Chapter 8.72 Community Floodplain** ***8.72.120 Standards of Construction*.** If a proposed building site is in a flood-prone area, all new construction and substantial improvements, including manufactured homes, shall: A. Be designed (or modified) and adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy; and B. Be constructed: 1. With materials and utility equipment resistant to flood damage; 2. Using methods and practices that minimize flood damage; and 3. With electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding. (Ord. 97-10 § 1, 1997). **Chapter 17.43 Water Quality Protection Ordinance** ***17.43.060 Development Standards*.** A. BMP Requirements and Implementation. All development shall be evaluated for potential adverse impacts to water quality and the applicant shall consider site design, source control and treatment control BMPs in order to minimize polluted runoff and water quality impacts resulting from the development. A SWMP requires the implementation of site design and source control BMPS, as specified in CMC 17.43.030(B), and a WQMP requires the implementation of site design, source control and treatment control BMPS, as specified in CMC 17.43.030(C). In order to maximize the reduction of water quality impacts, BMPs should be incorporated into the project design in the following progression: (1) site design BMPs, (2) source control BMPs, and (3) treatment control BMPs. Examples of these BMPs can be found in CMC 17.43.070 and Appendix I of the Carmel LIP. B. BMP Selection Process. In selecting BMPs to incorporate into the project design, the applicant should first identify the pollutants of concern that are anticipated to be generated as a result of the development. Table 1 in Appendix J should be used as a guide in identifying these pollutants of concern.
City of Seaside	General Plan (2004)	**Conservation and Open Space** ***Goal COS-3*:** Protect and enhance local and regional ground and surface water resources. *Policy COS-4.2*: Protect and enhance the creeks, lakes, and adjacent wetlands for their value in providing visual amenity, habitat for wildlife, and recreational opportunities. **Safety Element** ***Goal S-1*:** Reduce the risks to people and property from hazards related to seismic activity, flooding, geologic conditions, and wildfires. *Policy S-1.2:* Protect the community from flooding hazards. Implementation Plan S-1.2.1: Project Flood Control. Require developers to provide flood control systems in new development areas that mitigate potential on-site flooding hazards and also avoid increasing flood hazards elsewhere.
City of Seaside	Municipal Code (2007)	**Chapter 8.46 under Title 8, Health and Safety** ***Urban Storm Water Quality Management and Discharge Control*** would apply to all water entering the storm drain system generated on any developed and undeveloped lands lying within the city. The chapter lists requirements to prevent, control, and reduce stormwater pollutants, protection of water courses, and notification to emergency response officials in the event a chemical release occurs.
Sand City[2]	General Plan (2002)	**Conservation and Open Space** ***Goal 5.1*** Maintain the quality of water resources in Sand City and prevent their contamination. ***Goal 5.3*** Avoid adverse impacts of coastal erosion on development. *Policy 5.3.1*: The City shall not permit development within the 50-year erosion setback line, as established in the Moffatt & Nichol methodology.

TABLE 4.1-5 (Continued)
APPLICABLE CITY AND COUNTY REGULATIONS IN THE PROJECT AREA

Agency	Municipal Code or General Plan	Applicable Regulation or Policy
Sand City[2] (cont.)	General Plan (2002) (cont.)	**Public Safety and Noise** ***Goals 6.2*** Protect the lives and property of residents and visitors from flood hazards. *Policy 6.2.1:* Avoid the development of permanent structures within the 100-year flood zone. In instances where development is necessary within this zone, require that the facility be designed so that the finished floor elevation of the structure is at least 1 foot above the establish 100-year flood elevation or that any non-habitable structure be appropriately flood-proofed. **Goal 6.3** Reduce potential flooding caused by runoff that exceeds the capacity of storm drainage facilities. *Policy 6.3.1*: The City, through its development review process, shall ensure that all new development includes improvement to accommodate anticipated stormwater runoff.
City of Del Rey Oaks[2]	General Plan (2004)	**Open Space/ Conservation** ***Goal 2*****:** Preserve and protect the water quality, runoff, flow, and other resources of the Canyon Del Ray drainageway. ***Goal 3*****:** Protect the existing natural resources (the creeks and other areas identified as environmentally sensitive habitat)
Marina	General Plan (2000)	**Community Infrastructure** ***Stormwater Drainage*** **Goal 3.55** The manner in which stormwater runoff is accommodated has major implications for water quality, safety and overall aesthetics of the area. At present, storm water runoff is accommodated through the use of small, scattered retention basins. Since Marina has mostly fine to medium-grained, generally unconsolidated soils with a high percolation rate, this type of localized storm water drainage will most likely continue to be workable and practical. **Goal 3.56** There are, however, several adverse effects of the present system of storm water drainage that should be addressed. Among these are the current practice of fencing in retention areas without regard to issues of design or appearance and the need to prevent urban runoff from contaminating groundwater sources. The latter will become an increasing problem with construction of larger-scale commercial and industrial projects, which are normally characterized by more extensive areas devoted to parking, vehicular circulation, and outdoor storage. Throughout the planning area most soils are also highly susceptible to water erosion. **Community Design and Development** ***Water Resources*** **Goal 4.125** Approval of all future uses and construction within the Marina Planning Area shall be contingent upon compliance with the following policies and conditions intended to protect the quality of the area's water resources, avoid unnecessary consumption of water, and ensure that adequate water resources are available for new development.
Marina	Municipal Code (2007)	**Chapter 15.48** states provisions for flood prevention and reduction of flood hazards. A special flood hazard area is an area that is subject to one percent or greater change of flooding in a given year, which is the FEMA 100-year floodplain discussed above. The code also sets requirements for new storm drainage facilities.
Monterey County	North County Land Use Plan/ Local Coastal Plan (1999)	**Key Policy 4.3.4** All future development within the North County coastal segment must be clearly consistent with the protection of the area's significant human and cultural resources, agriculture, natural resources, and water quality.
Monterey County	Coastal Implementation Plan (1988)	**2 0.144 .07 Water Resources Development Standards.** The intent of this Section is to provide development standards which, will protect the water quality o the North County surface water resources and groundwater aquifers, control new development to a level that can be served by identifiable, available, and long-term water supplies, and protect North County streams, estuaries, and wetlands from excessive sedimentation resulting from l6and use and development practices in the watershed areas. (Ref. Policy 2.5.1)

[1] Monterey County includes the communities of Moss Landing and Castroville

[2] Sand City and Del Rey Oaks do not have Municipal Codes specific to surface water resources

SOURCE: Monterey County, 1982, 1998, 1999, 2008; City of Monterey, 2005, 2008; City of Carmel by-the-Sea, 2003, 2008: Pacific Grove, 1994, 2007; City of Seaside, 2004, 2007; City of Del Rey Oaks, 2004; Marina, 2000, 2007; Sand City, 2002.

4.1.4 Impacts and Mitigation Measures

4.1.4.1 Significance Criteria

Based on Appendix G of the CEQA Guidelines, a significant impact on surface hydrology and water quality would occur if the project would:

- Violate any water quality standards or waste discharge requirements;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in any additional or a certain amount of flooding on- or off-site;
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- Otherwise substantially degrade water quality;
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows;
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; or
- Expose people or structures to a risk from inundation by seiche, tsunami, mudflow, or sea level rise.

There are no regulatory standards or objectives that apply specifically to project discharges from desalination plants. Therefore, the impacts to ocean water quality from the discharges from the Moss Landing Project and North Marina Project were studied based on parameters (e.g., salinity, temperature, treatment chemicals, and source water quality- discussed below) that are representative of the existing ocean water quality and natural habitat/environment.

Based on the comments received concerning the Coastal Water Project from the California Coastal Commission, Monterey Bay National Marine Sanctuary, Central Coast RWQCB, and the SWRCB and based on their assessments of existing reports such as the Ocean Plan and Thermal Plan, and the scientific literature, the salinity standard that is likely to be imposed on coastal desalination projects in the central California region is 10 percent above ambient levels. A maximum duration or frequency associated with salinities more than 10 percent above ambient has not been established. Few studies have been performed on local benthic species and this criterion would provide a margin of protection above lethal salinities that have previously been reported. Because the regulation of coastal desalination plants in this region is still being developed, the following analysis applies the same 10-percent threshold to assessing the potential impacts due to the discharge of other constituents. Consequently, the project impact would be considered significant if the project discharge would:

- Increase the salinity at the edge of the zone of initial dilution[9] by 10 percent or more above the ambient salinity;
- Increase the concentration of chloride and sulfate by 10 percent or more above ambient concentrations of 19,000 and 2,700 mg/L, respectively,
- Increase the temperature of the natural receiving waters at the discharge point by 20°F or more[10]; or
- Increase the temperature by 4°F or more, of the natural receiving waters at the shoreline, the surface of any ocean substrate, or the ocean surface beyond 1,000 feet from the discharge system[10].

As indicated in ~~**Table 3.2**~~ **Table 3.4** in Chapter 3, Project Description, chemicals such as sulfuric acid, ferric chloride, and sodium ~~bisulfate~~ bisulfite would be used in the microfiltration/reverse osmosis treatment process. Sulfuric acid and ferric chloride would be added for pH adjustment and coagulation[11] during pretreatment. Sodium ~~bisulfate~~ bisulfite would be added for dechlorination following the reverse osmosis process. The chloride from ferric chloride would~~will~~ be discharged through the MLPP discharge. Ferric ion ~~will~~would be retained as a precipitate and separately disposed. Bisulfite ~~will~~ would be oxidized to sulfate and ~~will be~~ discharged through the MLPP discharge. ~~The treatment chemicals are anticipated to be found in the project discharge from the MLPP desalination facility that would flow into the Bay. As indicated in **Table 3.2** in Chapter 3, Project Description, chemicals such as sulfuric acid, ferric chloride, and sodium bisulfate would be used in the microfiltration/reverse osmosis treatment process. Sulfuric acid and ferric chloride would be added for pH adjustment and coagulation[11] during pretreatment. Sodium bisulfate would be added for dechlorination following the reverse osmosis process. The treatment chemicals are anticipated to be found in the project discharge from the MLPP desalination facility that would flow into the Bay.~~ The significance criteria for the concentration of treatment chemicals in the discharge are based on the criteria for salinity (see above) because there are no applicable water quality criteria. Chloride and sulfate are the main constituents that could be added through the treatment process at the desalination facility. Chloride is the dominant ion in seawater and directly affects salinity. Therefore, the significance threshold for chloride and sulfate is the same as in the salinity impact analysis.

The significance criterion for impacts from the MLPP project discharge due to an increase in concentration of source water contaminants, such as ~~pesticides~~ DDTs and dieldrin pesticides ~~and polychlorinated biphenyls (PCBs)~~ in the Moss Landing Harbor, is based on the Ocean Plan requirements. Concentrations of contaminants could be increased in the receiving water for the

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[9] The zone of initial dilution is defined as the zone immediately adjacent to a discharge where buoyancy-driven and momentum mixing produce rapid dilution of the discharge.

[10] Based on the Thermal Plan requirements.

[11] Pilot plant testing will determine whether coagulants are required.

brine discharges because the contaminants in the source water would be retained in the desalination concentrate and discharged in the form of brine. Water quality regulations require that a discharge of waste not exceed a water quality objective or increase an existing exceedance. Dieldrin and DDTs are~~is~~ used as a surrogate constituent to assess the water quality impact due to their ~~its~~ presence in the source water (~~i.e.,~~e.g., Moss Landing Harbor) ~~and its presence in high concentrations that exceed human health alert levels in mussels at numerous locations on the shore of Monterey Bay~~. The project impact due to contaminants in source water would be considered significant if the project discharge would:

- Exceed the Ocean Plan 30-day average for any contaminants ~~dieldrin of 0.00004 micrograms per liter (µg/L)~~ (SWRCB, 2005) or increase an existing exceedance of any contaminants~~for dieldrin concentrations~~.

The source water for the North Marina Project would be groundwater, which has low levels of dissolved oxygen (as discussed in Section 4.1.2). The significance criteria for impacts from the project discharge, which could have low levels of dissolved oxygen are based on the Ocean Plan (SWRCB, 2005) and the MRWPCA NPDES permit standards. The impact would be considered significant if the project discharge would:

- Decrease the ambient dissolved oxygen levels by the Ocean Plan standard of more than 10 percent or to less than 5 mg/L (SWRCB, 2005), whichever is more conservative, based on comparisons of sites near the discharge and reference site that are unaffected by the discharge.

4.1.4.2 Impacts and Mitigation Measures

Table 4.1-6 provides a summary of surface water resource impacts resulting from the Moss Landing Project and North Marina Project.

Impact 4.1-1: Project construction activities could cause erosion and increase stormwater runoff resulting in an adverse water quality impact.

Moss Landing Project

The potential water quality impact from erosion and increase in storm runoff from construction activities for the Moss Landing Project is less than significant with implementation of Mitigation Measure 4.1-1. The potential impact of the individual Moss Landing project components is discussed below.

Moss Landing Desalination Plant

Construction of the desalination plant at Moss Landing would involve activities such as site clearing, grading, excavation, and soil stockpiling at a 16-acre partially disturbed site approximately 1,500 feet east of the MLPP. The construction activities would generate loose, erodable soils that, if not properly managed, could be washed into surface water by rain or by water used during grading operations. Soil erosion could cause excess sediment loads and affect

TABLE 4.1-6
SUMMARY OF POTENTIAL SURFACE WATER RESOURCES IMPACTS

Facility	Impact 4.1-1	Impact 4.1-2	Impact 4.1-3	Impact 4.1-4	Impact 4.1-5	Impact 4.1-6	Impact 4.1-7	Impact 4.1-8	Impact 4.1-9	Impact 4.1-10
Moss Landing Site:										
Plant: Moss Landing Project	SM	SM	-	-	LTS	-	LTS	LTS	SM	LTS
Intake: Moss Landing Project	SM	SM	-	-	LTS	-	LTS	LTS	SM	LTS
Discharge: Moss Landing Project	-	-	LTS	SM	-	-	-	-	-	-
Transmission Main North Pipeline: *Moss Landing Project*	SM	SM	-	-	-	-	LTS	LTS	LTS	LTS
North Marina Site										
Plant: North Marina Project	SM	SM	-	-	LTS	-	-	-	-	-
Intake: North Marina Project	SM	SM	-	-	LTS	-	-	-	-	-
Discharge: North Marina Project	-	-	LTS	SM	-	-	-	-	-	-
Transmission Main South Pipeline	SM	SM	-	-	-	-	-	-	-	-
Terminal Reservoir Site	SM	SM	-	-	LTS	-	-	-	-	-
Valley Greens Pump Station	SM	SM	-	-	LTS	-	-	-	-	-
Aquifer Storage and Recovery Facilities	SM	SM	-	-	LTS	-	-	-	-	-
Monterey Pipeline	SM	SM	-	-	-	-	-	-	-	-
Carmel River	-	-	-	-	-	LTS	-	-	-	-
Moss Landing Project	SM	SM	LTS	SM	LTS	LTS	LTS	LTS	SM	LTS
North Marina Project	SM	SM	LTS	SM	LTS	LTS	-	-	LTS	LTS

SM	–	Significant Impact, can be Mitigated
SU	–	Significant Impact, Unavoidable
LTS	–	Less-than-significant Impact
–	–	No Impact

the water quality of any nearby ditch or water body. Construction activities would involve use of fuel and other chemicals that, if not managed properly, could be washed off into the stormwater, resulting in a significant water quality impact.

The project would be subject to the SWRCB General Construction Permit requirements, per NPDES permit requirements. ~~therefore~~Therefore, the project sponsor would prepare a Stormwater Pollution Prevention Plan (SWPPP) along with a Notice of Intent prior to construction. The SWPPP would be subject to review and approval of Monterey County ~~CPUC~~. Implementation of the SWPPP would begin with the commencement of construction and continue through the completion of construction.

~~The project would be subject to the SWRCB General Construction Permit requirements, therefore the project sponsor would prepare a Stormwater Pollution Prevention Plan (SWPPP) along with a Notice of Intent prior to construction. The SWPPP would be subject to review and approval of CPUC. Implementation of the SWPPP would begin with the commencement of construction and continue through the completion of construction.~~

As discussed in Section 4.1.3, Regulatory Framework, the SWPPP is required to include specific elements such the erosion and stormwater control measures that would be implemented onsite. At a minimum, the SWPPP shall include the following:

- Description of construction materials, practices, and equipment storage maintenance;
- List of pollutants likely to contact stormwater and site specific erosion and sedimentation control practices;
- List of provisions to eliminate or reduce discharge of materials to stormwater; and
- BMPs for fuel and equipment storage;
- Non-stormwater management measures such as installing specific discharge controls during activities such as paving operations, vehicle and equipment washing and fueling.
- Equipment, materials, and workers will be available for rapid response to spills and/or emergencies. All corrective maintenance or BMPs will be performed as soon as possible, depending upon worker safety.

Examples of typical construction BMPs include scheduling or limiting activities to certain times of the year, installing sediment barriers such as silt fence and fiber rolls, maintaining equipment and vehicles used for construction, tracking controls such as stabilizing entrances to the construction site, and developing and implementing a spill prevention and cleanup plan. BMPs such as scheduling or limiting activities to certain times of the year, installing sediment barriers such as silt fence and fiber rolls, maintaining equipment and vehicles used for construction, tracking controls such as stabilizing entrances to the construction site, and developing and implementing a spill prevention and cleanup plan.

Further, implementation of Mitigation Measure 4.1-1 and compliance with the applicable Monterey County code for construction in the proximity of watercourses (see Local Regulatory Section) would minimize adverse water quality impacts. The impact would be less than significant with mitigation.

Pipelines: Transmission Main North, Transmission Main South, ASR, Monterey

Pipeline construction would involve installation of the source water pipeline from the MLPP site to the equalization basin at the desalination facility and the return flow pipeline to the disengaging basin at the MLPP site. The product water or water supply pipelines would include the approximately 8-mile Transmission Main North, approximately 10-mile Transmission Main South, approximately 2-mile pipeline for the aquifer storage and recovery (ASR), and approximately 5-mile Monterey Pipeline.

Construction activities would involve earthmoving activities such as excavation, grading, soil stockpiling, and backfilling. Pipeline construction would occur primarily through trenching along existing roadways (public right-of-ways) and jack and bore tunneling at sensitive areas such as stream crossings. Soil disturbance during construction could result in erosion and subsequent discharge of sediment to adjacent surface water or drainages such as Salinas River, Alisal Slough, Tembladero Slough, or Moro Cojo Slough. The pipeline at the Salinas River crossing would be installed on the piers of the Monte Road bridge, which would minimize impacts from soil disturbance. In addition, use and storage of chemicals associated with construction such as fuels, oils, antifreeze, coolants, and other substances could adversely affect water quality if the chemicals were inadvertently released to surface waters, which would be a significant impact. However, the project sponsor would comply with the General Construction Permit and implement the BMPs, as part of Mitigation Measure 4.1-1 and as discussed for the desalination facility. The impact would be less than significant with mitigation.

Storage Facilities: Terminal Reservoir, ASR

The Moss Landing Project would involve construction of the Terminal Reservoir in Seaside. Construction of the reservoir would consist of installing two 2-million-gallon (MG), 132-foot-diameter, and 30-foot high circular tanks. Minimal land disturbance work is expected, if any, related to any buried pipelines or manholes or to retrofit or upgrade inlets. The impacts could be significant, however localized to the reservoir site (see **Figure 3-17** in Chapter 3). The impact would be minimized to less than significant levels with implementation of BMPs and stormwater control measures similar to those discussed for the desalination facility and the pipelines, and Mitigation Measure 4.1-1.

The proposed ASR system would include construction of two injection/extraction wells at two different sites along General Jim Moore Boulevard. Construction would involve site clearing and grading prior to installation of the tanks and wells. Impacts to surface water quality from construction activities would be similar to those discussed under the desalination facility above, although would be lesser in extent given the smaller areal extent of the wells. The impact would be potentially significant but mitigated to less-than-significant through implementation of Mitigation Measure 4.1-1. Long term groundwater impacts and permits required to drill the intake wells are discussed in Section 4.2, Groundwater Resources.

Pump Stations: Moss Landing Desalination Facility, Valley Greens, ASR

Construction of the new inlet pump station at the desalination facility, Valley Greens pump station, and the ASR pump station at the Terminal Reservoir site would involve site clearing and grading prior to building a concrete pad and installing a pumping station. Impacts to water quality from the construction activities would be similar in nature to that of the desalination facility, although would be lesser in extent given the smaller areal extent of the pump stations and the current developed or graded nature of the pump station site. Please refer to the discussion under Desalination Plant above. The impact would be potentially significant and would be minimized to less-than-significant levels with implementation of Mitigation Measure 4.1-1.

Moss Landing Project Significance: Less than Significant with Mitigation.

North Marina Project

The potential impact of construction activities for the North Marina Project to cause erosion and increase runoff resulting in an adverse water quality impact, is less than significant with implementation of Mitigation Measure 4.1-1. The potential impact of the individual North Marina project components is discussed below.

North Marina Intake Facility

Construction of the intake facility would consist of drilling six slant wells on an approximately 1-acre site. For each slant well, approximately 120 cubic yards of drilling spoils would be generated and hauled offsite for disposal. Construction of the slant wells would require large drilling machinery that would require use of fuels and other chemicals that, if not properly managed, could be washed off into a nearby ditch or water body and would adversely affect water quality. This could be a significant impact. The project would be subject to the General Construction Permit requirements; therefore, the project sponsor would prepare a SWPPP prior to construction. The SWPPP requirements would be similar to that for the Moss Landing Project (please refer to the discussion above; see Mitigation Measure 4.1-1). The impact would be potentially significant, but would be reduced to less than significant with implementation of Mitigation Measure 4.1-1. Long term groundwater impacts and permits required to drill the intake wells are discussed in Section 4.2, Groundwater Resources.

North Marina Desalination Plant

Construction of the desalination plant would occur on a 10-acre site south of the existing MRWPCA WWTP in Marina and have similar impacts as those discussed for the desalination facility for the Moss Landing Project. Due to the proximity to the Salinas River, the erosion control measures discussed under the Moss Landing Project would be implemented during construction of this facility. Please refer to the discussion above. The impact of the desalination facility construction on water quality would be potentially significant and minimized to less-than-significant levels through implementation of Mitigation Measure 4.1-1.

Pipelines: Transmission Main South, Monterey, Source Water, Return Flow

An approximately 3-mile source water pipeline would be installed along Reservation Road and Beach Road. A return flow pipeline would be installed from the desalination facility to the MRWPCA outfall for brine disposal. Construction of the pipelines from North Marina to Terminal Reservoir (transmission main south pipeline) and for the Seaside/Carmel Valley Conveyance (Monterey pipeline) would occur primarily along public roadways. Please refer to the discussion of the pipeline construction for the MLPP. The impact of the pipeline construction on water quality would be potentially significant and minimized to less-than-significant levels through implementation of Mitigation Measure 4.1-1.

Storage Facilities: Terminal Reservoir, ASR

The North Marina project would include construction of the Terminal Reservoir and ASR system. The proposed ASR system would include construction of two injection/extraction wells at two different sites along General Jim Moore Boulevard (See description in the Moss Landing project impact discussion above and refer to Section 4.2, Groundwater Resources, for additional information). The impact of the storage facility construction on water quality would be potentially significant and minimized to less-than-significant levels through implementation of Mitigation Measure 4.1-1.

Pump Stations: North Marina Desalination Facility, ASR, Valley Greens

The North Marina Project would include two pump stations at the North Marina desalination plant, an ASR pump station, and Valley Greens pump station. The impacts would be similar to those discussed for pump stations under the Moss Landing Project. The impact of the pump station construction on water quality would be potentially significant and minimized to less-than-significant levels through implementation of Mitigation Measure 4.1-1.

North Marina Project Significance: Less than Significant with Mitigation.

Mitigation Measure

Mitigation Measure 4.1-1: The project sponsor will implement the following:

- For construction activities in the proximity to the Elkhorn Slough, Moro Cojo Slough, old Salinas River, and Moss Landing Harbor, the project sponsor will implement additional erosion control measures such as stabilizing slope, preventing or minimizing stream bank or channel disturbance through selection of narrowest crossing location, or placing work areas at least 50 feet from the stream channel (CASQA, 2003).

- The project sponsor will develop and implement a monitoring program as required under the General Construction Permit. The project sponsor will require the contractor to conduct inspections of the construction site prior to anticipated storm events and after the actual storm events. During extended storm events, the inspections will be conducted after every 24-hour period. The inspections will be conducted to identify areas contributing to stormwater discharge, to evaluate whether measures to reduce pollutant loadings identified in the SWPPP are adequate and properly installed and functioning in accordance with the General Construction Permit, and to determine whether additional control practices or corrective maintenance activities are needed.

Significance after Mitigation: Less than Significant.

Impact 4.1-2: Excavation during construction could require dewatering of shallow groundwater. The water discharge, if contaminated, could adversely affect surface water.

Moss Landing and North Marina Projects (All Project Facilities)

Groundwater levels vary throughout the project area and by time of year. Depths of excavation would also vary with each project component. Project construction activities, particularly trenching (for all project facilities), jack and bore tunneling (for pipelines), and installation of the slant wells as a part of the North Marina Project may intercept shallow or perched groundwater, requiring temporary localized dewatering to facilitate construction. Construction of the two 1.5-million gallon-tanks as a part of Clearwell Reservoir in the Moss Landing Project and the North Marina Project would require excavation, which could intercept shallow groundwater.

~~Construction of the two 1.5-million-gallon-tanks as a part of Clearwell Reservoir in the North Marina Project would require excavation, which could intercept shallow groundwater.~~ Groundwater encountered during excavation would be pumped and discharged to the local drainage system or receiving waters. The extracted groundwater could contain materials used during typical construction activities such as silt, fuel, grease or other chemicals or contaminants present in local soil and/or groundwater. The discharge from construction dewatering could thus contaminate downstream surface water. This could be a significant impact. As discussed in Section 4.1.3, Regulatory Framework, the extracted groundwater would be required to be tested for possible pollutants. The tests are generally based on the source of the water, land use history of the construction site, and potential impacts to the quality of the receiving water. The disposal of the extracted groundwater would require coverage under the NPDES permit for dewatering. Depending upon the water quality tests, the permit could be a waiver, a site-specific permit or a permit for low threat discharges. Higher level of contamination would require implementation of treatment and disposal method to minimize any adverse impacts to the receiving waters. In addition to complying with the NPDES dewatering permit requirements, implementation of **Mitigation Measure 4.1-2** would ensure that the impact would be less than significant. Please refer to Section 4.2, Groundwater Resources, for details on impacts related to groundwater well development.

Moss Landing Project and North Marina Project Significance: Less than Significant with Mitigation

Mitigation Measure

Mitigation Measure 4.1-2: The project sponsor shall implement the following measures:

- Notify the RWQCB prior to discharge of the extracted groundwater and provide the results of the tests performed; and
- Conduct treatment of the extracted groundwater as required under the permit issued by the RWQCB.

Significance after Mitigation: Less than Significant.

Operational Impacts

Impact 4.1-3: The product water generated at the desalination facilities would be used as potable water that would be compliant with the drinking water standards.

Moss Landing Project

The desalination facility at the MLPP would generate 10 mgd of product water. As discussed in Chapter 3, Project Description, and the setting section above, the source water for the proposed project would be cooling water from the MLPP intake (i.e., the water from the Moss Landing Harbor). The water in the harbor may contain contaminants such as algal toxins, pesticides, fertilizers, pharmaceuticals, oil, and grease from surrounding land uses and tributaries. The source water may exhibit natural changes in the fluctuating contaminant levels. Typically, water salinity changes are triggered by natural diurnal and seasonal events. In addition, the intake water turbidity and microbial concentration changes seasonally and vary significantly due to rain events (CalAm and RBF Consulting, 2005).

Water diverted from the disengaging basin would flow into an equalization basin to stabilize the temperature and quality of the source water. ~~Water diverted from the disengaging basin would flow into an equalization basin to stabilize the temperature.~~ The source water would then undergo pretreatment such as coagulation and flocculation, microfiltration, followed by reverse osmosis (RO), and post-treatment for pH adjustment and disinfection at the desalination facility. The pretreatment facilities would be equipped with filter effluent turbidimeters and particle counters, which would allow continuous monitoring of the pretreatment filter performance that would help trigger adjustments to accommodate changes in source water quality. The USEPA recognizes RO membrane treatment as a best available technology for water treatment and for meeting future water quality regulations. The RO system membrane performance would be continuously monitored through the feed source water, permeate (product water) conductivity, and the differential pressure through the membranes. ~~If the permeate salinity (i.e., total dissolved solids levels) exceeds the design level, the~~ The membranes would be periodically cleaned to recover their original performance capabilities. In addition, an average of 10 percent to 15 percent of the membrane elements would be replaced every year, thereby maintaining the product water quality at steady levels (CalAm and RBF Consulting, 2005).

~~The RO system membrane performance would be continuously monitored through the feed source water, permeate (product water) conductivity, and the differential pressure through the membranes. If the permeate salinity (i.e., total dissolved solids levels) exceeds the design level, the membranes would be cleaned to recover their original performance capabilities. In addition, an average of 10 percent to 15 percent of the membrane elements would be replaced every year, thereby maintaining the product water quality at steady levels (CalAm and RBF Consulting, 2005).~~

The treatment processes employed to generate the product water would ensure compliance of the product water with the Safe Drinking Water Act and the federal primary and secondary drinking water standards As discussed in Chapter 3, Project Description, hardness, alkalinity, and pH of the product water generated at the desalination facility would be adjusted prior to distribution to make the water more compatible with existing potable water quality in the CalAm system and to ensure acceptable water quality. The water would be distributed for potable use under a CDPH water supply permit. CalAm operates its Monterey Public Water System on a permit issued by the CDPH pursuant to California Health & Safety Section 116525. Because the proposed project would modify a substantial portion of the System's source water, which would have a different method of treatment than the existing water supply, CalAm would apply to the CDPH to amend its existing permit. (California Health & Safety Code Section 1165509(a).) As part of the water supply permit application, CalAm would submit a technical report that would provide a detailed description of source water, water quantity, assessment of vulnerability to contamination, source water quality analysis, and treatment and design information. As discussed earlier, the treatment processes would ensure compliance of the product water with potable water standards (CalAm and RBF Consulting, 2005). The impact would be less than significant.

Moss Landing Project Significance: Less than Significant.

North Marina Project

The desalination facility at North Marina would generate 11 mgd of product water, which would require a water supply permit obtained from the CDPH and compliance with the Safe Drinking Water Act. A combination of ocean and brackish water pumped from the groundwater wells would undergo reverse osmosis and chlorination at the facility (see discussion above for additional information). The source water is expected to have lesser fluctuations in temperature and salinity than seawater, which would be used for the Moss Landing Project. Because the source water would be of higher quality and less variable water quality, no additional impacts from the source water are anticipated on the potable water quality. In addition, because of the expected lower concentrations of tri-halomethanes and halo-acetic acid precursors in the water, the formation of disinfection by-products in the desalinated water is expected to be less. Further, due to the filtering action of the aquifer matrix, this water is expected to be of low turbidity, as well as stable temperature and salinity (CalAm and RBF Consulting, 2005). Because the source water would be of higher quality and less variable, the desalination process is simplified and no additional impacts to potable water quality are anticipated. The product water, as a result, would comply with the Safe Drinking Water Act and CDPH water supply permit with quality consistent with existing water distributed by CalAm. Refer to the discussion under Moss Landing Project. The impact would be less than significant.

North Marina Project Significance: Less than Significant.

~~**Significance after Mitigation:** Less than Significant.~~

Impact 4.1-4: The project discharge from the desalination facility could degrade the marine water quality in Monterey Bay.

The project discharge - a combination of MLPP cooling water and the desalination brine generated from the desalination facility - could degrade the marine water quality in Monterey Bay. Analysis of the impact of project discharges on ocean water quality is based on a review of existing water quality conditions in the Moss Landing Harbor and Monterey Bay, an evaluation of how the project discharge would alter the existing conditions, and whether the change would be significant. Dilution calculations, discharge plume models, and groundwater models were completed for the projects (**Appendices C, D,** ~~and~~ **E, and Q**). The analysis of the project discharge impacts takes into account the different water sources and discharge environments for each project.

Moss Landing Project

The project discharge from the Moss Landing desalination facility could degrade the marine water quality in Monterey Bay by increasing the salinity or the concentrations of other constituents in the Bay beyond the objectives set in the California Ocean Plan or by increasing existing exceedances. The proposed desalination facility would operate concurrent with the operation of the MLPP; the facility would be temporarily shut down when MLPP shuts down for maintenance. The desalination process at the MLPP would operate at 44~~45~~ percent efficiency (the North Marina Project would operate at 50 percent efficiency); approximately ~~23.5~~24 mgd of source water would undergo pre-treatment, followed by reverse osmosis and post-treatment at the desalination facility to generate 10 mgd of product water for distribution and 12.~~2~~ 7mgd of brine for discharge. ~~Approximately 1.3 mgd of backwash water would be generated during pre-treatment and reverse osmosis, which would be recycled back to the disengaging basin (see **Figures 3-11** and **3-12** in Chapter 3, Project Description).~~ The solids from the pretreatment filtration processes would be hauled to a landfill (see Section 4.11, Public Services and Utilities, for details). The resulting 12.7 mgd of brine ~~and 1.3 mgd of backwash seawater~~ would be discharged in combination with the MLPP cooling water via the MLPP outfall as project discharge into Monterey Bay. Approximately 1.3 mgd of backwash seawater ~~would be~~ generated during pre-treatment and reverse osmosis, ~~which~~ would be recycled back to the disengaging basin (see **Figures 3-11** and **3-12** in Chapter 3, Project Description) or discharged along with the brine via the MLPP outfall into Monterey Bay. ~~The solids from the pretreatment filtration processes would be hauled to a landfill (see Section 4.11, Public Services and Utilities, for details). The resulting 12.2 mgd of brine would be discharged in combination with the MLPP cooling water via the MLPP outfall as project discharge into Monterey Bay.~~ The project discharge would potentially affect the receiving water quality (i.e., salinity, temperature, treatment chemicals, and source water quality) at Monterey Bay, which is discussed below.

Salinity

Salinity at both the cooling water intake and the MLPP outfall varies seasonally according to local inputs of freshwater and oceanographic conditions (Appendix C). Benthic organisms[12] are sensitive to changes in salinity, but because benthic organisms adapt to such salinity variation

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[12] Benthic organisms live on, in, or near the seabed

over time, it is possible that relatively short-term salinity fluctuations that could be associated with the discharge would exceed salinity objectives being considered by water quality regulators. Therefore, the analysis of salinity effects primarily considers short-term salinity fluctuations.

To assess the effects on the salinity levels, Visual Plumes modeling was conducted (CalAm and RBF Consulting, 2005). Visual Plumes is an accepted diffused discharge model. However, Visual Plumes does not adequately model the behavior of a negatively buoyant plume (i.e. a plume that sinks towards the bottom), nor can it describe the behavior of plumes that do not fully develop because of contact with the water surface, which occurs at MLPP. Consequently, in the absence of appropriate near-field dilution modeling, a conservative approach was taken that considered the effects of the project discharge and assumed that the discharge a) would settle to the bottom around the MLPP diffuser prior to dilution and b) would not be diluted by either waves or currents.

For the conservative approach, project discharge dilution calculations were completed (Appendix C). The salinity of the project discharge at MLPP was calculated as a function of the intake salinity and MLPP flow rate, and the rate of product water generation. The salinity data, which were collected at 5-minute intervals (and subsequently subsampled to hourly) at the Moss Landing Marine Laboratories small boat dock from February 16, 2007 to April 30, 2008 (approximately 14.5 months), were used as a proxy for the salinity at the intake (Appendix C). The inflow rate for the MLPP from February 16, 2003 to April 30, 2004 was used. As discussed previously, 10 mgd of product water would be generated under the Moss Landing Project with brine discharge of 12.7~~3~~ mgd and 1.3 mgd of backwash seawater~~12.2 mgd~~. There was no overlap in time between the flow rate and salinity time series, but the combination provides a range and frequency of values of the salinity for the project discharge. As there was limited salinity data available near the outfall and there was no appropriate discharge dilution modeling, the ambient salinity used to estimate increases due to desalination operations in this analysis is from Moss Landing Harbor.

The amount that the salinity of the discharge exceeds the salinity of the intake is solely a function of the power plant intake flow rate and the rate of freshwater production. Exceedances of 110 percent of the intake salinity occurred 1.3 percent of the time during power plant operation, with a maximum duration of 26 hours, and only when MLPP discharge was less than 110 mgd. The power plant was not operating 1.1 percent of the time period that was analyzed to make these discharge salinity calculations (Appendix C).

Although there are no available data to suggest a 10-percent exceedance of ambient salinity would be lethal in 26 hours, the 10-percent figure ~~is being~~ was suggested ~~by~~ in conversations with staff from the Central Coast Water Board and the Monterey Bay National Marine Sanctuary ~~regulatory agencies~~ as the maximum allowable. This maximum is consistent with that suggested by the World Health Organization (WHO, 2007) and falls within the range of salinities (i.e., 75%–125%) at which the sand crab, *Emerita analoga*, was shown to survive for 24 hours (Gross, 1957). Consequently, the duration of the exceedances of greater than 110 percent (i.e., 26 hours) of the intake salinity could be considered high. Therefore, the high duration of exceedance of the ambient salinity levels is considered to result in a significant impact. The effects of elevated salinities on marine organisms are discussed in Section 4.3, Marine Biological Resources. With implementation of Mitigation Measure 4.1-4a, the impact would be reduced to a less-than-significant level.

~~Although there are no available data to suggest a 10-percent exceedance of ambient salinity would be lethal in 26 hours, the 10-percent figure is being suggested by regulatory agencies as the maximum allowable. Consequently, the duration of the exceedances of greater than 110 percent (i.e., 26 hours) of the intake salinity could be considered high. Therefore, the high duration of exceedance of the ambient salinity levels is considered to result in a significant impact. The effects of elevated salinities on marine organisms are discussed in Section 4.3, Marine Biological Resources. With implementation of Mitigation Measure 4.1-4a, the impact would be reduced to a less-than-significant level.~~

Temperature

Based on three years of MLPP discharge temperature data (August 2002 to July 2005), the existing discharge does not exceed the significance thresholds stated above and complies with the Thermal Plan standards (CalAm and RBF Consulting, 2005). The desalination operation at MLPP would not increase the project discharge temperature and would potentially decrease the project discharge temperature from the MLPP outfall. ~~The desalination operation at MLPP would not increase the project discharge temperature.~~ The increase in temperature of the ambient water in Monterey Bay at the discharge point would be less than 20°F. The project discharge would be less buoyant and denser than the existing discharge, due to the higher salinities. Therefore, the increase in temperature at the surface would be slightly less than under existing conditions. The impact would be less than significant.

Treatment Chemicals

Using the estimated ambient concentrations of chloride and sulfate of 19,000 mg/L and 2,700 mg/L respectively, and applying the minimum possible dilution of the project discharge that would occur at the MLPP outfall, the sulfate and chloride levels would be increased by 0.58 percent and 0.02 percent, respectively (see **Table 4.1-7**), which is substantially lower than the 10 percent increase threshold. The impact would be less than significant.

Source Water Quality-Contaminants

The source water for the Moss Landing Project is the water from Moss Landing Harbor that contains legacy pesticides and other contaminants described in the Environmental Setting above. The project discharge would contain some of the chemicals from the source water that would be removed in the desalination process and ultimately flow back into Monterey Bay. While there are limited data on the concentrations of contaminants in Moss Landing Harbor and at the outfall locations, mussels on the shore of Monterey Bay have exhibited high dieldrin concentrations and data are available for concentrations of dieldrin in both water and mussels.

TABLE 4.1-7
LEVELS OF SULFATE AND CHLORIDE IN THE PROJECT DISCHARGE FOR THE MOSS LANDING PROJECT

Treatment Chemical Constituent[1]	Concentration in brine, mg/L[2]	Ambient concentration in Monterey Bay, mg/L	Minimum project discharge, mgd[3]	Maximum project discharge concentration, mg/L	Maximum percentage increase over ambient concentration
Sulfate[4]	2,764	2,700	50	2,715.6	0.58%
Chloride[5]	19,015	19,000	50	19,003.7	0.02%

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[1] Includes all treatment chemicals that would be used in pretreatment and reverse osmosis process
[2] Return stream concentrations are from Table 3-2
[3] Minimum project discharge is calculated by subtracting the product water flow (10 mgd) from the minimum MLPP flow (60 mgd)
[4] Sulfuric Acid + Sodium Bisulfite ~~Bisulfate~~ = Sulfate
~~4 Sulfuric Acid + Sodium Bisulfate = Sulfate~~
[5] Chlorine + Ferric Chloride = Chloride

Moss Landing Harbor contains contaminated sediments and has high concentrations of contaminants in resident organisms. The contaminants may have originated in upstream agricultural watersheds or from local activities. Reported dry-weight concentrations of total DDTs (a pesticide) in sediment in the Moss Landing Harbor range from 308 to 963 micrograms per kilograms (μg/kg), which are substantially above the National Oceanographic Atmospheric Administration (NOAA) effects range median of 46.1 μg/kg (Rice et al, 1993). The NOAA effects range median represents the threshold above which 80 percent to 100 percent of samples exhibit adverse effects due to DDT (NOAA, 1999). Moreover, a report for the Monterey Bay National Marine Sanctuary identified the Moss Landing Harbor area as having relatively high concentrations of contaminants relative to other locations in the Sanctuary (Hardin et al., 2007). These contaminants include dieldrin, chlordanes, DDTs, polynuclear aromatic hydrocarbons, and PCBs.

Although there are few published data for concentrations of contaminants in the water of Moss Landing Harbor (Kozlowski et al., 2004), it is possible to estimate water concentrations of organic contaminants from mussel data collected by the NOAA Status and Trends program (Kimbrough et al., 2008). Because DDTs, which include six separate homologous compounds, are known to occur in high concentrations in Moss Landing harbor and because dieldrin is found in concentrations exceeding human health alert levels in mussels at several locations in Monterey Bay (CCLEAN, 2007), these two pesticides were chosen as surrogates ~~it was chosen as a surrogate~~ for organic contaminants in Moss Landing Harbor. ~~An a~~Approximate bioconcentration factors[13] can be calculated for DDT and dieldrin in San Francisco Bay from water and mussel data collected by the Regional Monitoring Program for Water Quality since 1994 (San Francisco Estuary Institute, 2008). During the coagulation and flocculation process in desalination, the DDT and dieldrin attached to particulate matter would settle and be hauled to a landfill. The dissolved forms of DDT and dieldrin could be concentrated through the desalination process and discharged into Monterey Bay. The bioconcentration factors for dissolved DDT and dieldrin in San Francisco Bay, near Yerba Buena Island, have~~s~~ ranged from 313,543 to 966,631 and from 126,202 to

498,750, respectively. If the minimum bioconcentration factors from San Francisco Bay are ~~is~~ applied to the highest DDT and dieldrin concentrations from NOAA mussel data for Moss Landing Harbor (1074.74 µg/kg, dry weight, for DDTs in 1998 and ~~(~~147.19 µg/kg, dry weight, for dieldrin in 1997), the worst-case concentrations of DDT and dieldrin in Moss Landing Harbor would be 0.00343 µg/L and 0.00117 µg/L, respectively, which is significantly higher than the 30-day averages of 0.00017 µg/L and 0.00004 µg/L, respectively, allowed by the California Ocean Plan (SWRCB, 2005).

~~Because dieldrin is found in concentrations exceeding human health alert levels in mussels at several locations in Monterey Bay it was chosen as the surrogate for organic contaminants in Moss Landing Harbor (CCLEAN, 2007). An approximate bioconcentration factor[13] can be calculated for dieldrin in San Francisco Bay from water and mussel data collected by the Regional Monitoring Program for Water Quality since 1994 (San Francisco Estuary Institute, 2008). During the coagulation and flocculation process, the dieldrin attached to particulate matter would settle and be hauled to a landfill. The dissolved form of dieldrin could be concentrated through the desalination process and discharged into Monterey Bay. The bioconcentration factor for dissolved dieldrin in San Francisco Bay, near Yerba Buena Island, has ranged from 126,202 to 498,750. If the minimum bioconcentration factor from San Francisco Bay is applied to the highest dieldrin concentration from NOAA mussel data for Moss Landing Harbor (147.19 µg/kg, dry weight, for 1997), the worst-case concentration of dieldrin in Moss Landing Harbor would be 0.00117 µg/L, which is significantly higher than the 30-day average of 0.00004 µg/L allowed by the California Ocean Plan (SWRCB, 2005).~~

Using DDTs and dieldrin as a surrogate for organic contaminants in Moss Landing Harbor, the estimated maximum concentration in the project discharge was compared to ambient concentrations reported by CCLEAN for a site approximately 5 miles offshore, nine miles northwest of MLPP (CCLEAN, 2007). The average concentrations of DDTs and dieldrin at this site from March 2004 through March 2008 were 0.00007 µg/L and 0.00002 µg/L for DDTs and dieldrin, respectively. The maximum concentrations of DDTs and dieldrin in the combined effluent represents a 20 percent increase in the concentrations of each over estimated maximum concentrations in Moss Landing Harbor ~~dieldrin~~ (see **Table 4.1-8**), which could be a significant impact if it either pesticide exceeds the California Ocean Plan objective ~~for dieldrin~~ or increases an existing exceedance. ~~Using dieldrin as a surrogate for organic contaminants in Moss Landing Harbor, the estimated maximum concentration in the project discharge was compared to ambient concentrations reported by CCLEAN for a site approximately 5 miles offshore, nine miles northwest of MLPP (CCLEAN, 2007). The maximum concentration of dieldrin in the combined effluent represents a 20 percent increase in the concentration of dieldrin (see **Table 4.1-8**), which could be a significant impact if it either exceeds the California Ocean Plan objective for dieldrin or increases an existing exceedance.~~ The impact would be reduced to a less-than-significant impact with implementation of Mitigation Measure 4.1-4b.

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[13] Bioconcentration factor refers to the amount of increase in mussel tissue concentrations over water concentrations (Risebrough et al., 1975).

TABLE 4.1-8
DISSOLVED DDTS AND DIELDRIN IN THE PROJECT DISCHARGE FOR THE MOSS LANDING PROJECT

Contaminant of Concern	Maximum Moss Landing Harbor concentration, μg/L[1]	Maximum brine concentration, μg/L	Minimum project discharge, mgd[2]	Maximum project discharge concentration, μg/L	Percent increase over Moss Landing Harbor intake
Dieldrin	0.00117	0.00212	50	0.00140	20.0%
DDTs	0.00343	0.00623	50	0.00411	20%

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[1] Estimated from bioconcentration factor calculated from San Francisco Bay
[2] Minimum project discharge is calculated by subtracting the product water flow (10 mgd) from the minimum MLPP flow (60 mgd)

Source Water Quality-Dissolved Oxygen

Under existing conditions, the MLPP discharge is required to adhere to the dissolved oxygen limits of the Ocean Plan. Although areas in Moss Landing Harbor sometimes have low dissolved oxygen, the dissolved oxygen would not substantially decrease due to the desalination process. Therefore, the impact is less than significant.

Moss Landing Project Summary

In summary, the project discharge from the proposed desalination facility at the MLPP could affect the water quality in Monterey Bay at varying levels depending upon the parameter of concern. The analysis includes potential impacts on Monterey Bay water quality due to elevated levels of salinity, temperature, treatment chemicals, concentration of contaminants, and dissolved oxygen content of the project discharge. The potential impact due to elevated salinity, greater than 110 percent of ambient salinity is potentially significant, but would be less than significant with the incorporation of Mitigation Measure 4.1-4a. The potential impact due to elevated temperature and treatment chemicals would be less than significant. The concentration of organic contaminants could exceed the Ocean Plan limits, which could result in a significant impact. The impact would be minimized with the incorporation of Mitigation Measure 4.1-4b. The project discharge would comply with NPDES permit and monitoring requirements of the RWQCB. The implementation of Mitigation Measures 4.1-4a and 4.1-4b would reduce the water quality impacts in Monterey Bay from the Moss Landing Project to a less-than-significant level.

Moss Landing Project Significance: Less than Significant with Mitigation.

Mitigation Measures

Mitigation Measure 4.1-4a: The project sponsor shall develop and implement a comprehensive monitoring program for the Moss Landing desalination facility. The CPUC shall review the program prior to implementation. The project sponsor shall maintain records of the monitoring results to document that the salinity in the project discharge is not exceeding the salinity criterion of 110 percent of ambient salinity in Monterey Bay. If the RWQCB adopts a salinity threshold requirement that is intended to provide equal or greater protection to the marine environment, the CPUC is authorized to amend this mitigation measure to conform to the RWQCB Order. The project sponsor shall implement the following features as part of the monitoring program:

- Continuously monitor the ambient salinity at the seabed near the discharge location, but outside of the zone of initial dilution (i.e., document ambient background conditions);
- Continuously monitor salinity levels at the seabed near the discharge location, inside the zone of initial dilution (i.e., where benthic organisms could be exposed to the discharge plume); ~~and~~
- Continuously monitor discharge flow rates; ~~.~~
- Conduct ~~Frequency of~~ measurements not less than twice per hour, preferably with real-time data availability and ~~with analysis of~~ monitoring data at least annually to determine the frequency and duration of exceedences; and
- Coordinate~~ion~~ between desalination plant operators and MLPP operators ~~sufficient~~ to allow implementation of the following remedial actions.

In the event the salinity in the project discharge ~~is greater~~ averages more than 110 percent of ambient salinity in Monterey Bay at the seabed near the discharge location for any 12-hour period, either the operations of the desalination facility shall be reduced or additional dilution shall be provided until the project discharge salinity in Monterey Bay at the seabed is less than 110 percent of ambient salinity in Monterey Bay.

~~In the event, the salinity in the project discharge is greater than 110 percent of ambient salinity in Monterey Bay at the seabed near the discharge location, the operations of the desalination facility shall be reduced until the project discharge salinity in Monterey Bay at the seabed is less than 110 percent of ambient salinity in Monterey Bay.~~

Mitigation Measure 4.1-4b: The project sponsor shall include the following measure in the comprehensive monitoring program prepared in compliance with Mitigation Measure 4.1-4a. The CPUC shall review the program prior to implementation. The project sponsor shall maintain records of the monitoring results to ensure compliance with the Ocean Plan. At a minimum, sampling for organic contaminants shall be done twice a year, in the wet and dry season, each for a 30-day period. The 30-day period should include sampling during times of reduced power plant discharge. The project sponsor shall implement the following features as part of the monitoring program:

- Perform high-volume, time-integrated water sampling for concentrations of organic contaminants, such as dieldrin and DDTs, at the two locations identified in Mitigation Measure 4.1-4a; ~~and~~
- Perform high-volume, time-integrated water sampling for concentrations of organic contaminants, such as dieldrin and DDTs, at the intake location; and ~~.~~
- Provide analysis of monitoring results at least annually.

~~Anytime~~ Data analysis shows that the concentration ~~the project discharge~~ of contaminants, such as dieldrin and DDTs, in the project discharge would be ~~is~~ greater than the inflow contaminant concentration and either exceed~~s~~ the Ocean Plan limits or increase~~s~~ an existing exceedance.~~,~~ The operation of the desalination facility shall be reduced or the discharge would be diluted to maintain the ~~until the~~ contaminant concentrations ~~drop~~ below the Ocean Plan limits or the inflow contaminant concentration.

- ~~Perform high-volume, time-integrated water sampling for concentrations of organic contaminants, such as dieldrin, at the two locations identified in Mitigation Measure 4.1-4a; and~~
- ~~Perform high-volume, time-integrated water sampling for concentrations of organic contaminants, such as dieldrin, at the intake location.~~

~~Anytime the project discharge of contaminants, such as dieldrin, is greater than the inflow contaminant concentration and either exceeds the Ocean Plan or increases an existing exceedance, the operation of the desalination facility shall be reduced until the contaminant concentrations drop below the Ocean Plan limits or inflow contaminant concentration.~~

Significance after Mitigation: Less than Significant.

North Marina Project

The existing MRWPCA outfall diffuser has 172 ports. The outfall diffuser is approximately 1,350 feet long and is located in a water depth of 95 to 109 feet below mean sea level. The ports discharge horizontally from either side of the diffuser, in an alternating pattern (Appendix D). The ports are approximately 6 inches above the rock structure used to attach the diffuser to the seafloor and spaced approximately 8 feet apart. Fifty-two ports nearest the shore are currently closed (Appendix D).

The project discharge from the North Marina desalination facility could degrade the marine water quality in Monterey Bay. Geoscience assumed the maximum salinity in the source water obtained from the slant wells could be 35 ppt (Appendix E). Salinity in Monterey Bay is usually lower than 35 ppt. At a process efficiency of 44~~50~~ percent, 11 mgd of product water would be generated with ~~11~~14 mgd of brine with salinity as high as ~~70~~62.5 ppt at the point of discharge. The ~~11~~14 mgd of brine would be discharged via the MRWPCA outfall, which consists of 120 operational ports. The brine would combine with wastewater effluent during the winter and would be discharged with minimal or no wastewater effluent during the summer. The 14~~11~~ mgd of brine would be discharged via the MRWPCA outfall, which consists of 120 operational ports. The brine would combine with wastewater effluent during the winter and would be discharged with minimal or no wastewater effluent during the summer. ~~For the purpose of the analysis, the impact is reviewed for summer conditions because it demonstrates the worst-case scenario with minimal dilution available for the project dischargeFor the purpose of the analysis, the impact is reviewed for summer conditions because it demonstrates the worst-case scenario with minimal dilution available for the project discharge.~~

Salinity

Flow Science, Inc. used a semi-empirical method and Visual Plumes methods to evaluate the discharge of the brine from the MRWPCA diffuser (Appendix Q~~D~~). The semi-empirical method is well grounded in empirical observations and has been verified for inclined negatively buoyant jets. Visual Plumes is an accepted diffused discharge model, but has not been verified for negatively buoyant jets. These methods were compared for a number of different brine flow and concentration scenarios. The worst-case scenario for impacts related to increased salinities near the seabed would occur during the summer, when there is little or no wastewater effluent available to blend with the brine discharge.

The model simulations assume an ambient summer temperature of 17° C and ambient background salinity at the seabed of 34.2 ppt (Appendix Q~~D~~). The ambient temperature and salinity levels are based on oceanographic survey data that was collected in 1975, 1976, and 1977, during the design of the MRWPCA outfall and diffuser. Monterey Bay is a dynamic environment where there is rarely no current. The model simulations assume no current and thus represent a worst-case scenario in terms of plume dilution and dispersion.

Based on the modeling results (see **Table 4.1-9**) reported for a point at the edge of the zone of initial dilution, the maximum seabed salinity predicted by the semi-empirical method would be 36.0~~8~~ ppt, which is approximately 5.2~~7.5~~ percent above the average ambient salinity of 34.2 ppt. The maximum seabed salinity predicted by the Visual Plumes method would be 35.1~~35.4~~ ppt, which is approximately 2.5~~3.6~~ percent above the average ambient salinity of 34.2 ppt used in the modeling.

TABLE 4.1-9
DISCHARGE MODELING RESULTS FOR THE NORTH MARINA PROJECT

	Input						Output			
Method	Product water, mgd	Inflow salinity, ppt[1]	Effluent Discharge, mgd	Effluent salinity, ppt[2]	Ambient salinity at seafloor, ppt	Plume diameter, inch	Dilution Factor[3]	Distance from port, ft	Maximum salinity at seafloor, ppt[4]	Percent above ambient salinity
Semi-Empirical	11	35	14~~11~~	~~70~~62.5	34.2	35~~30~~	16~~14~~	11.4~~9.4~~	36.0~~8~~	5.2~~7.5~~%
Visual Plumes	11	35	14~~11~~	~~70~~62.5	34.2	47~~39~~	31~~29~~	9.9~~8.1~~	35.1~~35.4~~	2.7~~3.6~~%

[1] Highest inflow salinity modeled by Geoscience for the proposed North Marina Project slant wells (**Appendix Q~~4.1C~~**)
[2] Effluent salinity is based on a desalination plant efficiency of ~~50~~44 percent
[3] Dilution factor represent the minimum dilution, maximum effluent concentration, at the seafloor
[4] The maximum salinity at the seafloor refers to a point at the edge of the zone of initial dilution (for a sinking plume this is the point at which it contacts the seabed)

SOURCE: FlowScience Inc., 2009 (see **Appendix Q**)~~, 2008 (see **Appendix 4.1B**~~)

~~The semi-empirical method assumes lower dilution, higher maximum plume salinity at the~~ seafloor, and higher percentage above ambient salinity. According to both modeling methods, for the North Marina Project, the discharge plume would have a maximum salinity at the seafloor that is within 10 percent of the ambient salinity. Based on these model results, the salinity impact from the brine discharge for the North Marina Project would be less than significant.

Temperature

The temperature of the discharge for the North Marina Project would likely be similar to the ambient temperature in Monterey Bay. The desalination project would not include a substantial change in water temperature. Therefore, the temperature impact from the brine discharge for the North Marina Project would be less than significant.

Treatment Chemicals

Although the water from the intake wells would have characteristics similar to seawater, the well water would have fewer suspended solids or particles as compared to the harbor water at MLPP. Regardless, the North Marina project may require a pretreatment process that includes coagulation and flocculation to remove particles. Sulfuric acid and ferric chloride would be used for the pretreatment process. Sodium bisulfite ~~bisulfate~~ would be used for dechlorination in the reverse osmosis process.~~Sodium bisulfate would be used for dechlorination in the reverse osmosis process.~~ Using the estimated ambient concentrations of chloride and sulfate of 19,000 mg/L and 2,700 mg/L, respectively, and applying the modeled dilution of brine (~~14~~16:1)[14] predicted by the semi-empirical model (Appendix Q~~D~~), the resulting sulfate concentration in the receiving water would be 2,704~~5.57~~ mg/L (i.e., an increase of approximately 0.15~~7~~ percent) (see **Table 4.1-10**), which would not be substantial. The resulting chloride concentrations in the receiving water would be 19,001~~1.07~~ mg/L (i.e., an increase of approximately 0.01 percent). Thus, the increase in both chloride and sulfate concentrations would likely be substantially less than 10 percent. The impacts due to the addition of treatment chemicals would be less than significant.

TABLE 4.1-10
DISCHARGE OF TREATMENT CHEMICALS FROM THE DESALINATION PROCESS FOR THE NORTH MARINA PROJECT

Treatment Chemical Constituent[1]	Concentration in brine, mg/L[2]	Ambient concentration in Monterey Bay, mg/L	Dilution Factor[3]	Discharge concentration, mg/L	Percentage increase from ambient
Sulfate[4]	2,764	2,700	16~~14~~	2,704~~.57~~	0.148%
Chloride[5]	19,015	19,000	16~~14~~	19,001~~.07~~	0.005~~01~~%

[1] Includes all treatment chemicals that would be used in pretreatment and reverse osmosis process
[2] Return stream concentrations are from Table 3-4~~2~~
[3] Dilution factor was determined in the Flow Science, Inc. modeling (**Appendix Q~~4.1B~~**)
[4] Sulfuric Acid + Sodium Bisulfite ~~Bisulfate~~ = Sulfate
[5] Chlorine + Ferric Chloride = Chloride

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[14] ~~14~~ 16 parts of project discharge to 1 part of ambient Monterey Bay water at the point of discharge

Source Water Quality-Contaminants

The source water for the North Marina Project would be extracted from subsurface slant wells that would draw mostly seawater from under the seafloor. Therefore, the source water is expected to have similar levels of salinity and other constituents as the ambient seawater adjacent to the discharge. ~~Dieldrin is~~ Because they have been broadly detected in the rivers and ocean waters of the Monterey Bay area (CCLEAN, 2007), DDTs and dieldrin are used as ~~an indicator~~ indicators of source water quality contamination.

~~Dieldrin is used as an indicator of source water quality contamination. The levels of dissolved dieldrin and other dissolved contaminants in the source water would be similar to the ambient water at the outfall locations.~~

The worst-case source water concentrations of ~~dieldrin~~ DDTs and dieldrin would probably be similar to their ambient water concentrations ~~of dieldrin~~ in Monterey Bay, adjacent to the outfall. Summer data from CCLEAN (2007) suggest ambient DDT and dieldrin concentrations could vary from 0 µg/L to 0.000043~~23~~ µg/L and 0 µg/L to 0.000006 µg/L, respectively. Using the maximum source water concentrations of these two contaminants ~~dieldrin~~, and applying the modeled dilution of the discharge (~~14~~16:1) predicted by the semi-empirical model (see Appendix Q~~D~~), maximum seabed concentrations of DDTs and dieldrin ~~was~~ were calculated (see **Table 4.1-11**). Under these worst-case summer scenarios, the maximum seabed concentrations of DDTs and dieldrin would be ~~0.000026 mg/L, which is significantly~~ substantially lower than the 30-day averages ~~of 0.00004 mg/L~~ allowed by the California Ocean Plan (SWRCB, 2005). Therefore, the impacts for these contaminants would be less than significant. Moreover, source-water concentrations of all organic contaminants for the North Marina Project would likely be much lower than the worst-case concentrations. This is because most organic contaminants readily adsorb to the surfaces of particles and the slant wells proposed for the North Marina Project would draw seawater through many feet of seafloor sand, which likely will filter most of the contaminants from the source water by trapping particles.

TABLE 4.1-11
WORST-CASE ~~LEVELS~~ CONCENTRATIONS OF ~~SULFATE AND CHLORIDE~~ CONTAMINANTS IN THE PROJECT DISCHARGE FOR THE NORTH MARINA PROJECT UNDER SUMMER CONDITIONS

Contaminant of Concern	Maximum Source Water and Ambient Monterey Bay Concentration, µg/L[1]	Maximum Project Discharge Concentration, µg/L	Maximum ~~Discharge~~ Concentration after Initial Dilution, µg/L	California Ocean Plan Limit, µg/L
DDTs	0.000043	0.000077	0.000045	0.000170
Dieldrin	0.000006~~23~~	0.000011~~46~~	0.000006~~26~~	0.000040

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[1] Measured at a site in southern Monterey Bay (CCLEAN, 2007)

The project discharge in the winter would differ from the summer because in the winter the brine would be combined with municipal wastewater from the MRWPCA treatment plant. The project discharge in winter is anticipated to have lower salinity and higher dilution than in the summer. Based on modeling results shown in Appendix D (Scenario 13), the dilution of the project discharge would be greater than 27:1 (i.e., 27 parts project discharge water to 1 part ambient Monterey Bay water). Using the maximum desalination source water and wastewater concentrations of DDTs and dieldrin, and applying the modeled minimum dilution of the discharge (27:1) predicted by the semi-empirical model, maximum seabed concentrations of these two contaminants were calculated (see **Table 4.1-11B~~b~~**). Under these worst-case winter scenarios, the maximum seabed concentrations of DDTs and dieldrin would be substantially lower than the 30-day averages allowed by the California Ocean Plan (SWRCB, 2005). Therefore, the associated impact would be less than significant.

TABLE 4.1-11B
WORST-CASE CONCENTRATIONS OF CONTAMINANTS IN THE PROJECT DISCHARGE FOR THE NORTH MARINA PROJECT UNDER WINTER CONDITIONS

Contaminant of Concern	Maximum Source Water and Ambient Monterey Bay Concentration, µg/L[1]	Maximum Wastewater Concentration, µg/L[2]	Maximum Project Discharge Concentration, µg/L	Maximum Project Discharge Concentration after Initial Dilution, µg/L	California Ocean Plan Limit, µg/L
DDTs	0.000063	0.000715	0.000438	0.000076	0.000170
Dieldrin	0.000023	0.000429	0.000251	0.000031	0.000040

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[1] Measured at a site in southern Monterey Bay March 2004 (CCLEAN, 2007)
[2] Measured in MRWPCA effluent February 2005 (CCLEAN, 2007)

~~The source water concentration of dieldrin would probably be similar to the ambient water concentration of dieldrin in Monterey Bay, adjacent to the outfall. Data from CCLEAN (2007) suggests ambient dieldrin concentration could vary from 0 µg/L to 0.000023 µg/L. Using the maximum source water concentration of dieldrin, ambient concentration of dieldrin, and applying the modeled dilution of the discharge (14:1) predicted by the semi-empirical model (see Appendix D), maximum seabed concentration of dieldrin was calculated (see **Table 4.1-11**). The maximum seabed concentration would be 0.000026 µg/L, which is significantly lower than the 30-day average of 0.00004 µg/L allowed by the California Ocean Plan (SWRCB, 2005). Therefore, the impact would be less than significant.~~

Source Water Quality-Dissolved Oxygen

Monterey Bay is a dynamic environment that includes variable concentrations of dissolved oxygen. It is anticipated that subsurface intake water would have lower levels of dissolved oxygen than seawater. Although there are no data available for dissolved oxygen concentrations in sub-bottom marine waters, groundwater generally has low levels of dissolved oxygen. A range of 0.5 mg/L to 2.0 mg/L based on nearby wells was used for this analysis (Kulongoski and Belitz, 2005). Ambient dissolved oxygen concentrations at depths similar to the MRWPCA outfall in Monterey Bay have ranged from 4.25 mg/L to 8.00 mg/L (KLI, 1998; KLI, 1999).

Using the estimated range of ambient concentrations of dissolved oxygen of 4.25 to 8.00 mg/L in Monterey Bay and applying the modeled dilution of brine (~~14~~16:1), the project discharge would reduce the dissolved oxygen levels approximately 3.11 ~~3.53~~ percent to 4.41 ~~5.00~~ percent at the maximum estimated source-water dissolved oxygen concentration of 2 mg/L (**Table 4.1-12**). Even with a dissolved oxygen concentration of 0.5 mg/L in the source water, the decrease in dissolved oxygen in the diluted discharge would be 5.19 ~~5.88~~ percent and 5.51 ~~6.25~~ percent for ambient concentrations in Monterey Bay of 4.25 mg/L and 8.00 mg/L, respectively. The percentage decrease in dissolved oxygen would be less than 10 percent for all scenarios.

TABLE 4.1-12
CHANGE IN DISSOLVED OXYGEN DUE TO THE DESALINATION PROCESS FOR THE NORTH MARINA PROJECT

Dissolved Oxygen Concentration Scenario	Discharge Concentration in Brine, mg/L	Ambient Concentration in Monterey Bay, mg/L[1]	Estimated Concentration after Dilution, mg/L	Percentage Difference from Ambient
maximum brine and minimum ambient	2.0	4.25	4.12~~4.10~~	-3.11%~~-3.53%~~
maximum brine and maximum ambient	2.0	8.00	7.65~~7.60~~	-4.41%~~-5.00%~~
minimum brine and minimum ambient	0.5	4.25	4.03~~4.0~~	-5.19%~~5.88%~~
maximum brine and maximum ambient	0.5	8.00	7.56~~7.5~~	-5.51%~~-6.25%~~

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[1] Ambient concentrations at depths similar to outfall (KLI, 1998; KLI, 1999)

~~Monterey Bay of 4.25 mg/L and 8.00 mg/L, respectively. The percentage decrease in dissolved oxygen would be less than 10 percent for all scenarios.~~The ambient dissolved oxygen concentration in Monterey Bay, near the MRWPCA outfall, may be as low as 4.25 mg/L. The Basin Plan for the RWQCB states that the dissolved oxygen concentration in Monterey Bay waters shall not be reduced below 5.0 mg/L at any time. Consequently, ~~W~~when ambient dissolved oxygen is less than or equal to 5.0 mg/L, any decrease in dissolved oxygen could be significant. The impact would be less than significant with implementation of Mitigation Measure 4.1-4c.

~~The ambient dissolved oxygen concentration in Monterey Bay, near the MRWPCA outfall, may be as low as 4.25 mg/L. When ambient dissolved oxygen is less than or equal to 5.0, any decrease in dissolved oxygen could be significant. The impact would be less than significant with implementation of Mitigation Measure 4.1-4c.~~

North Marina Project Summary

In summary, the project discharge from the proposed desalination facility at North Marina could affect the water quality in Monterey Bay at varying degrees depending upon the parameter of concern. The project discharge would consist of brine discharge with limited or no wastewater effluent available for dilution during the summer. Therefore, summer conditions were considered to be a conservative or worst-case scenario.

The analysis includes potential impacts related of salinity, temperature, treatment chemicals, potential contaminants in source water, and dissolved oxygen content of the project discharge. The potential impact due to elevated salinity, temperature, treatment chemicals and source water contaminants would be less than significant. The impact of low dissolved oxygen would be potentially significant, but the implementation of Mitigation Measure 4.1-4c would reduce impacts of low dissolved oxygen to a less than significant level.

> **North Marina Project Significance:** Less than Significant with Mitigation.

Mitigation Measure

> **Mitigation Measure 4.1-4c:** The project sponsor shall develop and implement an aeration system (e.g. that would provide dissolved oxygen in the discharge of 5.0 mg/L or higher). The CPUC shall review the aeration system prior to implementation.
>
> **Significance after Mitigation:** Less than Significant.

Impact 4.1-5: The proposed project would add impervious surfaces that could alter the drainage pattern and increase storm runoff that could exceed the storm drainage system. The increased runoff flow could cause downstream erosion, siltation, and/or flooding.

Moss Landing Project

The potential impact of additional impervious surfaces for the Moss Landing Project to alter the drainage pattern and increase storm runoff would be less than significant. The potential impact of the individual Moss Landing project components is discussed below.

Moss Landing Desalination Facility

The proposed Moss Landing desalination facility would lie on a 16-acre vacant and partly disturbed site. As a part of the facility, the various structures such as the equalization basin, building structures for pre-treatment and reverse osmosis systems, storage facilities including two 1.5-million-gallon concrete reservoirs, and pump stations would add up to eight acres of impervious surfaces on the currently undeveloped site. The increase in impervious surfaces would reduce stormwater infiltration resulting in an increase in runoff volumes and rates that could cause downstream erosion and/or flooding.

Stormwater runoff from the site could contain a number of contaminants, including those commonly found in urban runoff and from site specific uses. These materials and others can be deposited on paved surfaces and rooftops as fine airborne particles causing stormwater runoff pollution. Site uses that could contribute to stormwater pollution are primarily related to storage and use of chemicals onsite. However, post-construction stormwater controls would be installed as described in the SWPPP prepared in accordance with the General Construction Permit. In the long term, the proposed project would also be required to comply with the stormwater control requirements under the Monterey Regional Stormwater Management Program (MRSWMP) for the City of Moss Landing. To reduce pollutant discharges in stormwater during project operation, stormwater controls/measures would include BMPs such as minimizing impervious surfaces, treating stormwater runoff using infiltration or detention/retention, using biofilter BMPs, and ensuring that interior drains are not connected to the storm sewer system. Further, onsite chemical storage and handling facilities would be protected from contact with rainwater as described in Section 4.6, Hazards and Hazardous Materials.

CalAm would be required to prepare and implement a post-construction Stormwater Management Plan, including a maintenance schedule for installed post-construction BMPs at the facility sites as required by the General Construction Permit. The plan would be subject to review and approval by the CPUC prior to its implementation. The stormwater collection system at the sites would be designed so as to tie in to the individual City's storm system at an adequate size.

The project design would incorporate any measures and practices and comply with the local regulations to minimize paved surfaces and reduce long term stormwater impacts. The project would incorporate drainage facilities onsite to mitigate the post-development peak flow impact of new development shall be installed concurrent with the development of the proposed facilities.

The new impervious surfaces would not be so extensive as to cause significant changes in the downstream hydrology or flow rates. Further, the site would be designed to include appropriate drainage infrastructure to convey flows generated onsite and from upstream areas. Drainage designs would be integrated with existing drainage systems, and would be designed to avoid or minimize effects to downstream areas and infrastructure. The storm drain would be designed according to the local stormwater quality control criteria that provide measures for a project to manage increased runoff from increased impervious surfaces. Other measures to be implemented may include detention basins, vegetated swales, buffer strips, and/or infiltration basins. The measures and standard BMPs implemented would be consistent with the Model Urban Runoff Program (discussed in Local Regulatory Setting). Therefore, the addition of impervious surfaces from the proposed structures for the desalination facility would be less than significant with mitigation (also see Section 4.6, Hazards and Hazardous Materials).

Pipelines: Transmission Main North, Transmission Main South, Monterey, ASR

All of the proposed pipelines would be underground and installed along a variety of pathways and surface terrain, including the bike path and the Transportation Agency for Monterey County right-of way, private property, and farm roads ~~public roadways~~.

~~All of the proposed pipelines would be underground and installed along public roadways. Following construction, the sites would be restored to pre-existing conditions. No long term drainage or stormwater impacts are expected.~~

Storage Facilities: Terminal Reservoir, ASR

Construction of the Terminal Reservoir on a currently undeveloped site proposed to be annexed by the City of Seaside would add up to three acres of impervious surfaces to currently undeveloped sites. Refer to the discussion under desalination facility above. The impact would be less than significant through compliance with the local stormwater regulations.

Pump Stations: Moss Landing Desalination Facility, Valley Greens, ASR

Construction of the pump stations at the Moss Landing desalination facility, Valley Greens, and ASR would add less than an acre of impervious surfaces at currently undeveloped sites. Addition of impervious surfaces would cause an increase in storm runoff as described under the desalination facility above. The pump stations would include features such as asphalt or concrete surfaces, rooftops, and other structures that could prevent natural drainage and infiltration of stormwater through the soil, causing an increase in the runoff. The impact would be similar to that discussed under the desalination facility, although would be lesser given the smaller area of the individual pump stations (less than an acre). The impact would be less than significant through compliance with the local stormwater regulations.

Moss Landing Project Significance: Less than Significant.

North Marina Project

The potential impact of additional impervious surfaces for the North Marina Project to alter the drainage pattern and increase storm runoff is less than significant similar to Moss Landing Project. The potential impact of the individual North Marina project components is discussed below.

North Marina Desalination Plant

The proposed desalination plant at North Marina would lie on an approximately 10-acre undeveloped site and would include building structures for administrative and operations and storage facilities. The facility would be subject to the Monterey Regional Stormwater Management Plan for the City of Marina, and the impact would be similar to that discussed under the desalination facility for the Moss Landing Project above. The project design would incorporate any measures and practices and comply with the local regulations to minimize paved surfaces and reduce long term stormwater impacts. For example, installing pervious concrete for paving of access roads to the North Marina desalination plant and Terminal Reservoir sites as part of Mitigation Measure 4.8-1b. The measures would include treatment control BMPs such as installing a bioswale that would capture any chemicals or grease from the sites. The impact would be less than significant.

Storage Facilities: Terminal Reservoir, ASR

Storage facilities that would potentially add new impervious surfaces include the Terminal Reservoir, which is discussed under the Moss Landing Project above. The impact would be less than significant.

Pump Stations: Moss Landing Desalination facility ASR, Valley Green

The Valley Green Pump Station would add less than an acre of impervious surfaces, as well as the ASR pump stations. Refer to the discussion under pump stations for the Moss Landing Project.

Given the smaller area of new impervious surfaces, the storm runoff would not be substantial to affect the storm system or nearby water bodies. Therefore, the impact of runoff from all pump stations would be less than significant.

North Marina Project Significance: Less than Significant.

Impact 4.1-6: Project operation would result in reduced pumping of the Carmel River water resulting in a relatively minor increase in the flows in Carmel River.

Moss Landing and North Marina Projects

The SWRCB 95-10 Order (see Chapter 2, Water Demand and Supplies, for details) required CalAm to find a new source of water to replace diversions over and above the entitled 3,376 acre-feet per year (AFY) from the Carmel River and reduce pumping from the river by 20 percent from historic levels (SWRCB, 1995b). The Coastal Water Project has been proposed in response to the 95-10 Order with the objective of limiting CalAm's annual water production from the Carmel River to the entitled diversion of 3,376 AFY. Project implementation would result in a reduction in pumping of river sub-flows from the Carmel River by as much as 8,498 acre-feet per year (AFY) compared to existing conditions (1996-2006 annual average production), thus returning equivalent amount of flows to the Carmel River.

Typically, impacts from diversions vary depending on the water year and season of diversion and the impacts can carry over from one water year to the next. The impacts from water diversions and reduction in diversions appear to be primarily associated with habitat degradation, effects on aquatic and terrestrial species, and stability of the riparian corridor (discussed in Section 4.3, Marine Biological Resources, and Section 4.4, Biological Resources). Diversions do not appear to have a significant direct effect on public safety issues such as flooding and also do not substantially alter the sediment transport regime of the river (Hampson, 2008b). The CalAm diversions would amount to 3,376 AFY or approximately 4.6 cfs with a reduction in pumping of 11.73 cfs (or 8,498 AFY as discussed above). The resulting increased flows in the river would be a significant impact if the flows would cause adverse effects such as flooding and/or stream bank instability.

Flooding

Flooding of the more susceptible areas such as the low-lying properties and some structures along the lower Carmel River can begin when flow in the river exceeds 7,000 cfs at Carmel Valley village (Hampson, 2008b). The most recent estimate for the peak 100-year event flows is 22,700 cfs at the United States Geologic Survey (USGS) gaging station (River Mile 3.2[15]). A flow of approximately 9,500 cfs is considered close to a 10-year event. Most of the losses from flooding recorded by Monterey County were estimated to result from 10-year and 35-year storm events in 2003 and 1995 respectively. The maximum instantaneous pumping capacity of CalAm

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[15] River miles are measured upstream from the mouth of a river.

wells reported in the lower reach near Carmel is approximately 33 cfs, which represents approximately 0.15 percent of the estimated peak flow in a 100-year flood (Hampson, 2008b). Based on these considerations, it is unlikely that existing CalAm diversions and reduced diversions during winter floods would have a significant effect on the magnitude of peak flood flows.

Stream Bank Stability

The lower reach of Carmel River is a potentially unstable system that varies between a narrow, stable channel and a wide shifting channel. CalAm diversions have led to a loss of continuous corridors of healthy riparian habitat and exposed stream banks to erosive forces during winter flows. Sediment deposited in the active channel has caused erosion as gravel bars deflected flows into banks and eroded additional material. Portions of the river have changed from a narrow single-threaded channel fringed by a dense riparian forest to a wide, shifting channel nearly devoid of riparian vegetation while severe to moderate bank erosion occurred during lower magnitude, more frequent events. In contrast, some reaches have been virtually unscathed. The absence of CalAm diversions in this reach prior to the episode of erosion was a key factor in the reach remaining stable (Hampson, 2008b).

The presence of vigorous streamside vegetation was a critical factor influencing whether reaches of the river remain relatively stable during winter flows or become unstable. Streamside vegetation depends directly on access to adequate levels of surface and groundwater to become established and to maintain its health and vigor. Diversions along the river during the low flow season reduce the amount of water available to sustain healthy streamside vegetation and can result in reduced vigor and/or mortality and loss of diversity of the vegetation (Hampson, 2008b).

Implementing a water supply project that would reduce diversions would help in restoring the river closer to a fully functioning natural system (Hampson, 2008b). As discussed above, the proposed project would result in reduced diversions from the Carmel River and as a result would return flows in the river that existed prior to the diversions and contribute to the growth and sustenance of streamside vegetation for stability. The Carmel River flows would be equivalent to flows that would be substantially lower than the flood flows as discussed above. In addition other activities such as other existing legal rights to divert, trapping of sediment behind the main stem dams, past floodplain development practices, and past gravel extraction practices affect the river flows greater than the CalAm diversions, which do not have a significant influence on the river flows and hydrology. Therefore, the impact from increased flows in the Carmel River, both in terms of flooding and stream bank stability, would be less than significant.

Significance: Less than Significant.

Impact 4.1-7: Portions of the proposed project would be located within a 100-year flood hazard area and could impede or redirect flood flows.

Moss Landing Project (All Project Facilities)

As discussed in the Environmental Setting section, Monterey County has a history of significant flooding events during which major water bodies, including the Salinas River and Carmel River, experienced flooding. Areas that could experience flooding in the lower portion of the Salinas River watershed include Moss Landing, Castroville, and other nearby communities. The proposed desalination facilities, storage facilities, pump stations, and pipelines south of Reservation Road are located outside of the 100-year flood hazard area, both inland and coastal. The coastal areas include areas where coincident flooding and high tide event/and or storm surge have a 1 percent annual chance of flooding. Underground portions of the proposed Transmission Main North pipeline would cross through inland areas within the 100-year and 500-year floodplains of Moro Cojo Slough, Tembladero Slough, Alisal Slough, and Salinas River. However, the proposed project would be developed in accordance with the County and City codes for flood protection. The Transmission Main North pipeline, within unincorporated Monterey County, would be underground and would not impede or redirect flood flows, and comply with the applicable local regulations such as the Monterey General Plan Policy S-2.3 and Monterey Code Chapter 16.16 (see Regulatory Setting). Therefore, the impact would be less than significant.

Moss Landing Project Impact: Less than Significant.

North Marina Project (All Project Facilities)

The proposed North Marina Project desalination facilities, storage facilities, pump stations, and pipelines would be located outside of the 100-year flood hazard area. Therefore, there would be no impact associated with impeding or redirecting flows within a 100-year flood hazard area.

North Marina Project Impact: No Impact.

Impact 4.1-8: The proposed project could expose people or structures to risk from flooding resulting from failure of a dam or levee.

Moss Landing Project (All Project Facilities)

Dams that are located in the project vicinity include Los Padres and San Clemente Dams in the Carmel River Watershed and Nacimiento and San Antonio Dams in the Salinas River Watershed. In the unlikely event of failure of a dam, the downstream areas that would be in the path of the flood flows would primarily be confined to the 500-year floodplain adjacent to the Salinas River (State of California, Office of Emergency Services, 2007). The project would not expose people or structures to risk from flooding related to a dam failure. The Moss Landing Project may reduce water in the dams and may reduce the risk of dam failure. Therefore, the impact on flooding resulting from failure of a dam would be less than significant.

Levees in the project area lie in the vicinity of Elkhorn Slough. The northern portion of the proposed Moss Landing desalination facility would be located close to Elkhorn Slough, therefore could be subject to flooding in the event of a levee failure. If the levee fails, flooding would occur primarily in the low-lying areas. The desalination facility would be located at elevations of approximately 12 feet amsl to 27 feet amsl (USGS, 2007), which are higher than the mean higher high tides in Monterey Bay (2.51 feet amsl) and the highest tide recorded (5.05 feet amsl) (NOAA, 2008b). Therefore, the impact on flooding resulting from failure of a levee would be less than significant.

Moss Landing Project Impact: Less than Significant.

North Marina Project (All Project Facilities)

There are no dams or levees adjacent to the North Marina Project. Dams that are located in the project vicinity include Los Padres and San Clemente Dams in the Carmel River Watershed and Nacimiento and San Antonio Dams in the Salinas River Watershed. The project would not expose people or structures to flooding damages due to failure of a dam or levee. There would be no impact associated with potential flooding from levee or dam failure.

North Marina Project Impact: No Impact.

Impact 4.1-9: The proposed project facilities could expose people or structures to risk from flooding due to a tsunami.

Moss Landing Project (All Project Facilities)

The pipelines, storage facilities, and pump stations associated with the Moss Landing Project would be located on ground that is higher than the predicted tsunami elevations (i.e., approximately 17 feet amsl). These facilities would likely not expose people or structures to risk from flooding due to a tsunami. Underground portions of the proposed Transmission Main North pipeline would cross through low-lying areas that could be inundated by a tsunami. The impact from pipelines exposing people or structures to risk from flooding due to a tsunami is less than significant.

The proposed Moss Landing desalination plant would be in a relatively low-lying coastal area at an elevation of approximately 17 feet amsl to 27 feet amsl, therefore it is likely that a portion of the facility could be inundated by a tsunami. Monterey County suggests evacuation of all areas that are less than approximately 17 feet amsl. The Moss Landing Project desalination facility could expose people or structures to risk from flooding and be a significant impact. Incorporation of Mitigation Measure 4.1-9 would reduce the impact to a less-than-significant level.

Moss Landing Project Impact: Less than Significant with Mitigation.

Mitigation Measure

Mitigation Measure 4.1-9: Prior to final design of the Moss Landing desalination facility, a certified engineer shall conduct a site-specific tsunami run-up study for each component of the desalination facility and shall mitigate tsunami run-up hazards in the final design and during construction. If the Moss Landing desalination facility is determined to be within a tsunami run-up area, the engineer will provide nonstructural and structural design measures and the project sponsor will integrate these into the design. Nonstructural and structural ~~Structural~~ design measures considered for implementation shall be located ~~include slowing the tsunami-related water by constructing wave-slowing elements, steering and redirecting tsunami related water by constructing angled walls or ditches, or blocking tsunami-generated waves by constructing hardened walls, terraces, or berms~~ adjacent to the desalination facility, outside of the coastal zone.

~~**Mitigation Measure 4.1-9:** Prior to final design of the Moss Landing desalination facility, a certified engineer shall conduct a site-specific tsunami run-up study for each component of the desalination facility and shall mitigate tsunami run-up hazards in the final design and during construction. If the Moss Landing desalination facility is determined to be within a tsunami run-up area, the engineer will provide structural design measures and the project sponsor will integrate these into the design. Structural design measures considered for implementation shall include slowing the tsunami-related water by constructing wave-slowing elements, steering and redirecting tsunami related water by constructing angled walls or ditches, or blocking tsunami-generated waves by constructing hardened walls, terraces, or berms.~~

Significance after Mitigation: Less than Significant.

North Marina Project (All Project Facilities)

The pipelines, storage facilities, and pump stations associated with the North Marina Project would be located on ground that is higher than the predicted tsunami elevations. The proposed North Marina desalination plant would be located approximately 2.5 miles east from the coast, but within half-a-mile of the Salinas River. The Salinas River may experience an increase of water height during a tsunami (City of Marina, 2008). The proposed North Marina desalination facility site is at an elevation of approximately 100 feet amsl, which is significantly above the predicted tsunami elevations. Therefore, the impact to all North Marina Project facilities would be less than significant.

North Marina Project Impact~~Significance~~: No Impact

Impact 4.1-10: The proposed project facilities could be subject to flooding due to the sea level rise from global warming.

Moss Landing Project

The rate of sea level rise in Monterey Bay is approximately 0.053 inches per year (NOAA, 2008a). The Intergovernmental Panel on Climate Change report projects that the global rates of sea level rise could increase by 0.07 to 0.23 inches per year (IPCC, 2007). The Pacific Institute report (2009) projects sea level rise along the California coast could increase by 55 inches in the upcoming 100-years. Sea level rise would likely be accompanied by an increased rate of coastal erosion. Thus, pursuant to that report, during the lifetime of the project facilities (50 years), the sea level could rise by a total of 27.5 inches.

~~The Pacific Institute report (2009) projects sea level rise along the California coast could increase by 0.55 inches per year. Sea level rise will be accompanied by an increased rate of coastal erosion.~~The proposed project facilities would be located at elevations that are more than 5 feet above the highest recorded tide. The above ground pipelines, storage facilities, and pump stations associated with the Moss Landing Project would be located on ground that is higher than 16~~17~~ feet amsl. These facilities would likely not expose people or structures to risk from flooding due to sea level rise. Underground portions of the proposed Transmission Main North pipeline would cross through low-lying areas that could be inundated by sea level rise during a one-percent flood event.

The proposed Moss Landing desalination plant would be located in a low-lying area with elevations at approximately 16 ~~17~~ feet amsl to 39 ~~27~~ feet amsl (USGS, 2007), which are above the mean higher high tides in Monterey Bay (2.51 feet amsl) and the highest recorded tide (5.05 feet amsl) (NOAA, 2008b), as well as the adjacent base flood elevation associated with a one-percent flood event of approximately 11 feet amsl (FEMA, 2007).

Given the elevation of the proposed project facility sites, the sea level rise of approximately ~~7 to 23 inches~~ 2.5 feet during the lifetime of the project (the next 50 years) ~~next 100 years~~ would result in one-percent flood water levels of 13.5 feet amsl, which are lower than the facility site elevations during a one-percent flood event. ~~t~~Thus the project facilities would not be subject to flooding due to sea level rise from global warming during the lifetime of the project. Therefore, the impact on project facilities would be less than significant.

~~Given the elevation of the proposed project facility sites, the sea level rise of approximately 7 to 23 inches 2.5 feet during the lifetime of the project (the next 40 years) next 100 years would result in one-percent flood water levels lower than the facility site elevations,. t Thus the project facilities would not be subject to flooding due to sea level rise from global warming during the lifetime of the project. Therefore, the impact on project facilities would be less than significant.~~

~~The proposed project facilities would be located at elevations that are more than 5 feet above the highest recorded tide. The pipelines, storage facilities, and pump stations associated with the Moss Landing Project would be located on ground that is higher than 17 feet amsl. These~~

~~facilities would likely not expose people or structures to risk from flooding due to sea level rise. Underground portions of the proposed Transmission Main North pipeline would cross through low-lying areas that could be inundated by sea level rise.~~

~~The proposed Moss Landing desalination plant would be located in a low-lying area with elevations at approximately 17 feet amsl to 27 feet amsl (USGS, 2007), which are above the mean higher high tides in Monterey Bay (2.51 feet amsl) and the highest recorded tide (5.05 feet amsl) (NOAA, 2008b). Given the elevation of the proposed project facility sites, the sea level rise of approximately 7 to 23 inches during the next 100 years would result in water levels lower than the facility site elevations, thus the project facilities would not be subject to flooding due to sea level rise from global warming. The impact would be less than significant.~~

Significance: Less than Significant.

North Marina Project

The proposed North Marina desalination plant would be located approximately 2.5 miles east from the coast, but within half-a-mile of the Salinas River. The Salinas River may experience an increase of water height due to sea level rise, but the proposed North Marina desalination facility site is at an elevation of approximately 100 feet amsl, which is significantly above the predicted sea level rise for the next 100 years. Therefore, the impact to the North Marina desalination facility would be less than significant.

Significance: No Impact.

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4.2 Groundwater Resources

This section describes the hydrogeologic (groundwater) setting in the project vicinity and the regulatory framework, as they apply to groundwater resources within Monterey County. The Impacts and Mitigation Measures section, which follows the setting, evaluates the potential for the Coastal Water Project to result in significant impacts to groundwater resources, providing analysis based on an accepted significance criteria.

4.2.1 Environmental Setting

The study area for the groundwater resources analyses includes the area south of North Elkhorn Slough, west of the cities of Prunedale and Salinas, north of the Carmel River, and east of the Monterey Bay coast line.

4.2.1.1 Hydrogeologic Characteristics

Groundwater Basins

Groundwater is the water occurring beneath the earth's surface. Most of California's groundwater occurs in material deposited by streams, called alluvium. Alluvium consists of sand and gravel deposits and finer-grained deposits such as clay and silt. Coarse materials such as sand and gravel deposits usually provide the best source of water and are termed aquifers; whereas, the finer-grained clay and silt deposits are relatively poor sources of water and are referred to as aquitards (DWR, 2003)[1]. Alluvial aquifers can extend over many square miles and are referred to as basins. A groundwater basin is defined as an alluvial aquifer or a stacked series of alluvial aquifers with reasonably well-defined boundaries in a lateral direction and a definable bottom. California's groundwater basins usually include one or a series of alluvial aquifers with intermingled aquitards (DWR, 2003).

The Salinas Valley Groundwater Basin (SVGB), the Seaside Groundwater Basin (SGB), and the Carmel Valley Groundwater Basin (CVGB) underlie components of the proposed project and are thus considered part of the environmental setting. The boundaries of these basins, and the geologic formation within them, are shown on **Figure 4.2-1**. In general, groundwater basin boundaries are determined by physical attributes such as the lateral extent of alluvial material, boundaries to flow such as bedrock, or coastal areas comprised of marine sediment.

The Department of Water Resources (DWR), in its Bulletin 118 (California Groundwater), has delimited hydrogeologic boundaries of groundwater basins in California. However, in some cases, hydrogeologic boundaries determined by the DWR can be further refined and altered based on new information, groundwater basin management operations, and results of updated hydrogeologic studies. Such is the case for the SGB. The DWR Bulletin 118 refers to the SGB as the Salinas Valley Groundwater Basin—Seaside Area Subbasin and defines its area within the

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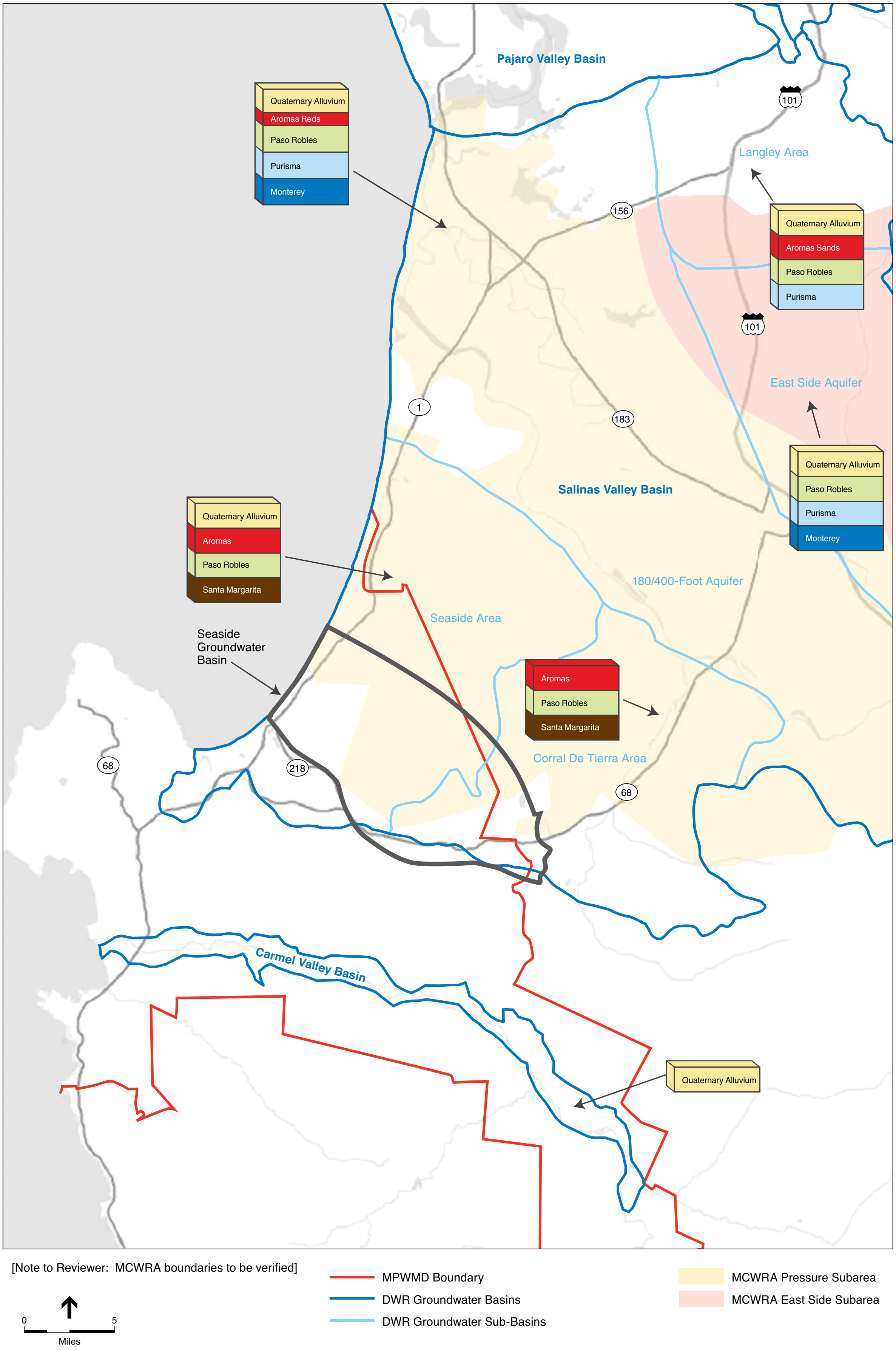
[1] Aquitards restrict or impede the vertical migration of groundwater or infiltrated surface water



[Note to Reviewer: MCWRA boundaries to be verified]

SOURCE: DWR, 2003; MCWRA, 2008b; MPWMD, 2008c; HydroMetrics LLC, 2007

NOTE:
MCWRA = Monterey County Water Resources Agency
DWR = Department of Water Resources
MPWMD = Monterey Peninsula Water Management District

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Figure 4.2-1
Groundwater Basin and Management Boundaries

larger Salinas Valley Basin, as shown in Figure 4.2-1. However, current groundwater management strategies, new hydrogeologic studies conducted by the MCWRA and MPWMD, and the SGB adjudication has defined the boundaries of the SGB to a configuration that is smaller in overall area and considerably different than the DWR's definition of the Salinas Valley Groundwater Basin—Seaside Area Subbasin (see Figure 4.2-1). Therefore, while the groundwater discussion and analyses in this EIR use general hydrogeological basin boundaries in most cases, this EIR considers the boundaries of the SGB as defined by MCWRA and MPWMD more relevant to the potential impact analyses relating to groundwater management practices.

Salinas Valley Groundwater Basin (SVGB)

The SVGB is defined by MCWRA as four subareas referred to as the Pressure, East Side, Forebay, and Upper Valley. The proposed project would be primarily located within the Pressure subarea, but some components of the proposed project alternatives may influence the East Side subarea; these two subareas are often grouped together and referred to as the Northern SVGB.

The Pressure subarea encompasses approximately 140 square miles, and consists of three primary aquifers: the 180-Foot Aquifer, the 400-Foot Aquifer, and the 900-Foot (Deep) Aquifer. Recent groundwater studies have correlated these aquifers with water bearing formations present within the Pressure subarea. Water bearing formations present within the Pressure subarea include Quaternary Alluvium[2], and the Aromas Sand, Paso Robles, and Monterey Formations. The 180-Foot Aquifer has been correlated with the Quaternary Alluvium and possibly the upper portions of the Aromas Sands Formation (DWR, 2004a). The 400-Foot Aquifer has been correlated with the Paso Robles Formation in the SGB (Yates, 2005). The 900-Foot (Deep) Aquifer has been correlated with the Santa Margarita Formation (Yates, 2005). Groundwater in the Pressure subarea has been historically extracted from the 180-Foot and 400-Foot Aquifers; the Deep Aquifer has experienced little development except near the coast where it is used to replace groundwater from the 180- and 400-Foot Aquifers rendered unusable by seawater intrusion (DWR, 2004a).

The East Side subarea is located to the east of the Pressure subarea. The hydrogeology and groundwater behavior is markedly different in the East Side subarea due to different depositional environments and geology. The transition zone between these subareas has been defined based on the transition from predominantly fluvial deposits within the East Side subarea to the alluvial deposits that make up the Pressure subarea (Kennedy/Jenks, 2004). The primary aquifers are referred to as the Shallow, Intermediate Deep, and Deep Aquifers, and have been shown to correlate with aquifers in the Pressure subarea, although the aquifers within the East Side area do not appear to have a discrete confining layer that separates the aquifers (Kennedy/Jenks, 2004). Water bearing formations present within the East Side subarea include Quaternary Alluvium, and the Aromas Sands, Paso Robles, and Purisma Formations (DWR, 2004b). Groundwater resources are generally derived from the Shallow and Intermediate Deep Aquifers.

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[2] Quaternary is a geologic time period ranging from present day to 1.8 million years ago.

Seaside Groundwater Basin (SGB)[3]

The northern boundary of the SGB is a flow divide where groundwater to the north is thought to flow to the SVGB and groundwater to the south flows to the SGB. ~~This flow divide is influenced by pumping in both basins and can change over time as a function of pumping rates and locations, and is defined as a zone rather than a discrete line (Jones and Stokes, 2008).~~ The northern boundary is a dynamic hydrologic divide, the location of which is dependent, among other things, on rainfall patterns and pumping rates in the SVGB and the SGWB. The current location of the boundary passes through the former Fort Ord south of the City of Marina. The northern boundaries of the shallow and the deep aquifers in the SGWB are at different locations, as shown in Figure 4.2-6 and Figure 4.2-7. The approximate flow divide between the SVGB and the SGB is depicted based on groundwater elevation data obtained from the Paso Robles Formation. As mentioned above, this generally correlates with the 400-Foot Aquifer in the Pressure subarea. The flow divide for the Santa Margarita Sandstone is different and appears to be located further north due to pumping and aquifer characteristics within the Santa Margarita Formation and the Deep Aquifer. The basin boundary in the Dune Sands deposits is also different, and is generally not defined because groundwater resources are generally not obtained from the Dune Sands within the Quaternary Alluvium and because the Dune Sands are in direct hydraulic communication with the ocean and only saturated along the coastal margin (Jones & Stokes, 2008).

The SGB encompasses an area of approximately 40 square miles, and consists of three aquifers that correspond with the sedimentary units within the Basin—the Aromas Sand/Older Dunes, the Paso Robles Formation, ~~and~~ the underlying Santa Margarita Sandstone, and the Purisima formation. Groundwater resources in the SGB are derived from the Paso Robles formation and Santa Margarita formation~~s~~, which transitions with the Purisima formation in the northern area of the SGB. Wells perforated in these formations produce approximately 20 percent of the water supply for the Monterey Peninsula. The Shallow Dune/Aromas Sand aquifer is not used for the production of potable groundwater; historically, CalAm extracted a limited amount of water from two wells in Sand City that were eventually abandoned in the early 1970s because of seawater intrusion.

Carmel Valley Groundwater Basin

The Carmel Valley groundwater basin is comprised of younger alluvium and river deposits from the Carmel River, and older alluvium and terrace deposits. The primary water bearing formation is the younger alluvium, consisting of boulders, gravel, sand, silt, and clay ranging in thickness from 30 feet in the upper basin to about 180 feet near the mouth of the basin (DWR, 2004c). Because groundwater resources in the Carmel Valley are considered underflow to the Carmel River, and groundwater extraction from the Carmel Valley groundwater basin is regulated by surface water rights, impacts to the Carmel Valley groundwater basin are not analyzed as a groundwater resource in this EIR. Surface water impacts to the Carmel River are considered in Section 4.1, Surface Water Resources.

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[3] The SGB is considered by the DWR as a sub basin to the larger SVGB and is referred to as the Salinas Valley Groundwater Basin—Seaside Area Subbasin (DWR, 2003). For the purposes of this EIR, the Seaside Area Subbasin will be referred to as the Seaside Groundwater Basin.

Hydrogeologic Formations

This section provides descriptions of the water-bearing geological units underlying the project study area, specifically related to the characteristics of the groundwater basins, and provides information regarding the capability of the formations to produce groundwater. The units are described from youngest to oldest. As shown on Figure 4.2-1, the formations are the (Quaternary) Alluvium, Pleistocene Aromas Sands Formation, Pliocene- to Pleistocene-age Paso Robles Formation, the Pliocene Purisma Formation, the Miocene/Pliocene Santa Margarita Formation, and the Miocene-age Monterey Formation. **Figure 4.2-2** show the plan view of the SVGB area and locations of geologic cross-sections constructed from a detailed hydrogeologic investigation of the SVGB conducted by Kennedy/Jenks (2004) and **Figure 4.2-3** presents cross-section B-B' to illustrate subsurface conditions throughout the western coastal portion of the SVGB.

Quaternary Alluvium

Quaternary Alluvium includes formations described as the Pleistocene (10,000 to 1.8 million years ago) and Holocene (present to 10,000 years ago) alluvial deposits (terrace deposits), as well as Dune Sands deposits found in both groundwater basins. The thickness of the Quaternary Alluvium ranges from approximately 50 feet to 200 feet throughout much of the Northern SVGB (Kennedy/Jenks, 2004) and within the SGB, the thickness of these deposits ranges from 50 to 300 feet, although this range includes the Aromas Sands deposit as it is often grouped with the Dune Sands deposits (DWR, 2004d). Included within these deposits are the Salinas Aquitard and possibly the portions of the 180-Foot Aquifer. The Salinas Aquitard is a well-defined blue-gray clay deposit that overlies the 180-Foot Aquifer throughout much of the Pressure subarea. The Salinas Aquitard becomes thinner and discontinuous towards the Eastside subarea and north of the transition zone separating the SVGB and SGB.

The Dune Sands deposits are largely unsaturated in the northern portion of the Eastside subarea and the SGB. The water bearing portions of the Quaternary Alluvium are thick lenses of sand and gravel of limited areal extent, except in the case of the 180-Foot Aquifer that is thought to be correlative with the older portions of Quaternary Alluvium or upper portions of the Aromas Sands Formation. Groundwater also occurs locally in alluvial material along creeks in the canyon bottoms, and within local zones of saturation at some level above the groundwater table. This type of localized groundwater table is referred to as a perched aquifer.

Aromas Sands Formation

The Aromas Sands Formation is found within the SVGB and SGB. The formation consists of sand units that are separated by confining layers of interbedded clays and silt. The Aromas Sands Formation is often grouped together with the Dune Sands deposit in the SGB due to similarities between the units (DWR, 2004d). Within the SGB, the Aromas Sands is grouped together with the Dune Sands deposit, and ranges in thickness from 30 to 50 feet near the coast (DWR, 2004d).

Outcrops of the Aromas Sands Formation are present within the northern areas of the Eastside subarea, and the formation thickens westward and towards Elkhorn Slough. Outcrops provide an efficient mechanism for groundwater recharge to occur. Although the water producing zones within the Aromas Sands Formation can vary greatly in their ability to transmit water, this unit is considered the primary water-bearing unit in the northern portion of the East Side subarea. However, the Aromas Sands Formation is of minor importance in the SGB, as it is generally unconfined and in direct hydraulic communication with the ocean and is only saturated in the extreme coastal portion of the subbasin (Yates, 2005). The lower portion of the Aromas Sands Formation and the upper portion of the Paso Robles Formation may interfinger and form the 400-Foot Aquifer in the Pressure subarea (DWR, 2004a). More recent studies suggest the 400-Foot Aquifer also exists in the East Side subarea and correlates with the Intermediate Deep Aquifer (Kennedy/Jenks, 2004).

Paso Robles Formation

The Paso Robles Formation is the major water-bearing unit in the Eastside subarea and the SGB. The formation consists of sand, gravel and clay interbedded with some less prevalent calcareous beds (DWR, 2004d). The Paso Robles Formation interfingers with the lower portion of the Aromas Red Sands, and the upper portion of the Purisima Formation.

Purisima Formation

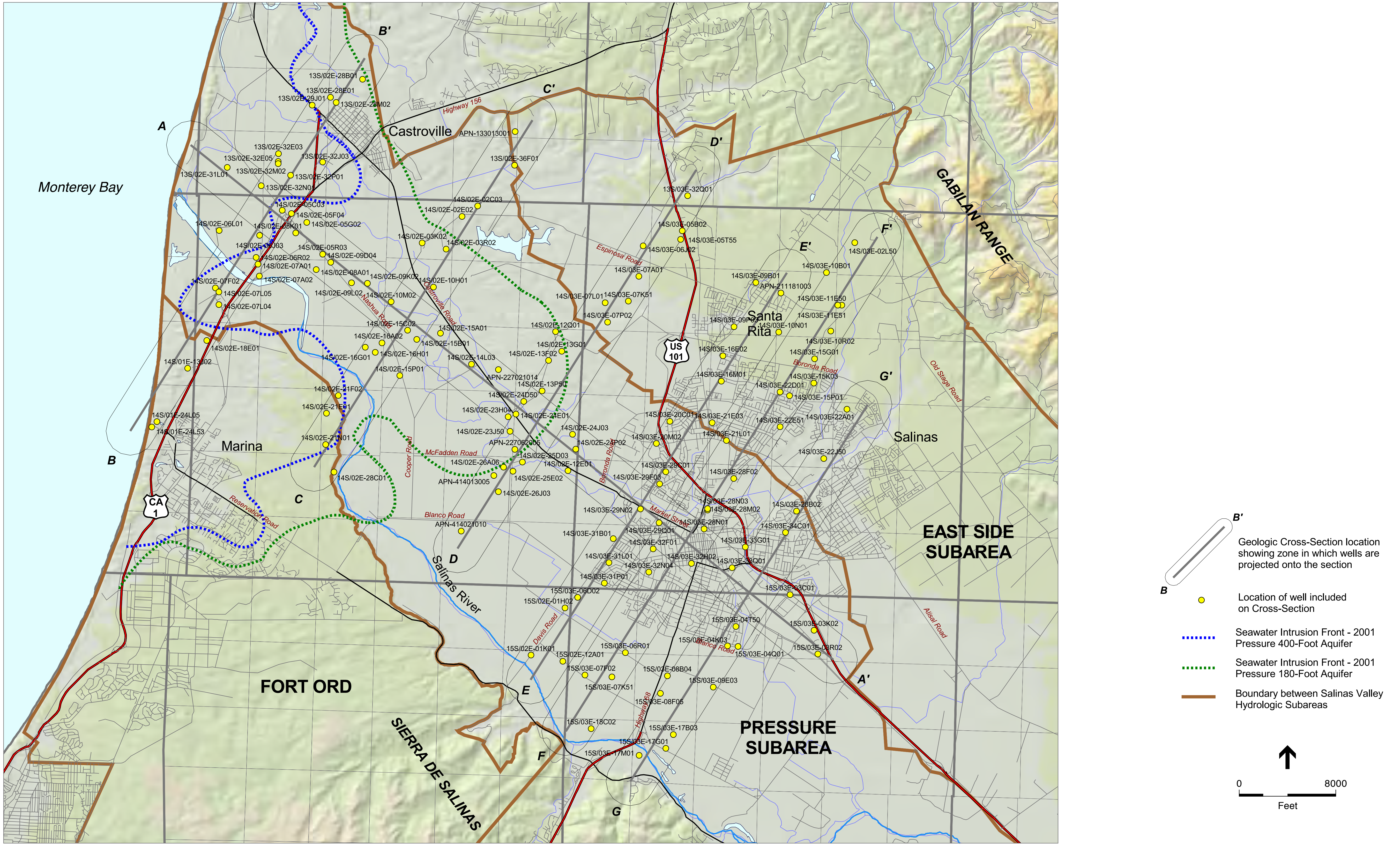
The Purisima Formation is found in the Pressure and East Side subareas. Mostly marine in origin, the Purisima Formation is a thick sequence of highly variable sediments ranging from extensive shale beds near its base to continental deposits in its upper portion (DWR, 2006). The sediments are permeable gravel, sands, silts, and clays. In the valley portion of the Northern SVGB, the Purisima transitions with the Santa Margarita Formation and has been developed to a minor degree. Hydrologically, the most important outcrops are north and east of the study area where this unit acts as a source of recharge to the SVGB. The Purisima Formation is also found in the SGWB.

Santa Margarita Formation

The Santa Margarita Formation is found in the SGB, and recent interpretations indicate it is also present in the Pressure subarea. It is a poorly consolidated to weakly-cemented marine sandstone, and is an important water-bearing formation in the SGB (Yates, 2005). Recent studies have correlated the 900-Foot (Deep) Aquifer with the Santa Margarita Formation (Yates, 2005). The 900-Foot Aquifer is present in the northern SVGB and consists of alternating layers of sand, gravels and clays. A blue marine clay aquitard is present at depth and separates the 900-Foot Aquifer from the overlying 400-Foot Aquifer. The Deep Aquifer consists of alternating layers of sand-gravel mixtures and clays (up to 900 feet thick), rather than a distinct aquifer and aquitard (Montgomery Watson, 1994). The Deep Aquifer has experienced little development in the SVBG except near the coast where it is used to replace groundwater from the 180- and 400-Foot Aquifers rendered unusable by seawater intrusion.

Monterey Formation

The Monterey Formation is found in both the SVGB and SGB. The Monterey Formation is made mostly of shale and mudstone, and generally composes the base of water-bearing sediments in parts of the northern SVGB and most of the SGB (Kennedy/Jenks, 2004). The Monterey



SOURCE: Kennedy/Jenks, 2004

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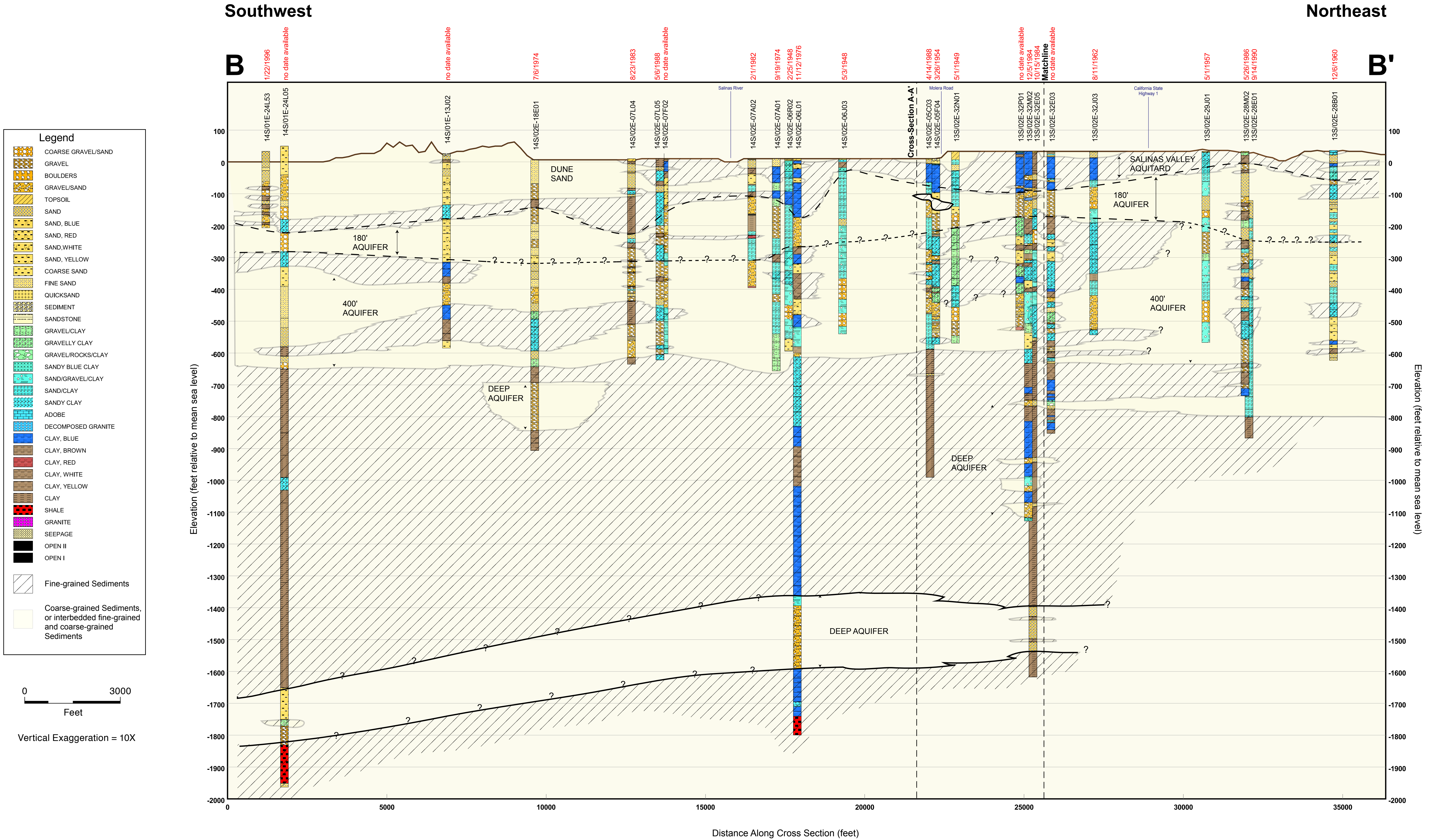
Figure 4.2-2

Cross-Section Location Map



SOURCE: Kennedy/Jenks, 2004

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Figure 4.2-3

Cross-Section B-B'

Formation outcrops at the surface within the northern SVGB. It is capable of yielding small quantities of poor-quality water to wells in many locations in the SGB even though it is generally considered to be a non-water bearing unit for water resource purposes (Yates, 2005).

4.2.1.2 Groundwater Flow and Occurrence

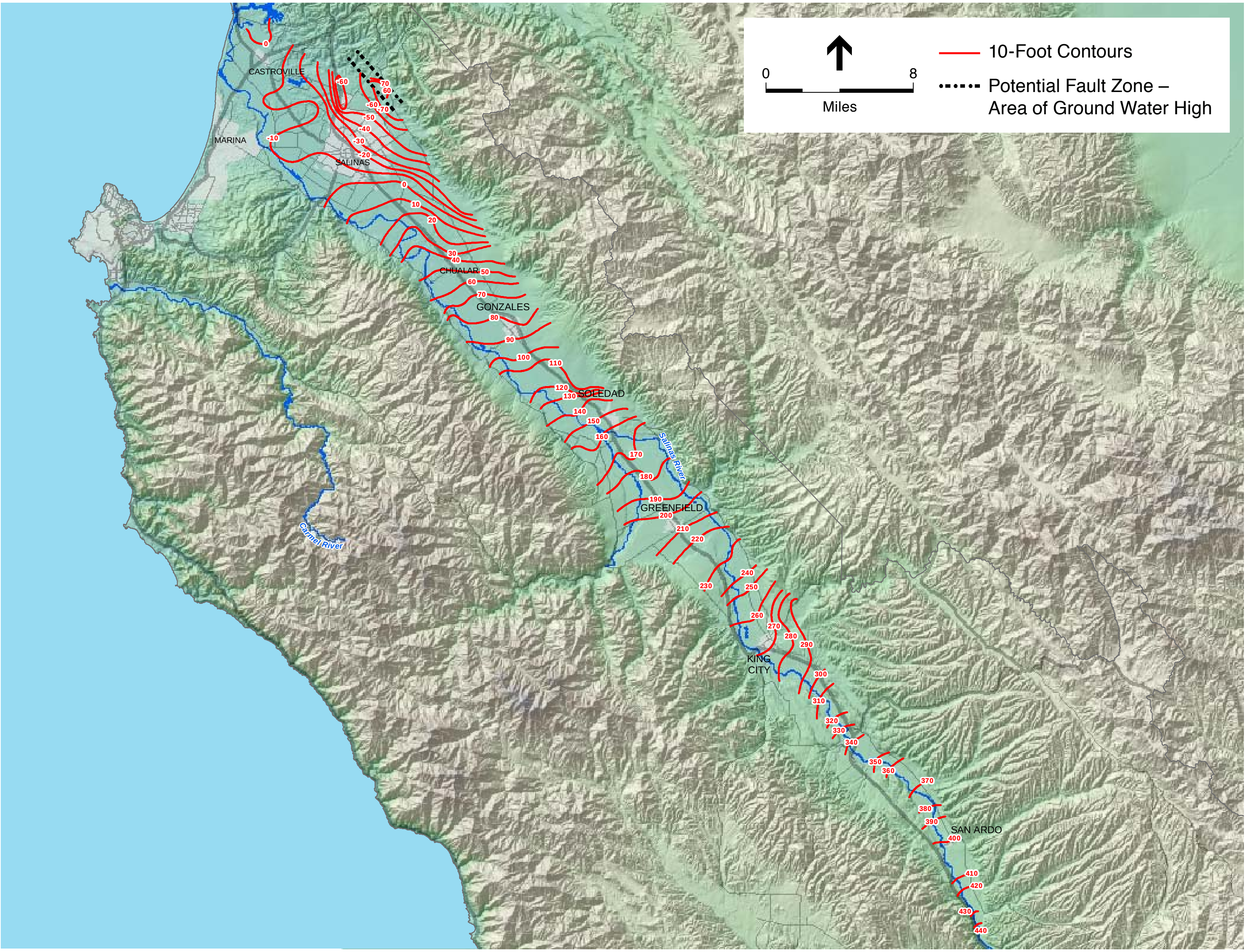
The hydrogeologic formations described above transmit water through a complex system made up of layers of highly permeable units of sand and gravel (aquifers or water bearing zones) separated by layers of low permeable units of silts and clays or shale (aquitards). Depending on the continuity of the low permeable layers, groundwater may be present under unconfined or confined conditions. The groundwater table in an unconfined aquifer is under the pressure exerted by the overlying water and atmospheric pressure, and groundwater under these conditions flows from areas of high groundwater elevation to areas of low groundwater elevation (Driscoll, 1986). Localized groundwater tables, or perched aquifers, also have the ability to transmit and store water within the groundwater basins due to the presence of impermeable and discontinuous layers that are present in the shallow alluvial deposits. Under confining conditions, such as with the 180-Foot and 400-Foot Aquifers, groundwater flow is influenced by pressure and the weight of overlying sediments, and groundwater flows from areas of high pressure to areas of low pressure. The groundwater flow direction is measured by the potentiometric surface – an imaginary surface that is analogous to an actual water surface exposed to atmospheric pressure. When a well penetrating a confined aquifer is pumped, internal aquifer pressure is reduced, which can increase the flow of water towards the well.

Many groundwater management strategies have been employed to protect groundwater resources in the SVGB and SGB, including detailed hydrogeologic studies of the basin, annual groundwater monitoring programs that collect water level and water quality data, development of water projects to reduce groundwater production within the basins, and investment into groundwater models as a tool for groundwater management.

Groundwater Elevations

A groundwater basin is much like a surface water reservoir – when water is removed from storage, the water level drops until the supply can be replenished by inflow or recharged by rainfall or stream flow. Along the coast, recharge can come from the ocean, which in some cases, results in the intrusion of seawater into coastal aquifers. When water is extracted from the basin, the system attempts to restore its equilibrium by drawing new water into the groundwater reservoir. Before extensive pumping began in the Salinas Valley, the regional groundwater flow was predominantly toward the coast from inland areas.

Since the 1940s, hydrogeologic studies have shown a regional decline in the groundwater table, which has resulted in a sea to land groundwater gradient in many areas. Water-level data collected from wells within the study area indicate that the direction of groundwater flow is from the ocean to inland along the coast, as shown on **Figures 4.2-4** through **4.2-7**. Please note that **Figure 4.2-5** and **4.2-6** are comprised of groundwater elevation data from the 400-Foot Aquifer collected from the Pressure subarea in 2005, and groundwater elevation data from the Paso



SOURCE: MCWRA, 2008c

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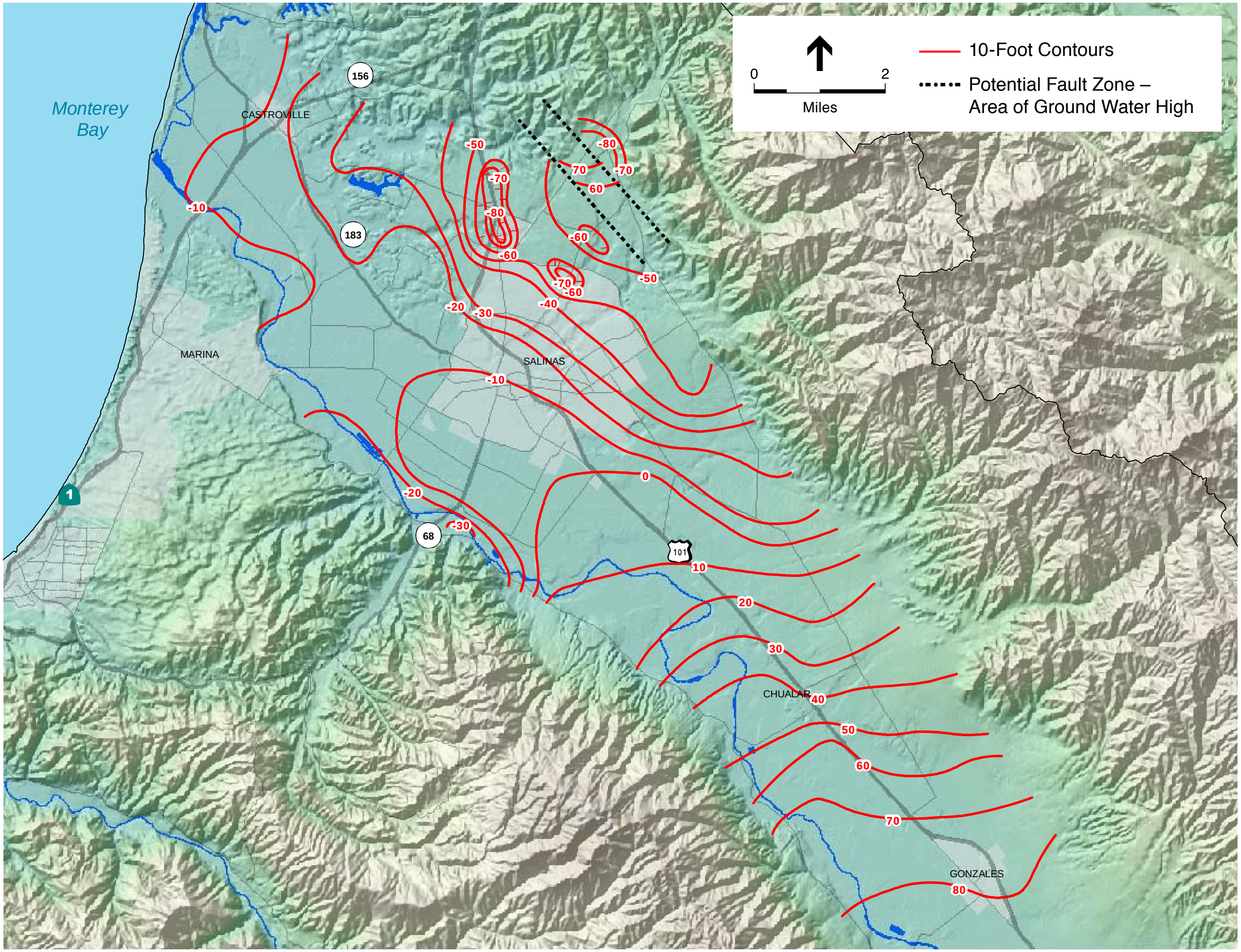
Figure 4.2-4

Lines of Equal Ground Water Elevation in the Pressure 180-Foot, East Side Shallow, Forebay and Upper Valley Aquifers



SOURCE: MCWRA, 2008c

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Figure 4.2-5
Lines of Equal Ground Water Elevation in the Pressure 400-Foot and East Deep Aquifers

SOURCE: HydroMetrics LLC, 2009

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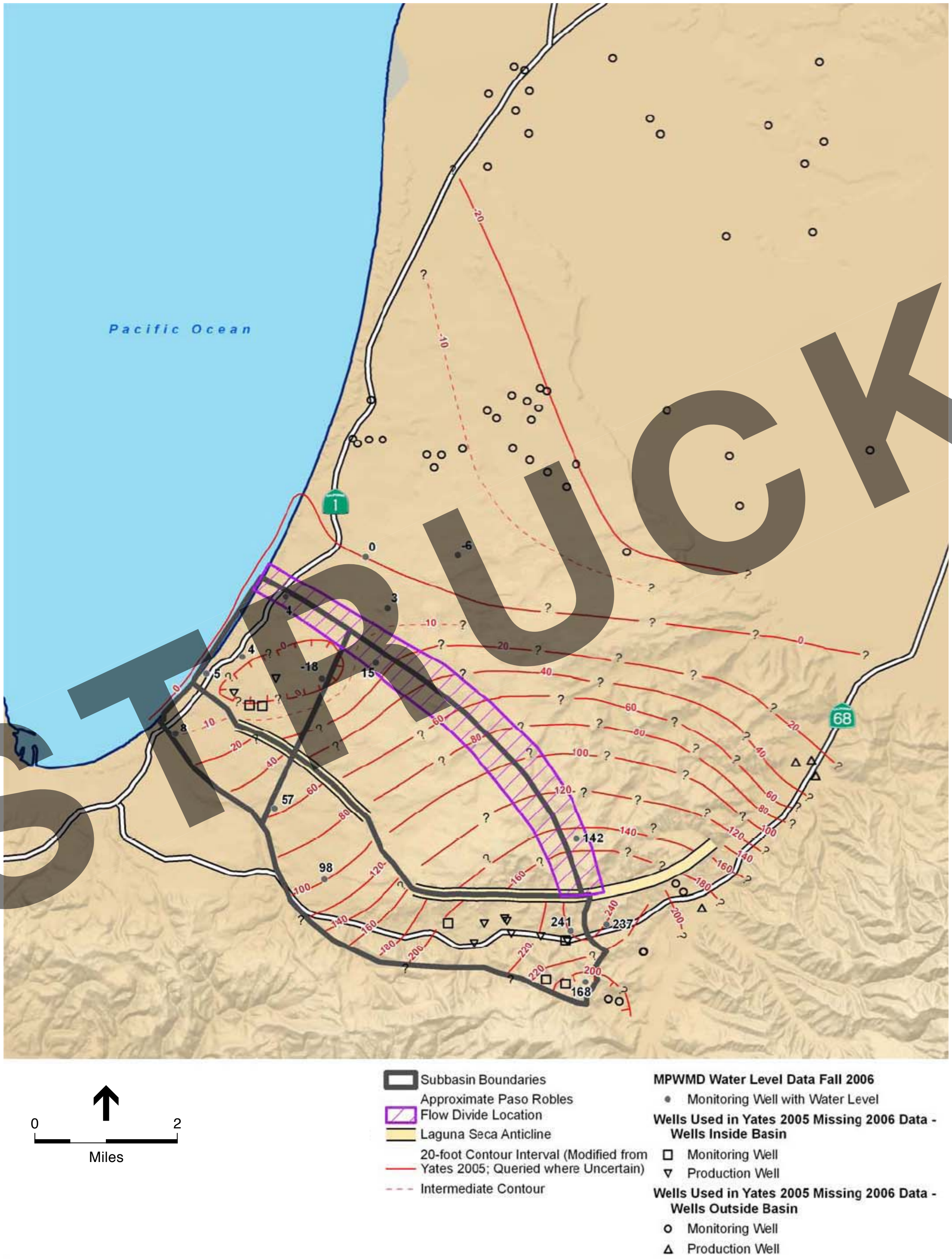
Revised Figure 4.2-6
Shallow Water Levels



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SOURCE: HydroMetrics LLC, 2007

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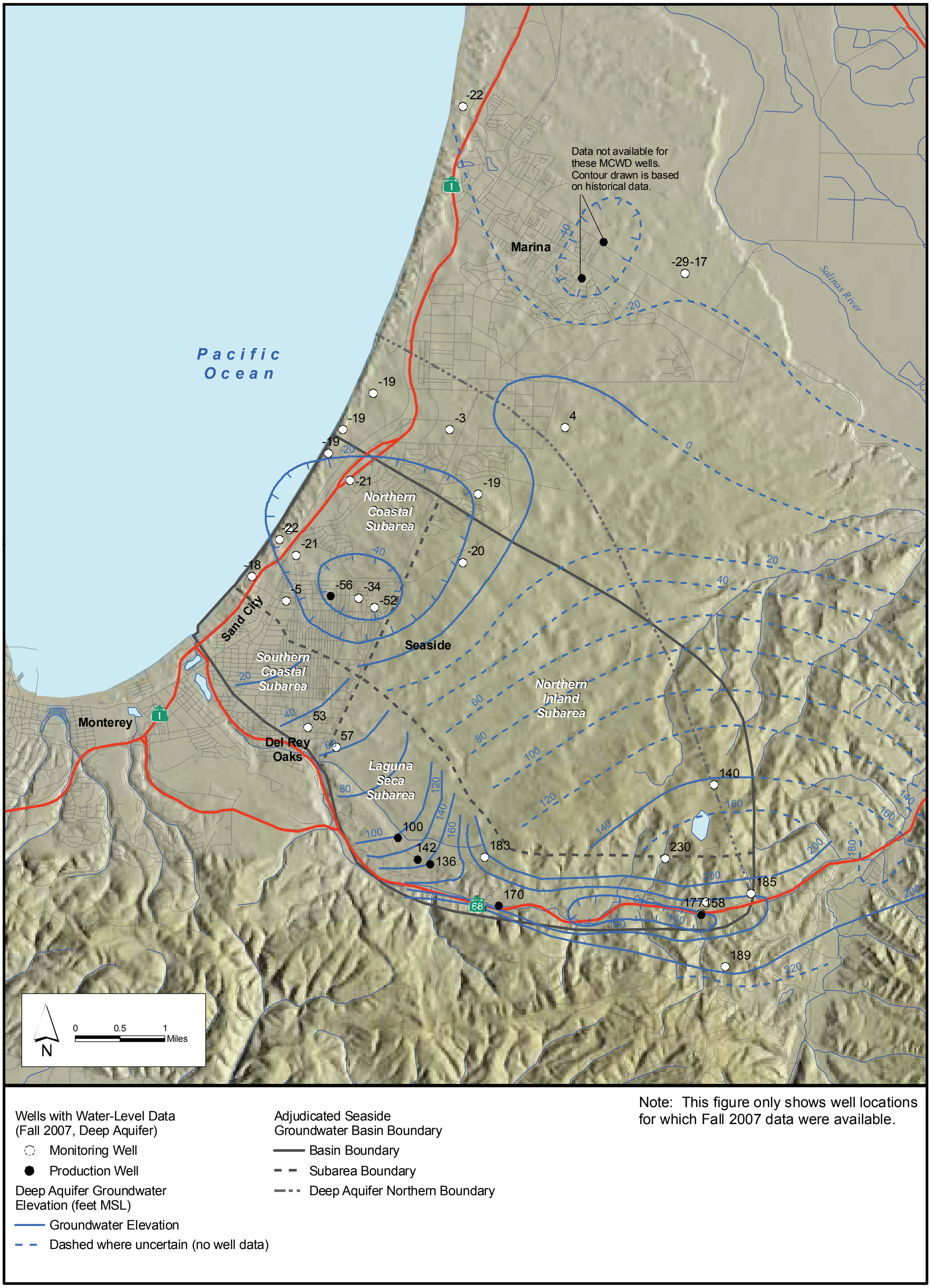
Figure 4.2-6
Shallow Water Levels



Note: This figure only shows well locations for which Fall 2007 data were available.

SOURCE: HydroMetrics LLC, 2009

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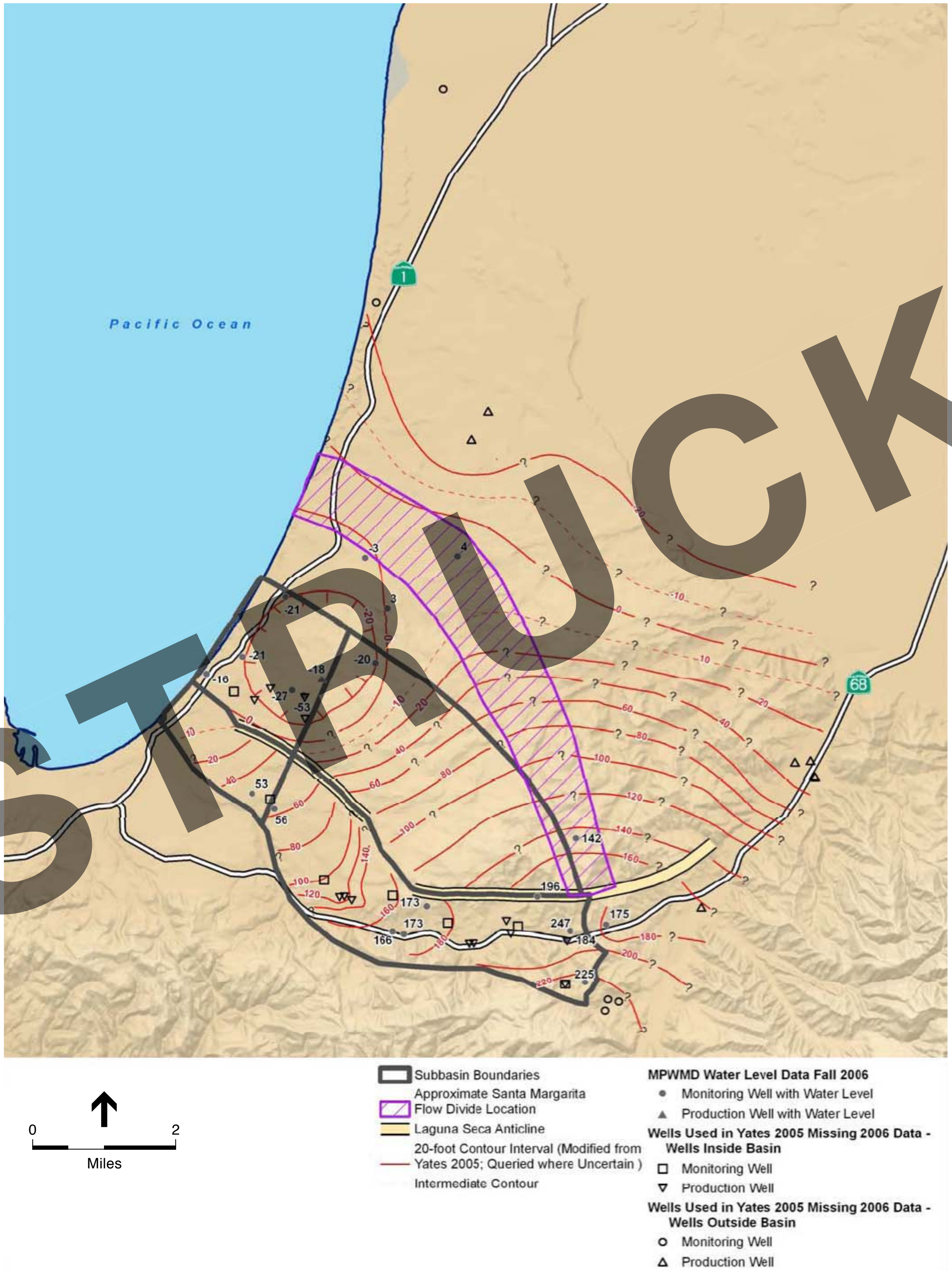
Revised Figure 4.2-7
Deep Water Levels



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SOURCE: HydroMetrics LLC, 2007

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Figure 4.2-7
Deep Water Levels

Robles Formation (or Shallow Zone) collected in 2006 within the SGB, respectively. Although these measurements are collected a year apart, they are presented together to provide a general understanding of the groundwater flow conditions within the study area within water-bearing units thought to be connected (Yates, 2005).

Groundwater Recharge

Groundwater recharge in the SVGB and SGB occurs due to percolation of rainfall, river and stream infiltration, underflow originating in upper valley areas, and agricultural irrigation and other return flow including enhanced groundwater recharge.[4] The capability of an overlying formation to provide a pathway for recharge depends on numerous factors. For example, recharge from direct percolation depends on the presence of near-surface confining and semi-confining clay layers that can impede the downward flow of water, as is the case throughout much of the Pressure subarea.

Similarly, the amount of recharge from underflow depends on the hydrologic connection of the water bearing formations, as well as groundwater extraction occurring in up-gradient areas within the basins. Groundwater withdrawal within both groundwater basins has outpaced groundwater recharge of fresh water, and has resulted in overdraft[5] conditions (RMC, 2006; California American Water Company v. City of Seaside et al., 2007).

Salinas Valley Groundwater Basin (SVGB) Recharge

A proper accounting of groundwater recharge for the SVGB is difficult to compile due to the differences in basin boundaries used by DWR and the MCWRA. Using DWR basin boundaries, Bulletin 118 provides generalized estimates of groundwater recharge within the SVGB and subbasins, of which the Seaside Area is a subbasin. These estimates do not apply directly to the groundwater basins as they are defined and managed by Monterey County.

Although many groundwater studies have been conducted throughout the SVGB, a collective repository of annual groundwater recharge estimates for the SVGB and subareas has not been developed. However, groundwater monitoring of seawater intrusion within the basin has indicated the need for conservation programs within the Basin. Due to the current extent of seawater intrusion within the Pressure subarea and the threat of additional seawater intrusion and other water quality deterioration in the SVGB, various programs have been designed to protect and restore the basin.

Groundwater recharge is promoted through a number of resource protection programs that are implemented throughout the SVGB. Specifically, there are two upstream reservoirs on the Salinas River that are operated to regulate stream flow to maximize recharge to groundwater. Flows are regulated to maximize groundwater recharge before entering the Pressure subarea boundary due to the extent of the confining layer that prevents surface infiltration within the Pressure subarea (RMC, 2006). The rate of recharge varies greatly from year to year, based on both the seasonal distribution of rainfall and the total annual precipitation.

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[4] Enhanced recharge refers to projects that are intended to accelerate localized recharge such as infiltration basins.

[5] Groundwater overdraft occurs when the groundwater levels are lowered due to excessive pumping at a rate that is greater than natural recharge.

As part of the approved Salinas Valley Water Project (SVWP), changes and enhancements in reservoir operations have and will be made that further enhance water conservation. Additionally, a diversion facility on the Salinas River ~~near Spreckles~~, once it is constructed, will also serve to capture excess river flows that would supplement water supply to the Castroville Seawater Intrusion Project (CSIP). The CSIP is a program that distributes recycled water through the Monterey County Recycled Water Project (MCRWP). Tertiary treated wastewater is obtained from the Monterey Regional Water Pollution Control Agency (MRWPCA) and delivered to agricultural users within the northern SVGB, alleviating groundwater extraction in those areas. This type of redistribution of water resources provides a form of "in-lieu" groundwater recharge by effectively reducing groundwater extraction in those areas of the basin that are part of the CSIP area. Since 1998, the CSIP has delivered approximately 13,000 AFY of recycled water to farm lands in the CSIP area (PVWMA, 2006).

Seaside Groundwater Basin (SGB) Recharge

Estimates of groundwater recharge for the SGB can be deduced from the Amended Decision of the Adjudication Decision. The Amended Decision defines a "Natural Safe Yield" or "Perennial Natural Safe Yield," which is the quantity of groundwater existing in the SGB that occurs solely as a result of natural replenishment. The Natural Safe Yield of the SGB as a whole (assuming no action is taken to capture subsurface flow exiting the northern boundary of the Basin) is from 2,581 to 2,913 AFY.

In addition to natural recharge within the basin, active enhanced groundwater recharge has been occurring within the basin through an aquifer storage and recovery (ASR) program developed and operated by the MPWMD. This stored water is considered a form of "Artificial Replenishment" of non-native water that is then deemed available to the MPWMD for extraction in addition to the standard production allocations granted through the Amended Decision; however, the MPWMD was not allocated a standard production percentage. The SGB ASR Initiative has been operating since 2006. The MPWMD is in the process of revising its permits the SWRCB to allow continued diversion of water from the Carmel River between December and May. The water is piped to two wells located on former Fort Ord property, where the water is injected deep into the Santa Margarita Sandstone for storage inside a large groundwater depression, which increases the groundwater available for subsequent extraction. Additional information on the ASR project and water quality monitoring is presented below.

Groundwater Extraction

Within Monterey County, groundwater is an important source of water supply for municipal and agricultural use. Groundwater extraction is monitored closely and reported on an annual basis for both groundwater basins. **Table 4.2-1** summarizes groundwater extraction within the northern SVGB and SGB from 2003 to 2007.

Regional Groundwater Models

As mentioned above, the development of groundwater models has been employed to help evaluate groundwater management programs. Several technical terms are used in the following

TABLE 4.2-1
GROUNDWATER EXTRACTION SUMMARY FOR THE SALINAS AND SEASIDE GROUNDWATER BASINS

	2003	2004	2005	2006	2007
Salinas Valley Groundwater Basin					
Pressure Subarea	121,183	125,454	118,372	112,531	125,620
Eastside Subarea	103,438	112,201	96,128	95,167	104,183
Seaside Groundwater Basin					
Coastal Subareas	1,039	NA	NA	901	961
Laguna Seca Subarea	4,271	NA	NA	4,105	4,423

NA = not available

SOURCE: MCWRA, 2005a; MCWRA, 2005b; MCWRA, 2007; MCWRA, 2008a; MCWRA, 2008b; MPWMD 2008; SGB Watermaster, 2007.

discussions and should be defined. *Hydraulic Gradient* is the slope of the groundwater surface and defines the direction at which groundwater flows. *Transmissivity* is the rate at which groundwater is transmitted through the aquifer at a unit hydraulic gradient. *Permeability* describes the ease with which a fluid moves through a porous medium and is a function of the physical properties of the medium itself. *Hydraulic Conductivity* is related to the ease in which water can flow through a porous medium and is a function of the physical properties of the medium and the fluid. *Specific Yield* is the quantity of water which a unit volume of aquifer, after being saturated, will yield by gravity. It is expressed either as a ratio or as a percentage of volume of the aquifer and is a measure of the water available to wells. *Storage Coefficient* (or *Storativity*) is the volume of water released from or taken into storage in an aquifer. *Effective Porosity* is the volume of interconnected pore space through which water can flow in a geologic medium divided by the total volume of the medium.

Salinas Valley Groundwater Basin (SVGB) Regional Model

MCWRA retained Montgomery Watson, Inc. to develop a basin wide groundwater model referred to as the Salinas Valley Integrated Groundwater and Surface Water Model (IGSM). The model was developed as a tool to evaluate long-term water resources management plans to protect good quality water, improve existing water quality, and evaluate water supplies within the SVGB. The original model was updated through a process involving MCWRA sponsored workshops with participation from the MCWRA Board of Directors, public, recognized experts, interested agencies, and the project engineering team (MCWRA, 2001). The focus of the workshops was to evaluate, update and revise the assumptions and input data used in the preparation of the IGSM so that it would be appropriate for use in the impact analyses section of the Salinas Valley Water Project (SVWP) EIR (MCWRA, 2001).

The IGSM simulates groundwater flow across a 650 square mile area that covers the SVGB. The model utilizes three model layers to describe the 180-Foot Aquifer, 400-Foot Aquifer, and 900-Foot Aquifer, with a confining layer near the ground surface and overlying the 180-Foot Aquifer in the Pressure subarea; a confining layer between the 180-Foot Aquifer and the 400-Foot Aquifer; and a confining layer between the 400-Foot Aquifer and the Deep Aquifer. The model incorporates river and drainage systems as they pertain to groundwater recharge; has the ability to model management strategies for the Nacimiento Reservoir and the San Antonio Reservoir; incorporates infiltration of surface water for varying soil types; includes hydrologic aspects of various land management practices; and simulates the volume and geographical extent of seawater intrusion into the Salinas Valley from the Monterey Bay (MCWRA, 2001). The model cell size is approximately 0.4 square miles (256 acres). Each grid has an orientation consistent with the general surface water drainage pattern and major stream systems, as well as groundwater flow directions. General model parameters are provided in **Table 4.2-2**.

TABLE 4.2-2
GENERAL HYDROGEOLOGIC MODELING PARAMETERS FOR IGSM

Unsaturated Zone Parameters	
Hydraulic Conductivity (feet/day)	0.2-1
Effective Porosity	0.04-0.08
Streambed Parameters	
Hydraulic Conductivity (feet/day)	0.2-5
Streambed Material Thickness (feet)	3-50

	Layer 1	**Layer 2**	**Layer 3**
Aquifer Parameters	180-Foot Aquifer	400-Foot Aquifer	Deep Aquifer
Hydraulic Conductivity (feet/day)	60-240	50-400	20-25
Specific Yield	0.08-0.16	0.06	0.06
Storage Coefficient	0.002	0.00001-0.0007	0.00001-0.00015
Vertical Hydraulic Conductivity	N/A	0.001-0.05	0.0012

SOURCE: Montgomery Watson, 1994

As part of the environmental evaluation of the SVWP, various model runs were developed to understand how the components of the SVWP might change the environmental baseline as defined by 1995 groundwater conditions. The objectives of the SVWP are to stop seawater intrusion, provide adequate water supplies to meet the current and future 2030 needs of the Salinas Valley, and improve the hydrologic balance of the SVGB. The programs identified to accomplish these objectives include a modification of Nacimiento Spillway, reoperation of Nacimiento and San Antonio Reservoirs, Salinas River recharge, conveyance and diversion; distribution and delivery of excess Salinas River water to agricultural users in the northern portions of the Salinas Valley as part of the CSIP program, and possibly to urban users in the cities of Castroville, Marina, Fort Ord, and Salinas, accompanied by additional delivery area pumping management. A potential future phase was envisioned that included expansion of the delivery areas and recycled water within the CSIP program.

The SVWP identified additional water resources from the use of approximately 9,700 AFY of excess flows from the Salinas River. The project evaluated the use of annual excess river flows in addition to approximately 13,300 AFY of recycled water that was already planned for distribution. Because the agricultural portion of the total existing water needs in the Basin was approximately 90% of the total, and agricultural water use reductions were assumed to be substantial, the project assumed an overall reduction of 17,000 AFY in basin-wide water use by 2030. IGSM results simulating the delivery of 18,300 AFY to the CSIP area and/or the urban areas resulted in beneficial impacts to groundwater elevations and seawater intrusion within the SVGB. IGSM modeling also demonstrated that delivery of an average 18,300 AFY of SVWP water in combination with recycled water to CSIP and agricultural uses outside of the CSIP area would fully halt seawater intrusion. In general, it is anticipated that implementation of the SVWP will successfully halt seawater intrusion; however, it was also assumed that additional deliveries may be necessary based on future build out conditions.

Seaside Groundwater Basin (SGB) Northern Coastal Model

Many hydrogeologic studies have been conducted within the SGB and localized groundwater models have been developed for the Laguna Seca area and the Northern Coastal subarea.

Groundwater modeling in the Northern Coastal area was conducted as part of the development of the ASR program and was presented in the *Final Environmental Impact Report/Environmental Assessment for the Monterey Peninsula Water Management District Phase 1 Aquifer Storage and Recovery Project*, ~~*Aquifer Storage and Recovery Project, Draft Environmental Impact Report*~~ dated ~~March~~ August 2006 (MPWMD, 2006). The modeling effort evaluated changes in groundwater levels and long term changes in groundwater storage in the Santa Margarita Aquifer from operation of the ASR wells. The groundwater model was developed utilizing the WinFlow software program, which simulates two-dimensional steady-state and transient groundwater flow. The model utilized published aquifer parameters for the Santa Margarita aquifer, with a transmissivity of 85,100 gpd/ft and storativity of 0.0018. The model simulated the groundwater level and storage response based on an approximate injection volume of 2,426 AF over the course of 183 days and extraction volume of 2,002 AF over the course of 153 days, which represented the range of likely “extreme” injection and extraction conditions that could be encountered over the life of that project. The results indicated that long term operation of the ASR program would result in a beneficial impact to SGB storage and groundwater levels at existing water supply wells.

4.2.1.3 Groundwater Quality

In general, groundwater quality in the SVGB is influenced by a number of factors including natural geochemical properties and flow within the different hydrogeologic formations, groundwater pumping and induced seawater intrusion, land use practices, and accidental releases of contaminants into the environment. For specific information regarding areas with contaminated soil and shallow groundwater see Section 4.6, *Hazards and Hazardous Materials*. Historically, the groundwater basin has two major issues with groundwater quality for drinking water resources: seawater intrusion and nitrate contamination (RMC, 2006).

The MCWRA and the MPWMD have implemented groundwater monitoring programs that include the collection of samples for laboratory analyses from various locations within the basins. Implementation of these programs helps protect against long term degradation of groundwater quality by providing a means to detect changes in groundwater quality early on and develop strategies for groundwater protection. In addition to these monitoring programs, as part of the Groundwater Ambient Monitoring Assessment (GAMA) Program created by the California State Water Resources Control Board, the US Geological Survey (USGS) collected groundwater samples from 94 public supply wells and three monitoring wells in Monterey, Santa Cruz, and San Luis Obispo Counties (the USGS Study; Kulongoski, 2007). The USGS Study was designed to provide a spatially unbiased assessment of raw groundwater quality throughout four specific study areas, where the Monterey Bay Study Area includes wells that were sampled from the northern SVGB and SGB.

Seawater Intrusion

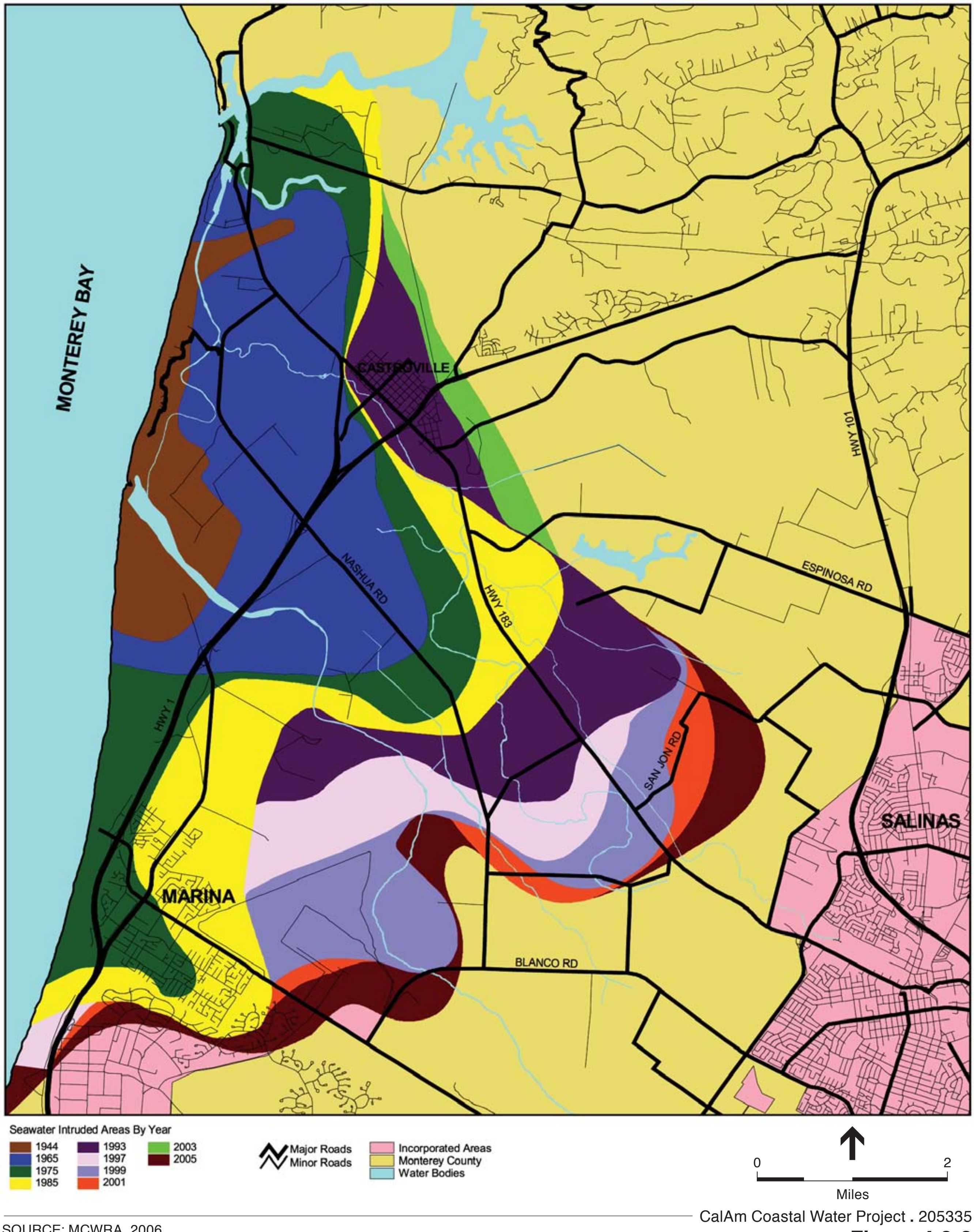
Extensive groundwater production in the Salinas Valley has resulted in overdraft conditions in the basin and induced seawater intrusion within the 180-Foot and 400-Foot Aquifers. Seawater intrusion in the Salinas Valley is typically inferred from chloride concentrations detected in groundwater monitoring and production wells, where concentrations that are greater than 500 milligrams per liter (mg/L) indicate seawater intrusion because these concentrations were above the previously established California Safe Drinking Water Act, Secondary Drinking Water Standards for drinking water (RMC, 2006). This drinking water standard was recently lowered to 250 mg/L in 2006. Seawater intrusion has not been detected in the primary water bearing formations of the SGB (HydroMetrics LLC, 2007).

Figures 4.2-8 and **4.2-9** illustrate the inferred seawater intrusion areas within the 180-Foot and 400-Foot Aquifers, respectively. The current estimates of seawater intrusion within the 180-Foot and 400-Foot Aquifers indicate that seawater had intruded approximately 5 miles and 2 miles inland, respectively, as of 2005, inferred from chloride concentrations greater than 500 milligrams per liter (MCWRA, 2006). The seawater intrusion has resulted in the degradation of groundwater supplies, requiring numerous urban and agricultural supply wells to be abandoned or destroyed (MCWRA, 2001). Seawater intrusion in the SVGB was first documented in 1946 when the State Department of Public Works (now known as Department of Water Resources) published Bulletin 52.

Additionally, both the SVGB and SGB are hydrologically connected to the ocean, thus providing a constant source of both pressure and direct recharge of seawater. Because groundwater elevations along the coast and directly inland have been at or below sea level in both groundwater basins, a landward groundwater gradient has developed and induced groundwater recharge from the ocean. The consequence of the overdraft conditions has lead to degradation of groundwater quality along the coast within the SVGB, and concerns of groundwater degradation within the SGB.

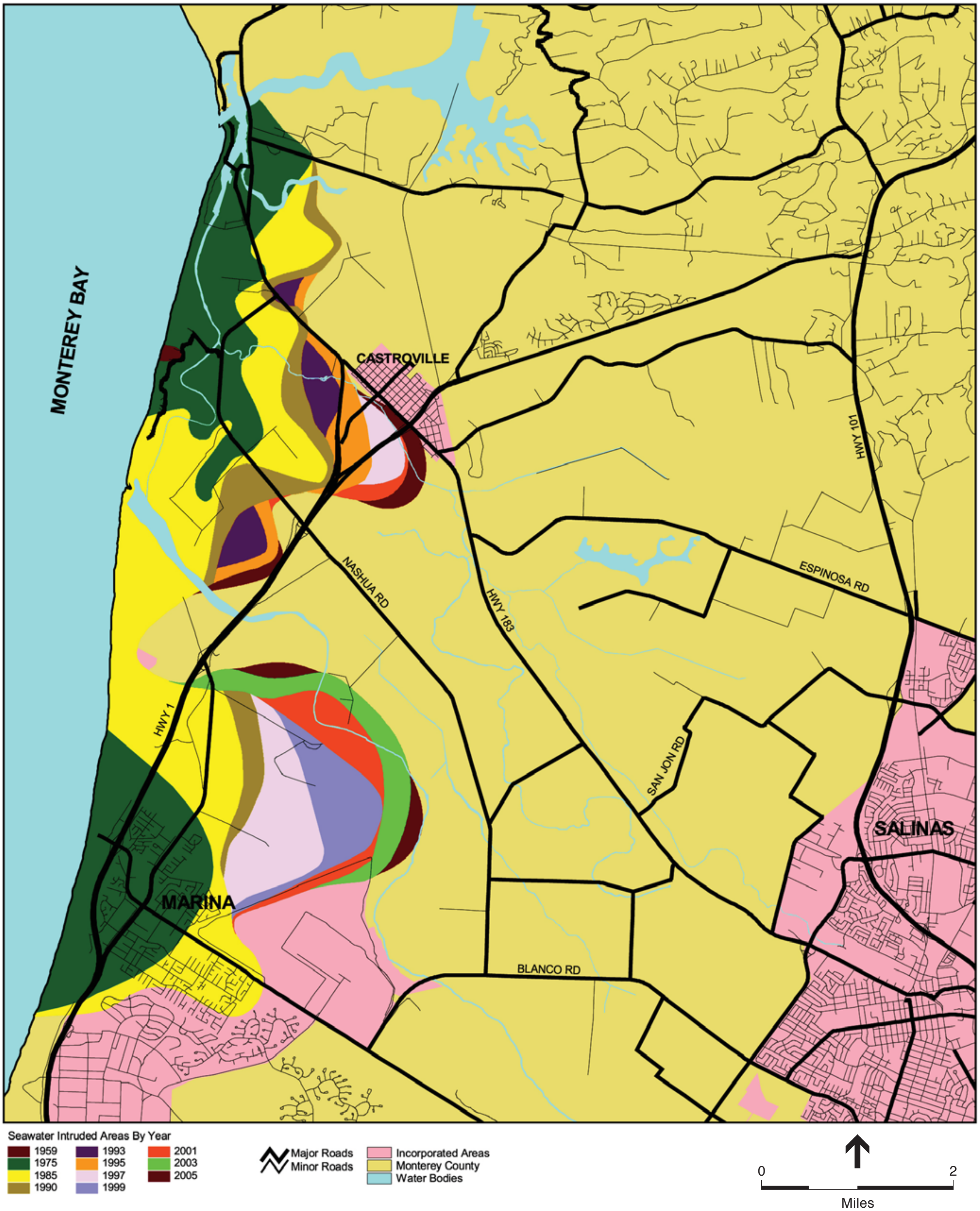
Conceptual Model of Seawater Intrusion

The conceptual model of seawater intrusion is presented based on the physical setting of the coastal portions of the aquifer systems, and previous groundwater studies on seawater intrusions.



SOURCE: MCWRA, 2006

Figure 4.2-8
Historic Seawater Intrusion Map
Pressure 180-Foot Aquifer
500 mg/L Chloride Areas



SOURCE: MCWRA, 2006

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Figure 4.2-9
Historic Seawater Intrusion Map
Pressure 400-Foot Aquifer
500 mg/L Chloride Areas

Along the Monterey Bay, there are ocean outcrops of water-bearing aquifer material, including a unit referred to as a deltaic deposit with 180-Foot Aquifer and Paso Robles-Aromas Unit with 400-Foot Aquifer, which are illustrated on a USGS marine geologic map of Southern Monterey Bay (Greene, 1970). These ocean outcrops facilitate the recharge of seawater along the coast when groundwater extraction exceeds natural recharge.

This recharge area is further investigated and documented in a study conducted by Kennedy/Jenks Consultants (2004), which evaluated the mechanisms of seawater intrusion into the SVGB. The report states that the core condition for seawater intrusion into the groundwater basin is the direct hydraulic contact of the aquifers with the Monterey Bay. The secondary condition for seawater mixing in the 180-Foot and 400-Foot Aquifers is that groundwater levels are below sea level and the normal landward to seaward gradient has been reversed in the 180-Foot Aquifer zone since the 1930s (Kennedy/Jenks, 2004).

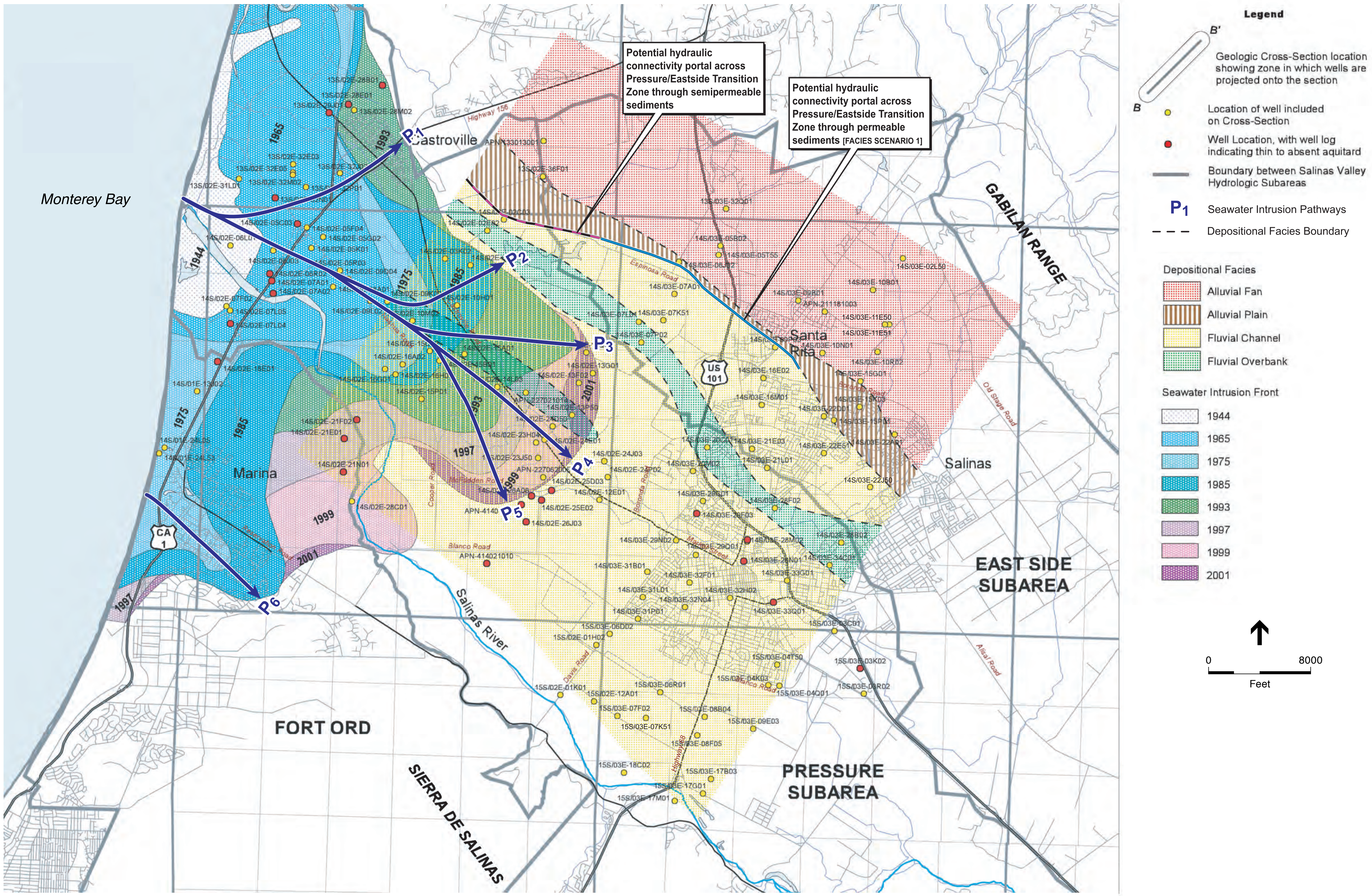
The Kennedy-Jenks study identified the axes of seawater intrusion in the two aquifer zones, and identified the primary pathways for seawater intrusion into the groundwater basin, as illustrated on **Figure 4.2-10**. Within the 180-Foot Aquifer, paths 1, 2, and 3 represent seawater advances towards Castroville and the East Side Subarea with approximated seawater intrusion rates of 202 to 440 feet per year (ft/year). A fine-grained and semipermeable barrier of flow separates the seawater intrusion front into two separate lobes. Path 6 is illustrated as another preferential pathway for seawater intrusion within the vicinity of Marina (Kennedy/Jenks, 2004).

Nitrate Contamination

Nitrate contamination in the Salinas Valley was first documented in a report published by the Association of Monterey Bay Area Governments (AMBAG) in 1978. The SWRCB has twice documented that nitrate levels in the SVBG have impaired the beneficial use of the SVGB as a drinking water supply. In response to the identification of nitrate contamination, the Nitrate Technical Advisory Committee (NTAC) was formed by the MCWRA to examine nitrate in the SVGB and recommend a course of action, and as a result, MCWRA has prepared a nitrate management plan that is currently under implementation (RMC, 2006).

Other Chemicals of Concern

As part of the USGS Study, collected groundwater samples were analyzed for volatile organic compounds (VOCs), pesticides, pesticide degradation products, nutrients, major and minor ions, trace elements, radioactivity, microbial indicators, and dissolved noble gases, as well as various naturally occurring isotopes. The results of the USGS Study are used to characterize the quality of untreated groundwater resources within the study area, and also provide insight to the overall trends in groundwater quality. **Figure 4.2-11** illustrates the wells sampled as part of the USGS Study that are within the boundaries of the proposed project. **Table 4.2-3** summarizes the analytical results obtained from their study. In general, analytical results indicate that raw groundwater quality is of good quality with respect to the compounds analyzed in the study; however, elevated concentrations of hexavalent chromium were reported as exceeding a threshold of 1 microgram per liter for the purposes of reporting the groundwater quality data summary (Kulongoski, 2007).



Potential hydraulic connectivity portal across Pressure/Eastside Transition Zone through semipermeable sediments

Potential hydraulic connectivity portal across Pressure/Eastside Transition Zone through permeable sediments [FACIES SCENARIO 1]

SOURCE: Kennedy/Jenks, 2004

Figure 4.2-10
Historic Seawater Intrusion Map and Inferred Travel Paths, Pressure 180-Foot Aquifer

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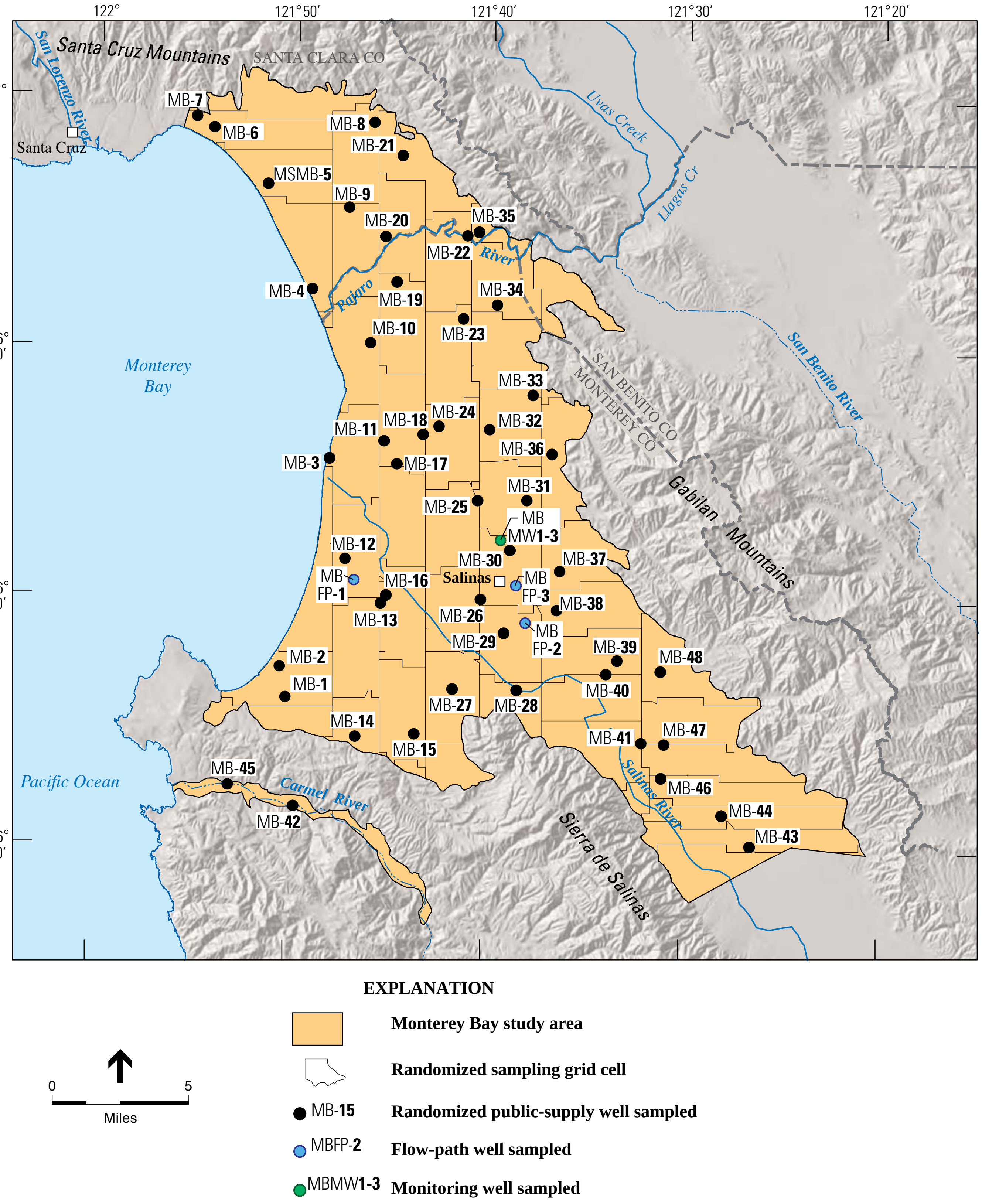

SOURCE: Kulongoski, 2007

Figure 4.2-11
Groundwater Quality Data

TABLE 4.2-3
GROUNDWATER QUALITY DATA

Sample ID	Dissolved Oxygen (mg/l)	pH (SU)	Specific Conductivity (µS/cm)	Temp-erature (*C)	Total VOCs (µg/L)	Pesticides and Degradates (µg/L)	Total Chromium (µg/L)	Hexavalent Chromium (µg/L)
MSMB-01	8.6		907	20.1	0.27	0.10	8	*9
MSMB-02	2.2		885	21.7	1.00	0.068	<1	<1
MSMB-03	1.9		338	33.2	--	--	17	*16
MSMB-10	4.3		1080	20.1	--	--	23	*23
MSMB-11	1.3		591	22	0.01	--	7	*7
MSMB-12	0.2	8.8	538	31.7	--	--	2	*2
MSMB-13	3.9		648	19.2	1.99	--	6	*6
MSMB-14	4.1		1180	21.9	--	--	8	*7
MSMB-16	4.1		651	19.7	0.59	--	5	*4
MSMB-17	1.8		953	22	--	--	14	*12
MSMB-18	3.5		499	20.6	0.07	--	13	*13
MSMB-23	2.7		693	20.6	--	--	19	*16
MSMB-24	7.5		555	18.7	0.24	--	10	*10
MSMB-25	4.5		562	23.1	--	--	18	*18
MSMB-26	2.7		77	22	--	--	5	*5
FP-01	0.3		615	29.1	--	--		

NOTES:
-- = not detected; detection limit not provided
mg/L = milligram per liter
µS/cm = microsiemens per centimeter
*C = degrees Celcius
µg/L = microgram per liter
VOCs = volatile organic compounds
* = value exceeds threshold detection level of 1 µg/l for the purpose of reporting.

SOURCE: Kulongoski, 2007

Seaside Groundwater Basin (SGB) Water Quality

Additional chemicals of concern include those related to the distribution of Carmel River water associated with the SGB ASR program. The ASR program currently delivers water that has undergone a chlorination process to disinfect it of possible microbiological contamination prior to injection into the Santa Margarita Formation. This process is known to result in the formation of disinfection by-products (DBPs), including trihalomethanes (THMs) and haloacetic acids (HAAs) that have regulatory limits for drinking water purposes. ~~Although the injected water typically meets drinking water standards prior to injection, o~~Other water quality concerns to the Santa Margarita Formation include changes in the aquifer water quality due to the presence of DBPs in the injectate water, and long-term changes in the geochemistry of the groundwater system.

While it has been successfully demonstrated at the SGB ASR site (as well as other ASR sites in California and elsewhere) that successive injection/storage/recovery cycles can yield fully potable water upon recovery, issues regarding the fate and stability of DPBs in the subsurface can also affect the potability of the recovered water. The DBP data collected during the injection, storage and recovery periods since the initiation of the ASR program indicate that THMs appear to increase during the first 40 days of storage, followed by a slow decline in THM levels over the following six month period. There is a lack of complete THM degradation although concentrations are generally at or below the State Drinking Water Regulations.

THMs biologically degrade under anaerobic subsurface conditions. The relatively slow microbial response of the aquifer system for attenuation of both THMs and HAAs, combined with the relatively slow decline in reduction-oxidation (redox) potential that was observed during the storage period at this site, is an indication that anaerobic biological activity is minimal in the vicinity of the injection wells. Measured total organic carbon (TOC) concentrations in the recharge water and also in the groundwater are quite low, likely representing one of the limiting factors to biological activity that might promote DBP degradation.

Available data regarding the TOC content of the aquifer and the treated drinking water suggest low concentrations ranging between 0.58 and 1.7 mg/l with slightly higher concentrations in the recharge water in comparison to the groundwater. Where TOC concentration is low, the rate of reduction of chlorine concentrations and also THM and HAA reduction is slower. It is possible that, over a few operating cycles, a zone of increased microbial activity will develop near each ASR well, acclimating to the slightly higher organic content of the recharge water and thereby increasing the rate of reduction of both THMs and HAAs. In other words, the repeated injection, storage, and recovery cycles is expected to incrementally change the aquifer minerals and background water quality towards the chemical nature of the injected water. This represents the development of a “buffer zone” of mixed water that gradually increases over time, and a natural effect of the equilibrium reached between the injected water and aquifer mineral substrate during water storage.

During testing of the ASR project, studies found that in the recovered water, levels of hydrogen sulfide were much lower than natural groundwater concentrations prior to injection, indicating a lasting and significant improvement of water quality during subsurface water storage.[6] This observation suggests that an ancillary benefit of the ASR in the SGB may include the “conditioning” of the aquifer; i.e., the reduction of hydrogen sulfide in groundwater extracted, which subsequently reduces the amount of chemical treatment that needs to be performed at the Seaside Ozone Treatment Plant. According to a report that summarized the pilot study results for the ASR project, with continued ASR operations over time, the need for the ozone treatment plant may become unnecessary (Padre Associates, 2004).

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[6] The cause of hydrogen sulfide reduction is likely due to the effects of the injectate’s chlorine residual and dissolved oxygen content. These oxidizers react in the subsurface to stifle anaerobic bioactivity, which normally produces hydrogen sulfide. As the aquifer environment is altered and becomes inhospitable to anaerobes, hydrogen sulfide generation declines. This effect has also been observed in ASR wells in similar coastal aquifers in Santa Barbara, Alameda, and Ventura Counties.

4.2.3 Regulatory Setting

Many of the Federal and State Regulations described in Chapter 4.1, Surface Water Resources, also apply to groundwater resources including the Clean Water Act, the Porter-Cologne Water Quality Control Act, and Water Quality Control Plans (Basin Plans). Additional information regarding the Basin Plan for the Central ~~Valley~~ Coast RWQCB is provided specific to groundwater resources.

4.2.3.1 State

SWRCB Anti-Degradation Policy

The RWQCB is responsible for implementing the SWRCB's anti-degradation policy (Policy 68-16) through implementation of the Basin Plan. Policy 68-16 requires that the quality of surface water and groundwater be maintained to the maximum extent possible. The policy requires that existing high quality be maintained to the maximum extent possible, and uses the highest water quality since 1968 to define baseline water quality criteria. The policy allows for a lowering of high quality waters if the change is consistent with maximum benefit to people of the state, and that the lowering of high quality waters will not unreasonably affect present and potential beneficial uses and will not result in water quality lower than applicable standards. As this policy also applies to waste discharge requirements and waivers for discharges, the policy requires that for proposed discharge that might lower water quality, it must result in the best practicable treatment or control of the discharge necessary to assure that no pollution or nuisance occurs (SWRCB, 1968).

This policy could apply to both the use of slant wells to draw seawater for the North Marina Project and to the current and proposed ASR wells.

4.2.3.2 Local

Central Coast Regional Water Quality Control Plan (Basin Plan)

One significant difference between the State and Federal programs is that California's basin plans establish standards for groundwater in addition to surface water. The Central Coast RWQCB has established water quality objectives for selected ground waters; these objectives are intended to serve as a water quality baseline for evaluating water quality management in the basin. Specific water quality objectives have not been defined for the SVGB (which in their oversight includes the SGB), but the overall general objectives are applicable.

General objectives are established for tastes and odors, and radioactivity; for municipal and domestic supply, additional general objectives are established for bacteria, organic chemicals, and various chemical constituents; and for agricultural supply, general objectives follow the guidelines for water quality from the University of California Agricultural Extension Service guidelines. In addition, agriculture supply must be handled such that no controllable water quality factor shall degrade the quality of any groundwater resource or adversely affect long-term soil productivity (RWQCB, 1994).

NPDES Permit Requirements

As described in Chapter 4.1, Surface Water Resources, the city of Seaside is part of the Monterey Regional Stormwater Management Program (MRSWMP). Section D of the municipal separate storm sewer system (MS4) General Permit requires that the Permittee address categories of non-stormwater discharges or flows (i.e., authorized non-stormwater discharges) only where they are identified as significant contributors of pollutants to the Small MS4, including uncontaminated groundwater infiltration to storm sewers, uncontaminated pumped groundwater, and discharges from potable water sources. The MRSWMP (2005) requirements also state that if the RWQCB Executive Officer determines that any individual or class of non-stormwater discharge(s) may be a significant source of pollutants to waters of the U.S. or physically interconnected MS4, or poses a threat to water quality standards (beneficial uses), the RWQCB Executive Officer may require the appropriate Permittee(s) to monitor and submit a report and to implement BMPs on the discharge (RWQCB, 2005). Development of the ASR wells may qualify for discharge under the NPDES General Permit No. CAS000004 if this discharge meets the criteria listed for authorized non-stormwater discharges.

The applicant may also qualify for other NPDES permits that have been identified for well development water. Specifically, if the discharge of well development water were to land only, the applicant may qualify for the Central Coast RWQCB, General Waiver for Specific Types of Discharges. The waiver is subject to specific conditions including compliance with the General Waiver Conditions as stipulated under Resolution Number R3-2008-0010 (RWQCB, 2008).

If the discharge of well development water were to a surface water body, the applicant may qualify for the General NPDES Permit for Discharges with Low Threat to Water Quality, Order Number R3-2006-0063, NPDES No. CAG 9933001. To be covered by this permit, the discharges must meet the following criteria (RWQCB, 2006):

1) Pollutant concentrations in the discharge do not (a) cause, (b) have a reasonable potential to cause, or (c) contribute to an excursion above any applicable water quality objectives, including prohibitions of discharge for a given surface water body.

2) The discharge does not include water added for the purpose of diluting pollutant concentrations.

3) Pollutant concentrations in the discharge will not cause or contribute to degradation of water quality or impair beneficial uses of receiving waters.

The applicant will be required to work with the RWQCB to determine the most applicable NPDES permit to apply for, at which time the RWQCB Officer will determine the appropriate actions required to protect against potential threats to water quality standards.

Monterey County Health Department

In order to protect groundwater quality, the well program is responsible for the permitting of the construction, destruction, and repairs/modification of a domestic, irrigation, agricultural, cathodic protection, observation, test, or monitoring well. The well program works closely with the cities and the MCWRA and MPWMD (Monterey County Health Department, 2008).

A permit would be required to construct the proposed ASR wells and North Marina Project slant wells.

Monterey County Plans, Policies, and Ordinances

The Monterey County and cities of Seaside and Marina groundwater plans, policies, and ordinances are applicable to the proposed project. Included below are a list of relevant goals and objectives, plans, policies, and ordinances as they relate to groundwater and water quality:

TABLE 4.2-4
MONTEREY COUNTY PLANS AND POLICIES

Agency	Municipal Code or General Plan	Applicable Regulation or Policy
Monterey County[1]	Monterey County General Plan (1982)	**Goal 5:** To conserve and enhance the water supplies in the county and adequately plan for the development and protection of these resources and their related resources for future generations. ***Objective 5.1***: Protect and preserve watersheds and recharge areas, particularly those critical for the replenishment of reservoirs and aquifers. *Policy 5.1.2*: Land use and development shall be accomplished in a manner to minimize runoff and maintain groundwater recharge in vital water resource areas. **Goal 6:** To promote adequate, replenishable water supplies of suitable quality to meet the County's various needs. ***Objective 6.1*:** Eliminate long-term groundwater overdrafting in the County as soon as practicably possible. *Policy 6.1.1*: Increased uses of groundwater shall be carefully managed, especially in areas known to have ground water overdrafting. *Policy 6.1.2*: Water conservation measures for all types of land uses shall be encouraged. ***Objective 6.2*:** Explore and implement measures to supply additional water to critically deficient areas. *Policy 6.2.1*: The County shall pursue development of suitable water supplies in keeping with broad **Goal 21:** To ensure that the County's water quality is protected and enhanced to meet all beneficial uses, including domestic, agricultural, industrial, recreational, and ecological. ***Objective 21.1*:** Protect and enhance surface and groundwater quality by implementing current adopted water quality programs and by continuing to evaluate new problems; develop new programs in accordance with the following policies by 1984. *Policy 21.1.2*: The County shall assume an active role in initiating and supporting beneficial water quality programs that affect the County. *Policy 21.1.6*: The County shall identify, and have the property owner repair or destroy, wells that contribute to groundwater degradation; wells shall be repaired or destroyed according to state standards and such actions shall be reviewed and approved by the County Environmental Health Department. *Policy 21.1.7*: The County shall monitor surface and groundwater quality to warn of potential problems. *Policy 21.1.8*: The County shall cooperate with state and federal agencies in identifying seawater intrusion problems and shall seek available state or federal assistance in solving these conditions.

TABLE 4.2-4 (Continued)
MONTEREY COUNTY PLANS AND POLICIES

Agency	Municipal Code or General Plan	Applicable Regulation or Policy
Monterey County (cont.)	Monterey County General Plan (1982) (cont.)	*Policy 21.1.10*: The County shall implement a program to prevent further seawater intrusion by developing supplemental sources of water for the North County. This may include water importation, water conservation, and wastewater reclamation. ***Objective 21.3*: **Ensure that sewage and industrial waste disposal from new and existing development will not contaminate surface or groundwaters. *Policy 21.3.1*: The County should support sewage treatment projects that reduce contamination of surface and groundwater to acceptable levels. *Policy 21.3.2*: The County shall encourage the investigation, under supervision of County health officials, of the cost- effectiveness, reliability and health acceptability of alternative wastewater disposal methods. The County should approve alternate wastewater disposal methods when they are safe and acceptable to the Environmental Health Department. *Policy 21.3.4*: The County should determine the number of septic systems that can be developed in an area before groundwater is threatened. Except for single-family residences on existing lots of record, development should not exceed that number unless approved alter native wastewater systems are provided. The North County Planning Area should be given first priority in any studies undertaken. **Goal 53:** To promote adequate water service for all county needs. ***Objective 53.1*** Achieve a sustained level of adequate water services. *Policy 53.1.1*: The County shall encourage coordination between those public water service providers drawing from a common water table to assure that the water table is not overdrawn.
Monterey County[1]	Monterey County Municipal Code (1995; 2008)	**Title 15 Public Services:** A. It is the purpose of this Chapter to provide for the construction, repair, and reconstruction of all wells, including cathodic protection wells, test wells, observation wells, and monitoring wells, to the end that the groundwater of this County will not be polluted or contaminated and that water obtained from such wells will be suitable for the purpose for which used and will not jeopardize the health, safety or welfare of the people of this County. It is also the purpose of this Chapter to provide for the destruction of abandoned wells, monitoring wells, observation wells, test wells, and cathodic protection wells found to be public nuisances, or when otherwise appropriate, to the end that all such wells will not cause pollution or contamination of groundwater. B. To comply with Articles 1, 2, 3, and 4 (commencing with Section 13700) of Chapter 10, Division 7 of the Water Code, relating to water wells, cathodic protection wells and monitoring wells. (Ord. 3316 §§ 1, 2, 1988; Ord. 1967 § 1, 1973)
MCWRA	MCWRA Act (1995)	**Chapter 52:** ***Section 8*:** The objects and purposes of this act are to provide for the control of the flood and stormwaters of the MCWRA and the flood and storm waters… and to conserve those waters for beneficial and useful purposes by spreading, storing, retaining, and causing those waters to percolate into the soil within the MCWRA… and prevent the waste or diminution of the water supply in the Agency, including the control of groundwater extractions as required to prevent or deter the loss of usable groundwater through intrusion of seawater and the replacement of groundwater so controlled through the development and distribution of substitute surface supply and to prohibit groundwater exportation from the SVGB… (h-6) Perform acts necessary or proper for the performance of any agreement with any district of any kind, public or private corporation, association, firm, or individual, or any number of them for the transfer or delivery to any district, corporation, association, firm, or individual of any water right or water pumped, stored, appropriated, or otherwise acquired or secured, for the use

TABLE 4.2-4 (Continued)
MONTEREY COUNTY PLANS AND POLICIES

Agency	Municipal Code or General Plan	Applicable Regulation or Policy
MCWRA (cont.)	MCWRA Act (1995) (cont.)	of the MCWRA, or for the purpose of exchanging the same for other water, water right, or water supply in exchange for water, water right, or water supply to be delivered to the MCWRA by the other party to the agreement. (h-7) Cooperate with, and act in conjunction with, the state, or any of its engineers, officers, Boards, commissions, departments, or agencies, or with the United States, or any of its engineers officers, Boards, commissions, departments, or agencies, or with any public or private corporation, in the construction of any work for controlling flood or storm waters of streams in or running into the Agency, of for the protection of life or property therein, or for the purpose of conserving the waters for beneficial use within the Agency, or for the protection, enhancement, and use of groundwater within the Agency, or in any other works, acts, or purposes provided for herein, and adopt and carry out any definite plan or system of work for any such purpose. ***Section 21*****:** *Legislative findings; SVGB extraction and recharge*. The Legislature finds and determines that the Agency is developing a project which will establish a substantial balance between extraction and recharge within the SVGB. For the purpose of preserving that balance, no groundwater from that basin may be exported for any use outside the basin, except that use of water from the basin on any part of Fort Ord shall not be deemed such an export. ***Section 22*****:** *Studies; groundwater basins; seawater intrusion; extraction prohibition*. If, as a result of appropriate studies conducted by the MCWRA, it is determined by the MCWRA Board of Supervisors that any portion of a groundwater basin underlying the Agency is threatened with the loss of a usable water supply as a result of seawater intrusion into that portion of the groundwater basin, the MCWRA Board of Supervisors may take appropriate steps to prevent or deter the further intrusion of underground seawater by establishing and defining an area and depth from which the further extraction of groundwater is prohibited. This determination shall be made only after a public hearing by the MCWRA Board of Supervisors upon the proposed determination, with notice of the hearing to be given in the manner prescribed in Section 6065 of the Government Code. At the hearing, the MCWRA Board shall accept evidence showing the nature and extent of the threat of seawater intrusion and the facilities proposed in order to provide the area threatened a substitute supply of surface water. If, at the conclusion of the hearing, the MCWRA Board of Supervisors determines that a threat of seawater intrusion exists which will be aggravated by continued groundwater extraction within a given area and depth, the MCWRA Board may adopt an ordinance prohibiting the further extraction of groundwater from the area and depth so defined.
MCWRA	Ordinance 3706 (1993)	**An ordinance of the MCWRA prohibiting groundwater extractions and the drilling of new groundwater extraction facilities in certain portions of the Pressure 180-Foot Aquifer After January 1, 1995.** The ordinance prohibits the extraction of groundwater from groundwater extraction facilities that have perforations between zero feet mean sea level and -250 feet and are located within the territory between the City of Salinas and Castroville, bounded by Highway 183 and the dividing line between the Pressure subarea and the East Side subarea. (Officially defined as Territory A and illustrated on **Figure 4.2-12**) The ordinance also prohibits the drilling of new wells with perforations between zero feet mean sea level and -250 feet in the portion of the pressure Area north of Harris Road to the Pacific Ocean. It provides a variance procedure in case of hardship and penalties for violations. (Officially defined as Territory B and illustrated on Figure 4.2-12).
MCWRA, MCWD, and Castroville Water District (CWD)	Memorandum of Understanding	The purpose of this Memorandum of Understanding is to coordinate water resources planning activities undertaken by the three water agencies, and memorializes the intent to coordinate and share information concerning water resources management planning programs and projects and other information, and to improve and maintain overall communication among the Parties involved. The Parties may develop and implement projects and programs individually or jointly in groupings of two or three, or enter into additional agreements in furthering those goals. (RMC, 2006)

TABLE 4.2-4 (Continued)
MONTEREY COUNTY PLANS AND POLICIES

Agency	Municipal Code or General Plan	Applicable Regulation or Policy
MCWRA, MPWMD, and Pajaro Valley Water Management District	Memorandum of Understanding	**Memorandum of Understanding for Integrated Regional Water Management in the Greater Monterey Bay Area** The purpose of this Memorandum of Understanding is to recognize a mutual understanding among public agencies in the greater Monterey Bay area regarding their joint efforts toward Integrated Regional Water Management (IRWM) planning. That understanding will continue to increase coordination, collaboration and communication for comprehensive management of water resources in the greater Monterey Bay area. (RMC, 2006)
Seaside Basin Watermaster	California Superior Court, Monterey California, Case No. M66343	**Seaside Basin Watermaster** Through the adjudication of the Seaside Basin, the California Superior Court created the Seaside Basin Watermaster on March 26, 2006. The purpose of the Watermaster is to assist the Court in the administration and enforcement of the provisions of the Judgment, which pertains to overseeing and managing the groundwater resources of the Seaside Groundwater Basin. The Watermaster's objective is to help resolve the problems of lowered groundwater levels and the threat of seawater intrusion, which are the result of over-pumping of the Seaside Basin.
Marina	General Plan (2000)	**Water Resource Management** *3.45*: In no event shall the City permit new development requiring water allocations in excess of the available supply or in excess of its designated water allocation for that portion of former Fort Ord within the City. Toward that end, the City shall employ a sound water resource management program which (1) protects the quality of the water supply; (2) promotes replenishment of water sources; (3) minimizes water consumption; and (4) makes maximum use of recycled wastewater for large areas of turf. The primary responsibility for water resource management rests with the MCWD, as the purveyor and the MCWRA, which is responsible for managing the surface and groundwater resources of the Salinas River basin. The policies and programs of the General Plan are designed to be consistent with the policies and objectives of these two agencies, and where within the legal authority of the City, promote these policies and objectives in land use and development decisions and in the adoption and enforcement of related development standards.
City of Seaside	General Plan (2004)	**Policy COS-3.1:** Eliminate long-term groundwater overdrafting as soon as feasible. **Implementation Plan COS-3.1.1 Halt Salt Water Intrusion.** Cooperate with the Monterey County Water Resources Agency (MCWRA), the Army Corps of Engineers (ACOE), State Water Resources Control Board (SWRCB), and the Regional Water Quality Control Board (RWQCB) to find a solution to halt seawater intrusion toward Seaside. ***Implementation Plan COS-3.1.2 Aquifer Recharge*** ***Areas*****.** Cooperate with Monterey County, the Regional Water Quality Control Board Central Coast (Region 3) and the Monterey County Water Resources Agency (MCWRA), providing technical assistance when necessary to help identify, protect, and preserve critical aquifer recharge areas so that their function is maintained and groundwater quality is not further degraded. ***Implementation Plan COS-3.1.3 Well Monitoring*****.** Cooperate with the MCWRA and water service providers, providing technical assistance when necessary, to continue to monitor urban and agricultural well usage rates and quality of the ground water. **Policy COS-3.2:** Work with all local, regional, State, and federal agencies to implement mandated water quality programs and regulations to improve surface water quality.

TABLE 4.2-4 (Continued)
MONTEREY COUNTY PLANS AND POLICIES

Agency	Municipal Code or General Plan	Applicable Regulation or Policy
City of Seaside (cont.)	General Plan (2004) (cont.)	***Implementation Plan COS-3.2.1 NPDES Requirements*.** To reduce pollutants in urban runoff, require new development projects and substantial rehabilitation projects to incorporate Best Management Practices (BMPs) pursuant to the National Pollutant Discharge Elimination System (NPDES) permit to ensure that the City complies with applicable state and federal regulations.
Monterey County	North County Land Use Plan/ Local Coastal Plan (1999)	**Key Policy 2.5.1** The water quality of the North County groundwater aquifers shall be protected, and new development shall be controlled to a level that can be served by identifiable, available, long term-water supplies. The estuaries and wetlands of North County shall be protected from excessive sedimentation resulting from and use and development practices in the watershed areas.
Monterey County	Coastal Implementation Plan (1988)	**2 0.144 .07 Water Resources Development Standards**. The intent of this Section is to provide development standards which, will protect the water quality o the North County surface water resources and groundwater aquifers, control new development to a level that can be served by identifiable, available, and long-term water supplies, and protect North County streams, .estuaries, and wetlands from excessive sedimentation resulting from land use and development practices in the watershed areas. (Ref. Policy 2.5.1)

[1] Monterey County includes the communities of Moss Landing and Castroville

SOURCE: Monterey County, 1982, 1998, 1993, 1995, 1999, and 2008; City of Seaside, 2004; City of Marina, 2000.

4.2.4 Impacts and Mitigation Measures

4.2.4.1 Significance Criteria

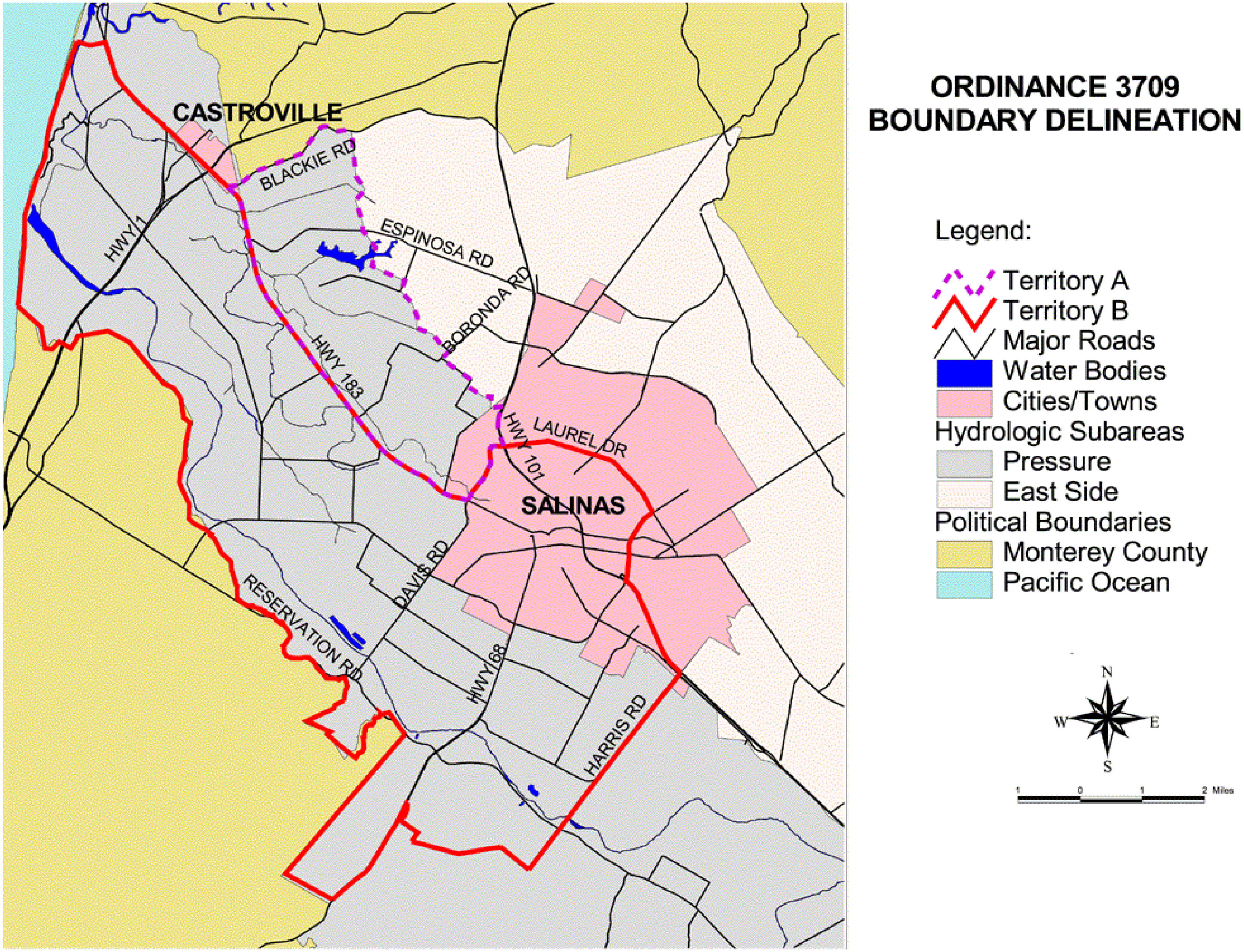
Significance thresholds in this section are based on Appendix G (Environmental Checklist Form) of the CEQA Guidelines, which indicates that a potentially significant impact on groundwater resources and groundwater quality would occur if the project would:

- Violate any water quality standards or waste discharge requirements;
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level;
- Otherwise substantially degrade water quality;

4.2.4.2 Groundwater Issues Not Analyzed Further in this EIR

MCWRA Ordinance 3709

The MCWRA Ordinance 3709 essentially prohibits pumping from the 180-Foot Aquifer within Territory A, and in Territory B, Ordinance 3709 prohibits drilling and groundwater pumping from the 180-Foot Aquifer. Territories A and B are illustrated on **Figure 4.2-12**. Source water for the North Marina Project would be extracted from subsurface slant wells located at the end of Reservation Road, an area not encompassing the restrictive territories identified by



SOURCE: MCWRA, 1993

Figure 4.2-12
Ordinance 3709 Boundary Delineation

Ordinance 3709. The proposed slant well location is not included within Territories A or B, therefore operation of the proposed slant well would not be in violation of Ordinance 3709.

Moss Landing

The facilities for the Moss Landing Project would obtain source water for desalination directly from an existing open seawater intake system. Groundwater resources and water quality impacts that could potentially be related to the Moss Landing Project are related to the expansion of the ASR system located in the SGB. Therefore, there would be *no impacts* related to groundwater resources within the SVGB; and there would be *no impacts* to water quality or potential to induce seawater intrusion within the SVGB.

4.2.4.3 Analyses of Impacts

The following impact analyses focus on potential effects on groundwater resources and water quality associated with implementation of the Moss Landing or the North Marina Project. The evaluation was made in light of project plans, current conditions at the project sites, applicable regulations and guidelines, and previous environmental assessments. **Table 4.2-5** presents a summary of the potential groundwater resources impacts of each project and its components.

TABLE 4.2-5
SUMMARY OF POTENTIAL GROUNDWATER RESOURCES IMPACTS

Facility	Impact 4.2-1	Impact 4.2-2	Impact 4.2-3	Impact 4.2-4	Impact 4.2-5	Impact 4.2-6
Moss Landing Site:						
Plant: Moss Landing Project	-	-	-	-	-	-
Intake: Moss Landing Project	-	-	-	-	-	-
Transmission Main North Pipeline: *Moss Landing Project*	-	-	-	-	-	-
North Marina Site						
Plant: North Marina Project	-	-	-		-	-
Intake: North Marina Project	-	-	-	LTS	LTS	LTS
Transmission Main South Pipeline	-	-	-	-	-	-
Terminal Reservoir Site	-	-	-	-	-	-
Valley Greens Pump Station	-	-	-	-	-	-
Aquifer Storage and Recovery Facilities	SM	LTS	B	-		-
Monterey Pipeline	-	-	-	-	-	-
Moss Landing Project	SM	LTS	B	-	-	-
North Marina Project	SM	LTS	B	LTS	LTS	LTS

SM – Significant Impact, can be Mitigated
SU – Significant Impact, Unavoidable
LTS – Less-than-significant Impact
– – No Impact
B – Beneficial Impact

Impact 4.2-1: The construction and development of ASR injection/extraction wells or desalination water supply wells may cause short-term changes in groundwater quality or violate waste discharge requirements.

Moss Landing and North Marina Projects

Both the Moss Landing and North Marina Projects include the construction and development of ASR injection/extraction wells. Construction of the new ASR wells would employ a drilling rig using mud rotary with bentonite-based drilling fluids. Mud rotary drilling is a commonly used method of drilling. This drilling method uses a drill bit on the bottom of a string of drill rods that are rotated in a borehole. Drilling fluid is circulated in the borehole by pumping down through the string of rods where it picks up the drill cuttings and carries them to the surface of the borehole. Bentonite-based drilling fluids are essentially a type of clay mixed with water, which keeps the drill bit cool and also keeps the borehole from caving in. The North Marina Project includes the construction of 6 wells that would be completed using large drilling machinery modified for angle (slant) wells. This type of drilling, although specialized, also uses a type of mud rotary drilling method. Another drilling method that could be used is air rotary, which uses air instead of mud to carry the drill cuttings to the surface of the borehole. The mud rotary drilling process essentially pumps mud into the borehole thereby causing the turbidity of groundwater to rise in a localized area surrounding the borehole.

In most cases, a groundwater supply well or injection well is “developed” after construction to remove drill cuttings or residual foreign material (i.e. drilling mud) and to increase the porosity and permeability of the filter media (sand, gravel, and wells screen). The development of newly installed slant wells and/or ASR groundwater wells would be developed by pumping the well for an extended period of time until the water is clear and the filter pack is transmitting water efficiently.

The ASR well development water would generally be discharged to an area where the water could percolate back into the groundwater system, but some groundwater may be discharged to the local storm drains. Well development of the slant wells would require pumping of each well for approximately one month. The extracted water from well development would be processed in a 20,000-gallon de-silting tank to reduce turbidity in the development water and then returned to the ocean by a pipeline to either a connection point with the MRWPCA outfall, or a diffuser box on the beach.

Well drilling and construction could degrade groundwater quality while discharge of well development water to the ground surface or water of the State, such as the local streams or the Ocean, could degrade receiving water quality by introducing foreign matter, increasing turbidity, or altering water chemistry beyond Basin Plan limits. The discharge of development water would vary in duration, water quality, and volume depending on the type of well (ASR or vertical, or angled extraction well). Degradation of groundwater and/or surface water through the process of well drilling and development would be considered a significant impact, in accordance with the significance criteria. Discharge of water to land or surface water may require a permit issued by the RWQCB. Discharge of well development could be 1) discharged to a sanitary sewer under permit from the treatment works 2) a low threat discharge to land, 3) a discharge to land requiring a RWQCB-issued conditional waiver of discharge requirements, 4) a discharge to a water body requiring a RWQCB-issued NPDES permit. Implementation of **Mitigation Measure 4.2-1** would cause the applicant, as required by the RWQCB, to apply for the appropriate discharge permit, characterize the discharge, and determine the potential for adverse impacts to groundwater quality, surface water quality, the environment prior to well development. The required process of reporting the waste discharge to the RWQCB would lead to the issuance of appropriate permit conditions which would thereby limit the potential threat of adverse water quality effects and reduce the impact to less than significant.

Mitigation Measure

> **Mitigation Measure 4.2-1:** Prior to pumping development water from all groundwater wells constructed as part of the project, the applicant shall consult with the RWQCB to determine the appropriate discharge permitting for the well development discharge. The permitting requirements will differ depending on the duration of the discharge, the quality of the water to be discharged, and the discharge location. Based on RWQCB consultation, the applicant shall prepare the proper Application/Report of Waste Discharge for the waste discharge requirements or NPDES Permit. If a Report of Waste Discharge is required, it shall include, at a minimum, a characterization of the discharge water, estimates of discharge rates and volumes, characterization of the discharge area and determination of the potential impact to groundwater, soils, surface water, runoff, and flooding. The applicant shall provide a copy of the Application\Report of Waste Discharge to the CPUC at the time of submittal to the RWQCB and keep the CPUC updated through the RWQCB hearing process until Board approval of the waste discharge.
>
> **Significance after Mitigation:** Less than Significant.

Impact 4.2-2: The injection and storage of Carmel River and/or desalinated water into the SGB ASR program may violate water quality standards or waste discharge requirements.

Moss Landing and North Marina Projects

The proposed ASR component for the Moss Landing Project and the North Marina Project, included in both the Moss Landing and North Marina projects, would utilize and augment the MPWMD’s existing ASR system, which currently consists of two ASR injection/extraction wells located on General Jim Moore Boulevard. The expansion includes the construction of two additional ASR wells along General Jim Moore Boulevard (see **Figure 3-24**) that would allow for an increase in the amount of Carmel River water that could be injected and stored within the Santa Margarita Formation within the SGB.

Diverted Carmel River water would be treated at the existing BIRP and the CVFP to potable drinking water standards and pumped approximately six miles through the CalAm distribution system to the SGB where the water would be injected into specially-constructed ASR wells for later recovery during dry periods. Additionally, treated potable water from the desalination facility would also be delivered for injection into the ASR wells for later recovery. The primary water quality concern associated with ASR projects using potable water is that DBPs, including THMs and HAAs, are formed during the disinfection process. Additionally, the injection of oxygenated water could potentially alter the geochemistry of the groundwater and increase the concentration of minerals in groundwater.

Recent monitoring results indicate that the THMs do increase upon initial injection of treated surface water into the formation comprising the Santa Margarita Aquifer, but concentrations steadily decreased with time (Pueblo, 2007). These results are explained by the natural tendency of the Santa Margarita Aquifer to reach reducing conditions; the introduction of surface water to the aquifer essentially delivers oxygen to an area where the predominant microbial activity occurs under anaerobic to sub-oxic conditions. The initial exposure to oxygen stifles biological activity that would otherwise work to degrade the THMs. During this initial period, free chlorine residuals may also be reacting with the dissolved organic material in the groundwater and/or injected water, forming additional THMs. Eventually, the oxygen is consumed and reducing conditions are restored over the course of six to eight months. Groundwater monitoring results indicate that over the course of that time, the pH has remained neutral (between 6 and 8), indicating relatively stable geochemical conditions.

The RWQCB currently oversees the ASR project. The MPWMD continues to conduct groundwater studies and monitoring to document the changes to the groundwater system due to ASR, and to ensure that the ASR project does not degrade groundwater quality within the SGB. Although the operation of the ASR project does not currently require a specific RWQCB-issued permit, the RWQCB will continue to require a monitoring and response program for continued operation of the project and to protect groundwater quality in the Santa Margarita Aquifer. Expansion of the ASR project would require the approval from the RWQCB for implementation; approval would require a similar level of water quality testing and assurances that the injected water would not degrade the receiving ground water in the SGB.

In accordance with the significance criteria, this impact would be significant if the expansion of the current ASR program resulted in degradation of existing groundwater quality. However, because the injected water would be of equivalent quality to the water injected under the current program and, under the proposed project, similar management and regulatory controls would remain in effect, the physical change to the receiving groundwater in the Santa Margarita Aquifer is negligible and the impact is less than significant.

Significance: Less than Significant.

Impact 4.2-3: The storage of Carmel River or desalinated water in the ASR program would increase groundwater storage and water levels in the SGB.

Moss Landing and North Marina Projects

The MPWMD’s ASR EIR (2006) analyzed the impacts to groundwater storage and water levels in the SGB. The analysis presented a pilot study and a simple groundwater model to determine the impacts to groundwater storage in the SGB through operation of the ASR program. The analysis determined that up to 2,426 AFY could be injected through the implementation of the ASR program, of which up to 2,003 AFY would be extracted. The findings of the analysis concluded that injecting excess Carmel River water into the ASR wells was beneficial to groundwater storage within the SGB.

Since the MPWMD's ASR project was approved, approximately 1,935 AF of excess Carmel River water has been placed into storage through the ASR program (SGB Watermaster, 2008). Monitoring results have indicated an overall increase in groundwater levels in neighboring wells. Although the program has not achieved the annual volume of water evaluated in the ASR EIR (2,426 AFY), the groundwater monitoring results indicate that the injection of excess water does appear to increase groundwater storage in the SGB. However an important distinction must be pointed out. The MPWMD ASR program can only divert a relatively small amount of excess winter flows from the Carmel River on a seasonal basis, and as such, is rainfall dependent and thus, in itself, is not a reliable means of raising the water level in the SGB. Further, it does not directly increase storage in the SGB, since all of the ASR water is subsequently pumped back out to reduce CalAm's pumping in the Carmel River Basin.

The Moss Landing Project and the North Marina Project each would include installation of two additional ASR wells to increase the capacity of the ASR program to store excess Carmel River water and desalinated water in the SGB. Currently, the operation of the ASR program is limited by the availability of excess Carmel River water and the relative demand and supply from customers. The expansion of the ASR program to include storage of desalinated water would be dependent on desalination operations, but would provide an additional water supply source. Contingent on approval to store water in the SGB from the Seaside Watermaster Board, the CWP would enhance the current ASR program by increasing SGB groundwater storage and raising water levels. This finding is consistent with the analysis presented in the 2006 MPWMD's ASR EIR.

Significance: Beneficial Impact.

North Marina Project Discussion

Background

The impact analyses provided in this section focus specifically on potential effects on groundwater resources and water quality associated with implementation of the North Marina Project, and the use of slant wells. This introductory section provides background data and information that applies to the analysis of impacts associated with the North Marina Project. Information presented here was developed specifically for the analysis of the North Marina Project. To avoid repetition, this section is presented first with the individual impacts following below.

Two technical foundations are applied in analyzing the potential impacts to groundwater resources due to operation of the North Marina Project slant wells.

- The conceptual model of seawater intrusion (as presented in the Environmental Setting) is in the vicinity of Reservation Road. The proposed slant wells would be screened in an aquifer known to have direct hydraulic communication with the ocean, and would be located at the mouth of preferential pathway P6 (illustrated on Figure 4.2-10).
- Groundwater modeling results were obtained from the North Marina Model, Scenario 3b as summarized in the Geoscience Support Services, Inc (Geoscience)~~GEOSCIENCES~~ report titled, *North Marina Groundwater Model, Evaluation of Potential Projects*, dated September 26, 2008 (Geoscience, 2008). ~~The report is included as **Appendix 4.1C**.~~

North Marina Model

For the purpose of this project analysis, the IGSM was revised by Water Resources and Information Management Engineering, Inc. (WRIME) and model parameters were exported to ~~GEOSCIENCE Support Services, Inc.~~Geoscience to develop a localized groundwater model referred to as the North Marina Model. The North Marina Model simulates long-term groundwater flow and seawater intrusion conditions within the SVGB in the vicinity of the North Marina Project.

The IGSM is a regional groundwater model with relatively large model cells of approximately 0.4 square miles that covers the entire SVGB (Montgomery Watson, 1994). The IGSM was updated with baseline conditions intended to represent land use and water use indicative of 2030 conditions and is a refined version of the Future Conditions Baseline utilized in the SVWP EIR/EIS (WRIME, 2008). Refinements of IGSM include 1) extension of the hydrologic period from 1949 to 2004, 2) the addition of the changes identified through development of the Biological Opinion for the SVWP including minimum streamflow requirements for fish passage, and 3) the inclusion of the SVWP itself as envisioned in 2030 by the SVWP EIR/EIS. Additionally, land use and water use were updated to add any development now in place that was not included in the projected 2030 land use and water use estimates (WRIME, 2008).

The North Marina Model was constructed with a smaller model cell size of 200 feet by 200 feet within a focused area south of Elkhorn Slough, west of Salinas, north of the Dunes State Park, and east of Monterey Bay (GEOSCIENCES, 2008). The North Marina Model uses the MODFLOW model computer code to simulate groundwater flow. MODFLOW was developed by the USGS and is a commonly used modeling program for water resources applications. The North Marina Model uses the MT3DMS in conjunction with MODFLOW to simulate solute transport of saline groundwater. MT3DMS is a three-dimensional transport model for simulation of advection, dispersion, and chemical reactions of contaminants in groundwater (GEOSCIENCES, 2008).

Using the updated model parameters in IGSM, the baseline conditions were modeled for the calibration period between October 1979 to September 1994 and the boundary conditions were used in the North Marina Model. Aquifer parameters from the IGSM to the North Marina Model include the top and bottom elevations for the primary model layers, horizontal and vertical hydraulic conductivity for specific model layers, and specific storativity, and effective porosity. Modeled boundary conditions for recharge and discharge include monthly data for deep percolation from precipitation and applied water (including return flow), stream recharge, and groundwater pumping. These modeled boundary parameters were applied to the North Marina Model area, as were the model simulated groundwater elevations.

Additional aquifer parameters were estimated for the North Marina Model based on the IGSM aquifer parameters. Specific model layers required additional information to represent horizontal and vertical hydraulic conductivity for certain model layers, which were calculated using standard hydrogeologic relationships for aquifer material (sand and clay). Additionally, to more closely simulate actual aquifer conditions, the North Marina Model introduced a new surface layer (Model Layer 1) to allow vertical leakage from the ocean to occur in the model. **Table 4.2-6** provides a summary of aquifer parameters obtained from IGSM and developed for the North Marina Model.

**TABLE 4.2-6
SUMMARY OF AQUIFER PARAMETERS USED IN THE NORTH MARINA MODEL**

Model Layer	Layer Thick-ness (ft)	Horizontal Hydraulic Conductivity (ft/day)	Vertical Hydraulic Conductivity (ft/day)	Specific Storativity (ft^{-1})	Specific Yield (Effective Porosity)	Dispersivity		
						Horizontal		Vertical
						Longitudinal	Transverse	Transverse
1	1	500	25	-	0.25	20	2	0.2
2	150	25 to 250	1.25 to 12.5	0.000008 to 0.00006	0.08 to 0.16	20	2	0.2
3	90	0.02 to 6.8	0.00004 to 0.0136	0.0000001 to 0.00005	0.02	20	2	0.2
4	280	5 to 100	0.25 to 5	0.000001 to 0.00007	0.1	20	2	0.2
5	150	1.8	0.0036	0.00000006 to 0.00002	0.02	20	2	0.2
6	900	20 to 25	1 to 1.25	0.00000002 to 0.000005	0.06	20	2	0.2

SOURCE: GEOSCIENCES, 2008

Impact 4.2-4: Operation of the proposed slant wells for the North Marina Project desalination water supply could lower groundwater levels and damage neighboring water supply wells within the vicinity of the North Marina project.

The North Marina Project would construct six new production wells within the MCWD service area at the end of Reservation Road. Based on the facilities summary, these wells would be designed to collectively operate at an average pumping rate of 2,550 gallons per minute (gpm) with a maximum pumping capacity of 3,000 gpm. These wells would be screened in the Dune Sands deposit but would potentially also draw water from the 180-Foot Aquifer. Long-term operation of these supply wells would cause a local depression in groundwater levels around the slant wells and within the shallow aquifer. Neighboring wells that are screened in the same aquifer and within that local groundwater depression could be impacted by causing physical damage to the well if groundwater levels dropped below the screens of the neighboring wells, and/or by lowering the well yield of neighboring wells.

Figure 4.2-13 illustrates the locations of neighboring groundwater wells. As shown in Figure 4.2-8, the 180-Foot Aquifer has been intruded by seawater since at least 1975. Therefore, many water supply wells that were screened in the 180-Foot Aquifer located within a 1.5 mile radius of the proposed slant wells have become contaminated with seawater and are no longer in service. The water supply for the City of Marina is obtained from three deep wells that are screened in the 900-Foot Aquifer, and Well #2 is no longer used as a municipal supply well. Additionally, there are no agricultural pumping wells or private domestic wells within a 1.5 miles radius of the proposed slant wells.

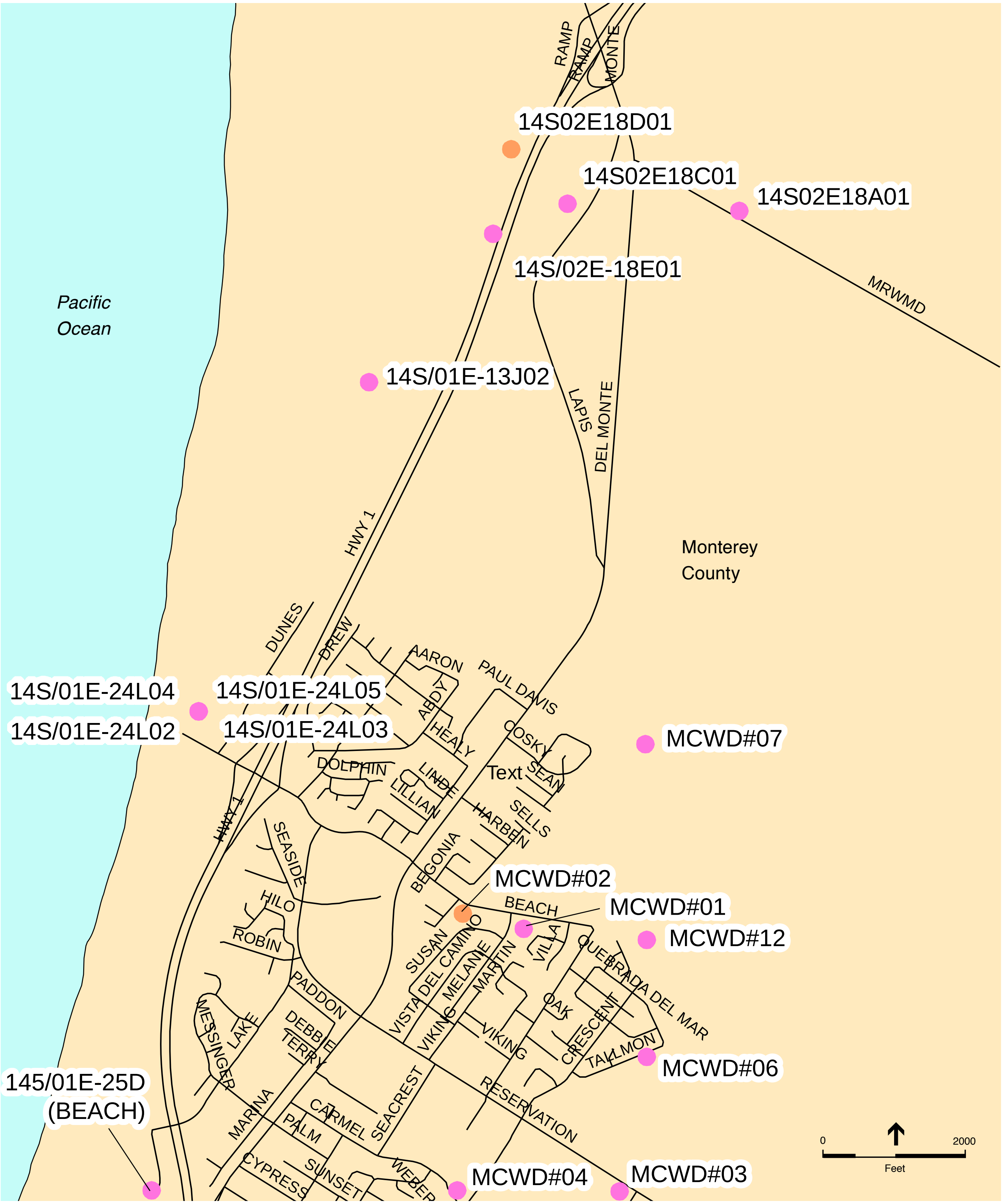
Methodology

Determining the potential for the slant wells to impact neighboring wells requires consideration of the area of influence, or “cone of depression” produced by the slant wells. The cone of depression around a pumping well is formed by drawing water from the aquifer storage. Over time, the cone of depression expands and deepens based on the pumping rate and recharge of groundwater to the well in an area called the radius of influence of the well. Eventually, the cone expands and deepens more slowly until some equilibrium conditions are established. In some wells, equilibrium occurs within a few hours after pumping begins; in others, it never occurs even though the pumping period may be extended for years (Driscoll, 1986). The cone of depression surrounding the proposed slant wells would intercept the Monterey Bay, which will increase the flow towards the well and equilibrium conditions would be present within a relatively short period of time following continuous operation of the desalination plant.

Radius of Influence Estimates

The proposed slant wells would likely be screened in the Dune Sands deposit (also referred to as the Dune Sands Aquifer), which could extend to a depth of 200 feet below sea level. It is important to note that within the vicinity of the proposed slant wells, the Dune Sands deposits are unconfined and the upper portions of the 180-Foot Aquifers are leaky or unconfined. Equilibrium conditions are different for unconfined aquifers compared to confined aquifers. In an unconfined aquifer, the radius of influence is smaller due to a larger volume of water actually withdrawn per unit area (as described by the storativity) (Kresic, 2006). In an unconfined aquifer, the storativity is equal to the specific yield, and values generally range from 0.01 to 0.30. Values of storativity for a confined aquifer generally range from 0.001 to 0.00001, 10 to 1,000 times smaller than an unconfined aquifer.

The North Marina Model provides an estimate of the radius of influence around the slant wells. The results indicate that a localized cone of depression would develop that would be up to 15 feet below sea level in close proximity to the slant wells. The results also indicate that the nearest municipal production well screened in the 180-Foot Aquifer (Well #2) and located approximately 1 mile south east of the slant wells would have just less than a two foot decline in groundwater



● Wells ● Wells Screened in 180 Foot Aquifer —— Roads

SOURCE: MCWRA, 2008

CalAm Coastal Water Project . 205335

Figure 4.2-13
Wells within a 2-Mile Radius
of the End of Reservation Road

levels due to the North Marina Project. At 1.5 miles to the north, the impacts of water levels would cause less than a 0.5 foot decline. The differences in water levels decrease with distance from the slant wells (GEOSCIENCES, 2008).

One of the limitations of the North Marina Model is that in the vicinity of the slant wells, model Layer 2 (180-Foot Aquifer) comprises both the Dune Sands deposit and the 180-Foot Aquifer as there is no Salinas Aquitard above the 180-Foot Aquifer. Although the slant wells are supposed to be pumping from above the theoretical 180-Foot Aquifer, due to the vertical distribution of the model layers, lithology, and cross-sections, the model has the wells extracting water from Layer 2, which comprises both the Dune Sands deposits and 180-Foot Aquifer (GEOSCIENCES, 2008).

Review of the aquifer parameters used for the North Marina Model indicates that the North Marina Model treats Layer 2 (180-Foot Aquifer) as if it were under confined conditions. The aquifer parameter for the specific yield in Layer 2 ranges from 0.08 to 0.16. The specific storativity in Layer 2 ranges from 0.000008 to 0.00006 ft^{-1}, which translates to a storativity value of approximately 0.0012 to 0.009 based on a saturated thickness of 150 feet. Because the North Marina Model simulates drawdown for confined aquifer conditions, the drawdown estimates provided for Layer 2 conservatively predict the lowering of groundwater levels within the cone of depression. Therefore, it is reasonable to assume that the drawdown would dissipate within 1.5 miles of the proposed slant wells.

Conclusion

There are no water supply wells screened in the Dune Sands Aquifer, but this analysis considers potential impacts to neighboring wells that could be screened in the 180-Foot Aquifer. Because the 180-Foot Aquifer has been intruded by seawater for over 30 years, many water supply wells within a 1.5 mile radius of the proposed slant wells are contaminated with seawater and are no longer in service. The water supply for the City of Marina is obtained from the 900-Foot Aquifer, and Well #2 is no longer used as a municipal supply well. There are no agricultural pumping wells or private domestic wells within a 1.5 miles radius of the proposed slant wells. Therefore, drawdown effects and the localized lower groundwater levels within the vicinity of the proposed slant wells would not cause damage to neighboring water supply wells and therefore, this impact is less than significant.

Significance: Less than Significant.

Impact 4.2-5: Operation of the proposed slant wells for the North Marina Project desalination water supply could deplete groundwater resources within the SVGB and export groundwater from the SVGB.

Source water for the North Marina Project would be extracted from subsurface slant wells that would draw seawater from groundwater formations. A slant well is a well that is drilled at an angle using modified vertical well construction methods. This allows construction of wells along the coastline that are perforated in, and produce from, the aquifer immediately adjacent to or beneath the ocean surface. The majority of the water pumped from the wells is derived from the ocean and not from inland groundwater aquifers.

The slant wells (also referred to as production wells) would generally be constructed within an area that is aligned with the MCWRA boundary for water resource management of the SVGB (the MCWRA boundary extends to the coast), and the surface projection of the slant wells could extend beyond the boundary and just off-shore, as illustrated on **Figure 4.2-14**. Although the majority of the water produced from the proposed slant wells would likely be derived from seawater transmitted to the slant wells just outside the MCWRA boundary, the production wells could potentially draw a small percentage of groundwater from the SVGB. As discussed in the *Regulatory Setting*, the MCWRA Act states that for the purpose of preserving the balance between extraction and recharge within the SVGB, no groundwater from that basin may be exported for any use outside the basin, except that use of water from the basin on any part of Fort Ord shall not be deemed such an export.

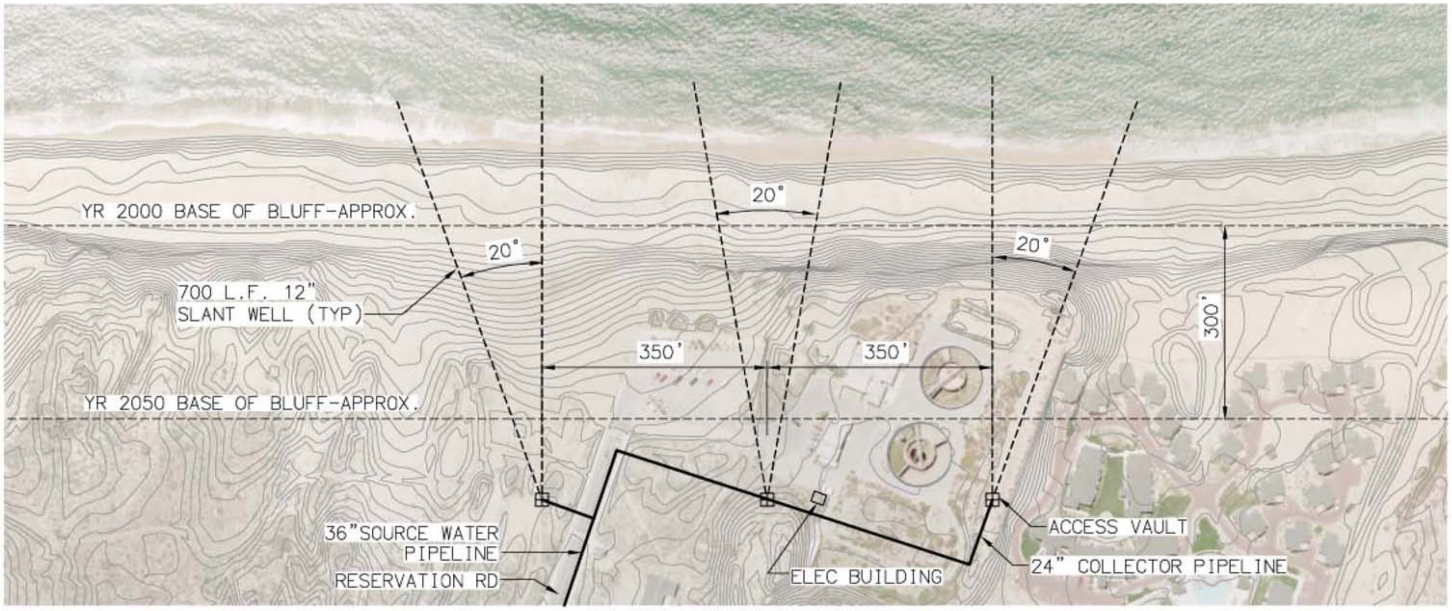
Impact Analysis

To evaluate the potential impacts to groundwater resources within the SVGB, the groundwater modeling results were evaluated in conjunction with the existing condition of the geologic formations that allows for direct hydrologic connection between the ocean and the shallow Dune sands and/or upper 180-Foot Aquifer.

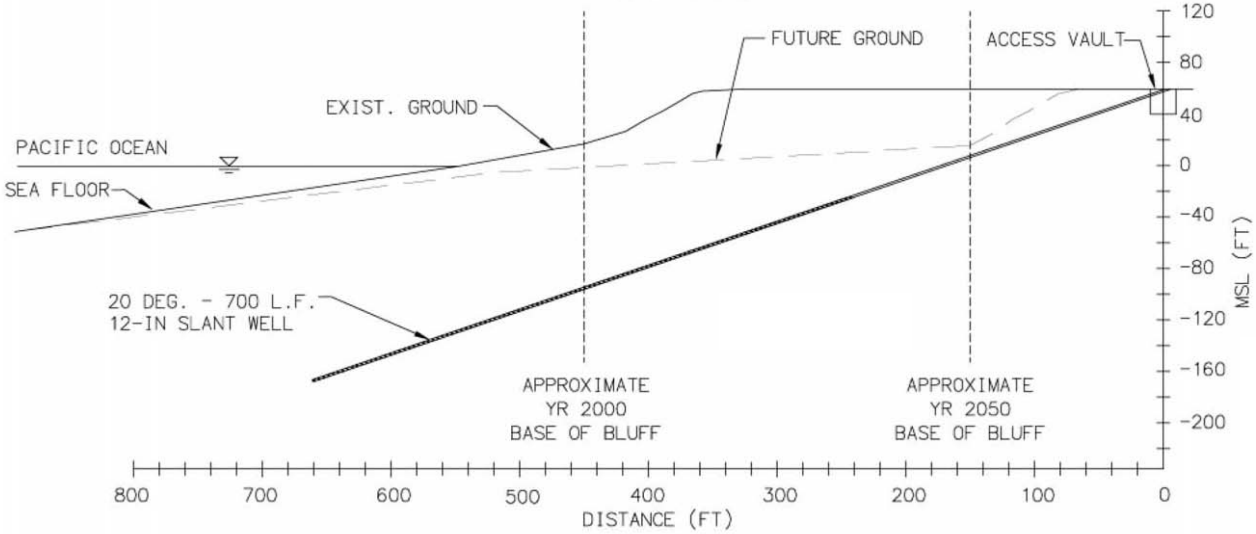
The baseline water budget for the North Marina Model include inflow from the northern, eastern, and southern model boundary, stream recharge, deep percolation from precipitation, applied water, and ocean inflow. Outflow is groundwater pumping, stream discharge, and ocean outflow. The total inflow to the North Marina Model area under baseline conditions is 53,213 AFY, and total outflow is 53,041 (GEOSCIENCES, 2008). Model results of the proposed North Marina Project pumping conditions indicate an increase of inflow from ocean recharge of 19,906 AFY, with a slight increase in underflow from the SVGB of approximately 762 AFY. Project-related outflow increased due to pumping of the proposed slant wells and was predicted at 24,631 AFY which caused a decrease in ocean outflow of 3,577 AFY. Given these input and output volumes, the total change in groundwater storage was -386 AFY (GEOSCIENCES, 2008). Although this modeled change in groundwater is a deficit in overall storage, the volume is relatively minor compared to the total volume of groundwater in the basin.

The exact water budget and specific volumes of water that are simulated by the model may or may not accurately predict future conditions. In general, these numbers are used in this EIR to illustrate and confirm the expected changes in the groundwater system within the vicinity of the proposed project based on the conceptual model of groundwater flow along the coast. Additionally, given that the wells would be located within 1,000 feet of the ocean outcrop, and a preferential pathway is present within the proposed slant well area indicate that, in addition to being in direct hydraulic communication with seawater, the shallow aquifer material in the vicinity of the proposed slant wells would provide an efficient conveyance structure for seawater to travel towards the proposed wells. This information further supports the conclusions of the North Marina Model that the majority of source water to the slant wells would originate from the Monterey Bay.

This layout was developed after model runs were completed. However, groundwater impacts are not expected to be much different between this layout and the layout modeled.



SLANT WELL LAYOUT
SCALE: 1"=200'



SLANT WELL PROFILE

SOURCE: Geoscience

Figure 4.2-14
Slant Well Layout

Level of Significance

This impact would be significant if water extracted through the North Marina Project exported water from the SVGB to an extent that such an export interfered with the preservation of the balance between extraction and recharge within the SVGB. The proposed slant wells are at least partially screened within the boundary of the SVGB and the results of the North Marina Model indicate that the slant wells would obtain a small portion of groundwater from the SVGB that would otherwise be discharged to the ocean, even though the majority of groundwater would be obtained from the Monterey Bay. However, because the slant wells would be located within preferential pathway P6 (illustrated on Figure 4.2-10), there is likely very little discharge to the ocean from the SVGB at the present time.

As noted in the *Chapter 3 Project Description*, the North Marina Project desalination plant would be operated such that, on an annual average basis, the plant would return desalinated water to the SVGB in an amount equal to the volume of SVGB-groundwater that was extracted from North Marina Project slant wells. The proposed method to return the excess desalinated water to the SVGB is to deliver the water to the CSIP 80-acre foot storage pond located on the MRWPCA's RTP property. During the irrigation season, the desalinated water would be blended with tertiary treated recycled water and delivered to farms connected to the CSIP. In turn, a pumping credit could be achieved for farms that utilize the desalinated water supply for irrigation instead of SVGB 400-Foot Aquifer wells.

The North Marina Project would potentially be extracting groundwater from the SVGB on a regular basis at unspecified volumes and delivering that water outside the SVGB. The exact volumes of water that would potentially come from the SVGB may in fact be similar to those predicted by the groundwater model, but verification of the percentage of seawater to SVGB groundwater that would be produced from the slant wells would only be possible through a monitoring program that included detailed geochemical characterization of the source water supply to the desalination plant. As part of this project, the applicant would annually conduct a water balance to determine the volume of water produced from the slant wells that may have been obtained from the SVGB. This action would ensure that SVGB water would not experience depletion of groundwater resources. The applicant would evaluate the annual quantity of desalinated water to be returned to the SVGB based on the actual quantities of SVGB water withdrawn, and desalinated water produced to meet CalAm customer need.

Conclusion

Due to the configuration of the slant wells, the proposed NWA would extract water from both the Monterey Bay and the SVGB, however, the majority of the product water would originate in the ocean. The fraction of water extracted from the SVGB would be minor compared to the volume of ocean water and would not contribute to an imbalance of recharge and extraction in the SVGB. Furthermore, the quantity of water that is actually extracted from the SVGB would be replaced because on an annual average basis, the desalination plant would return desalinated water to the SVGB in an amount equal to the volume of SVGB-groundwater that was extracted from North Marina Project slant wells. This impact is considered less than significant because the fraction of water extracted from the SVGB would not disrupt the balance of recharge and extraction from that basin and quantity of the water removed from the SVGB would be replaced annually.

Significance: Less than Significant.

Impact 4.2-6: Operation of the proposed slant wells for the North Marina Project water supply may otherwise degrade water quality by inducing seawater intrusion.

The proposed slant wells are located at the end of Reservation Road in an area that has been intruded by seawater for over 30 years. It has been estimated that between 1970 and 1992, 15,900 AFY of seawater intruded into the SVGB through the 180-Foot Aquifer and the 400-Foot Aquifer (Montgomery Watson, 1994). It was also estimated that in 1995, a volume of 8,900 AFY of seawater intruded the 180-Foot and 400-Foot Aquifers, illustrating the benefits of the various seawater response plans that have been implemented over time starting with the MCWRP in 1978. Furthermore, as the components of the SVWP are implemented, it is anticipated that seawater intrusion will eventually cease.

In the North Marina area, seawater has intruded approximately 3.75 to 7 miles landward within the 180-Foot Aquifer, and 0.25 to 3.25 miles landward within the 400-Foot Aquifer (see Figures 4.2-8 and 4.2-9) (GEOSCIENCES, 2008). As illustrated on Figure 4.2-8, the 180-Foot Aquifer in this area has been intruded since at least 1975. Because the Dune Sands deposits are generally thought to be very susceptible to seawater intrusion, it is likely that the shallow Dune Sands Aquifer in the North Marina area have been intruded by seawater before 1975.

The North Marina Project slant wells would effectively produce an anchor for seawater intrusion to occur within the vicinity of the slant wells, and would result in a permanent elevation of chlorides and TDS within a localized area along the North Marina Coast area. Although this does not necessarily impact groundwater quality as compared to current conditions, future beneficial uses of groundwater along the coast must be considered to determine the level of significance this may have on groundwater quality.

Impact Analysis

The North Marina Model results were analyzed by comparing the North Marina Project to a future baseline condition. The baseline conditions are described above in more detail, but basically include land and water use indicative of 2030 conditions, and a refined version of the Future Conditions Baseline utilized by the EIR/EIS for the SVWP (WRIME, 2008). The modeled slant well scenario included the 2030 baseline conditions plus slant well water production of 24,631 AFY.

The general differences between groundwater levels between baseline and the North Marina Project conditions are summarized from the GEOSCIENCES report (2008):

- In normal hydrologic years (precipitation is close to the long-term average), groundwater flow initiated by the slant wells remains similar to a no project condition (southwest to northeast), with the exception that the northeastwards flow of groundwater flattens out and the a localized cone of depression develops that is up to 15 feet below sea level near the slant wells.

- Under wet hydrologic conditions (precipitation is well above average), the effects of the slant wells is a slight steepening of the hydraulic gradient towards the slant wells. However, flow directions generally remain the same as Baseline flow directions outside of the slant well cone of depression. Increased recharge to the 180-Foot aquifer from infiltration of precipitation and streamflow percolation during wet years allows for more groundwater outflow to the ocean.
- In dry years (precipitation well below average), the groundwater elevations in the slant well model area are very similar to Baseline conditions. Flow is from the west to the east, with a localized depression formed around the slant wells.

The North Marina Model results indicate that after approximately 13 years of the modeled scenarios, the seawater intrusion front would recede at a faster rate in the North Marina Area with implementation of the North Marina Project, and at approximately the same rate as baseline in all other areas of the SVGB. After approximately 21 years of project operations, there would be very little difference between the rates of recession between the baseline conditions compared with implementation of the North Marina Project. Over the course of the following 35 years of the modeled scenarios, the seawater intrusion rate would be slightly faster under baseline conditions, but both model results indicate the seawater intrusion will likely reverse under both baseline conditions and with the North Marina Project. The model results also indicate that a small residual elevated chloride area would be present around the slant wells. These model results are illustrated in Figure 15 in **Appendix 4.1C**.

The area surrounding the proposed slant wells is already severely impacted by seawater intrusion, and the 180-Foot Aquifer has been intruded by seawater since at least 1975. The Dune Sands Aquifer was likely intruded even earlier than 1975 based on other areas subjected to seawater intrusion that are located along the coast and in direct hydraulic connection to the Monterey Bay.

The model simulated the changes to groundwater quality over time under both baseline conditions and North Marina Project conditions. The results indicate that the seawater intrusion would reverse and seawater would be flushed out in the areas south of the Salinas River. However, these beneficial changes to the SVGB might not occur for between sixty to eighty years. The model indicates that seawater intrusion is generally the same between baseline conditions and the North Marina Project conditions, except that the North Marina Project causes a slightly lower rate of recession of the seawater intrusion line and a localized area of seawater intrusion surrounding the proposed slant wells. At the same time, the North Marina Project would turn this heavily intruded area into an area that produces potable water for human consumption and irrigation purposes. Because the rate of regional seawater intrusion would be reduced over time and groundwater quality would improve, the North Marina Project would not contribute to groundwater degradation and the impact is less than significant.

Significance: Less than Significant.

4.2.5 References

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4.3 Marine Biological Resources

4.3.1 Introduction

This section addresses the existing marine biological resources located in the project vicinity and identifies applicable regulations on the federal, state, and local levels. Marine Biological Resources refers to marine life in the vicinity of the project discharge. Biological Resources, Section 4.4, refers to vegetation, wildlife, fisheries, and wetland resources. This section evaluates potential impacts from construction and operation of the Moss Landing Project and the North Marina Project and associated facilities on marine biological resources. Marine water quality is analyzed in Section 4.1, Surface Water Resources.

Documentation presented in this section for marine habitat and species, marine special status species, and the existing marine environment at project sites is based on existing sources of information. References used in the preparation of this section include, but are not limited to, the following sources:

- *Proponent's Environmental Assessment for the Coastal Water Project*, California American Water and RBF Consulting, 2005 (text incorporated after peer review);
- *Analysis of MRWPCA Marine Outfall Benthic Monitoring Program*, ABA Consultants, 1999.
- *California's Living Marine Resources: A Status Report*, California Department of Fish and Game (CDFG), 2001.
- *Scoping Document: Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling,* State Water Resources Control Board (SWRCB), March 2008. This document is not yet adopted.
- *Moss Landing Power Plant Modernization Project 316(b) Resource Assessment, prepared for Duke Energy Moss Landing, LLC*, Tenera Environmental Services, April 2000.
- *Moss Landing Power Plant Units 1&2 and Units 6&7 Impingement Study Data Report*, Tenera Environmental Services, March 2007.

Section 4.3.2 presents the environmental setting related to marine biological resources. Section 4.3.3 provides federal, state, and local regulations that would apply to the Moss Landing Project and the North Marina Project. Section 4.3.4 describes the project impacts and identifies mitigation measures to minimize significant impacts. Marine water quality impacts from the project-related discharges are analyzed in Section 4.1, Surface Water Resource.

4.3.2 Environmental Setting

The Coastal Water Project includes two proposed alternative desalination plant locations: Moss Landing and North Marina. In the larger context of Monterey Bay, these two potential project locations have the same marine setting. The discharges from both would be located in nearshore locations along the eastern shore of Monterey Bay ranging from approximately 40–100 feet in depth. Similar marine biological resources in Monterey Bay utilize each project location. Differences do exist, however, in the intake locations for each project, with the Moss Landing Project drawing source water from the Moss Landing Power Plant (MLPP) disengaging basin and the North Marina location drawing source water from slant wells. There are also differences in water quality (see Section 4.1, Surface Water Resources) and biology due to the influence of Elkhorn Slough and Moss Landing Harbor on the MLPP location. The following sections describe the overall regional oceanographic conditions and the marine habitats and resources of the greater Monterey Bay, as well as the site-specific marine habitats in the vicinity of each alternative project component.

4.3.2.1 Regional Setting

Monterey Bay National Marine Sanctuary

The project area is located within the Monterey Bay National Marine Sanctuary (MBNMS), designated as a federally protected area in 1992. The MBNMS is managed by the National Oceanographic Atmospheric Administration (NOAA) and includes coastal waters from Marin to Cambria (**Figure 4.3-1**). The MBNMS includes 276 miles of shoreline, extends an average distance of 30 miles from shore, and encompasses 5,322 square miles of ocean (MBNMS, 2008a). The sanctuary was established for the purpose of research, education, public use, and resource protection. The MBNMS includes a variety of habitats that support extensive marine life. Some of these habitats and marine life are discussed below.

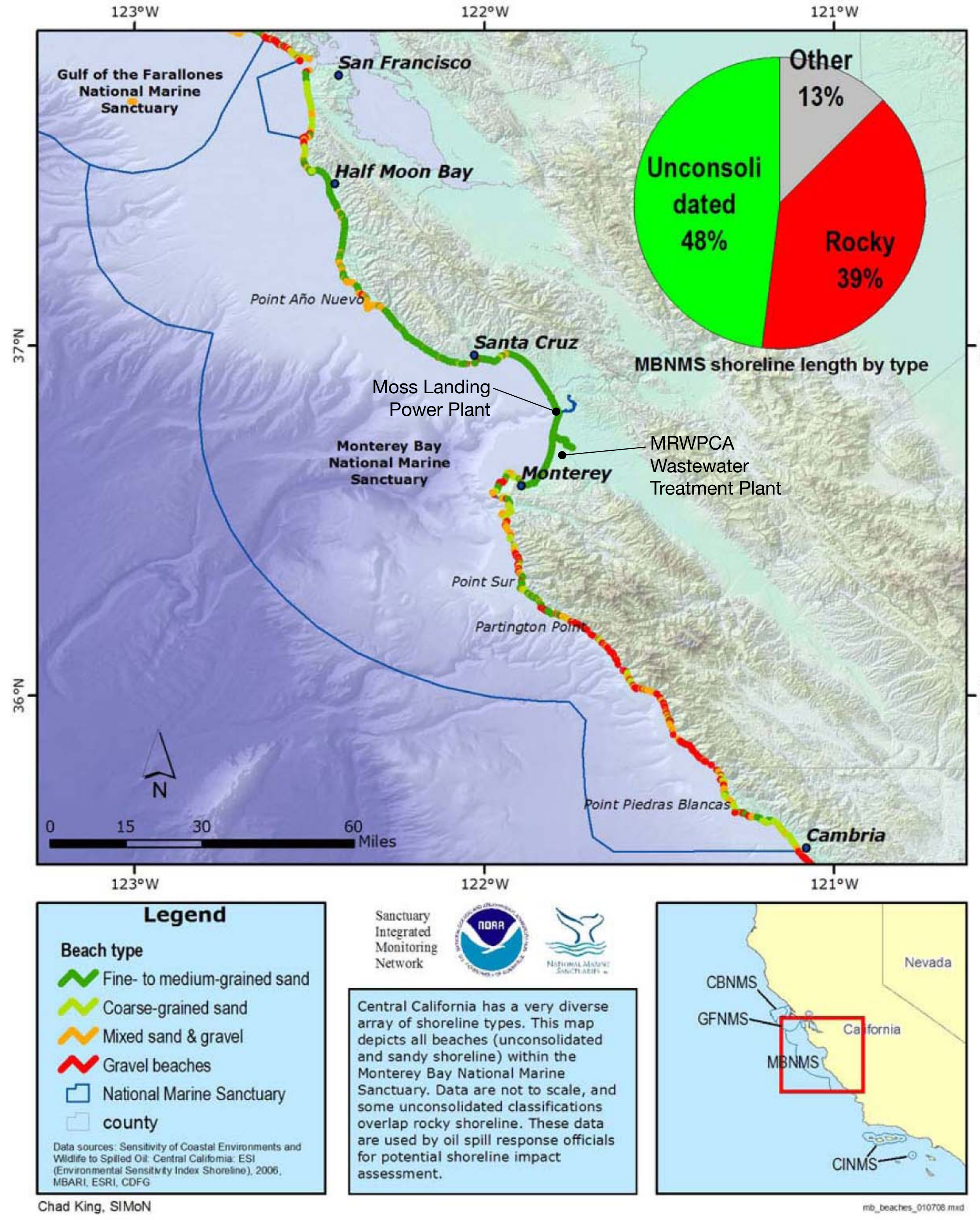
Section 4.1, Surface Water Resources, of this Draft EIR includes a summary of Monterey Bay hydrological characteristics and water quality. The Bay has been described as having three seasons: upwelling, oceanic, and Davidson Current (originally Skogsberg 1936, revised later by others, Pennington and Chavez 2000). The upwelling season, typically from early to late spring through the summer includes higher concentrations of nutrients coming to the surface where sunlight and some stratification of the water column often lead to high primary production and chlorophyll values (see Pelagic Habitat section for more details). During the oceanic period, usually late summer to fall, phytoplankton blooms are intermittent and primarily composed of small phytoplankton. During the Davidson current period, during winter months, the annual minimum for phytoplankton occurs.

4.3.2.2 Existing Environment

Marine Habitat and Species

Rocky Habitat

Rocky areas provide habitat for a diverse group of organisms in the MBNMS. More than 660 marine algae and kelp species are present in the rocky habitats of central California (Abbott and Hollenberg, 1976). Kelp forests occur in rocky subtidal areas and provide abundant microhabitats by virtue of their vertical structure. Kelp forests are capable of providing sufficient primary productivity (rate of formation of energy-rich organic compounds) to sustain the entire ecosystem. The growth requirements for kelp include light, relatively cool water, and nutrients



Data sources: Sensitivity of Coastal Environments and Wildlife to Spilled Oil: Central California: ESI (Environmental Sensitivity Index Shoreline), 2006, MBARI, ESRI, CDFG

Central California has a very diverse array of shoreline types. This map depicts all beaches (unconsolidated and sandy shoreline) within the Monterey Bay National Marine Sanctuary. Data are not to scale, and some unconsolidated classifications overlap rocky shoreline. These data are used by oil spill response officials for potential shoreline impact assessment.

Chad King, SIMoN

SOURCE: SIMoN, 2008

Figure 4.3-1
Monterey Bay National Marine Sancturay

(primarily nitrates, phosphates and some metals). In addition to macrophytes like giant kelp, (*Macrocystis pyrifera*), there are also microalgae or phytoplankton that live within the water column and form the basis of another key food chain. Highly diverse invertebrate and fish assemblages also inhabit rocky areas.

Sandy Habitat

Coarse, mobile sands comprise this high-energy environment which contains a wide range of abundance and range of composition of species. Crustaceans, cirolanid isopods and mole crabs are common in this environment (Oakden and Nybakken, 1977). Polychaete worms, bivalves (i.e. clams, mussels, and scallops) are also regularly present, though typically in lower abundances. Many shorebirds and nearshore fish species utilize sandy beach communities for food (Ricketts et al., 1985).

Sandy intertidal beach organisms are subject to daily tidal changes that result in highly fluctuating physical changes in temperature, salinity, and moisture content in the sand. Outflows from Elkhorn Slough can result in lower salinities during the wet season and higher salinities in the dry season in Moss Landing Harbor. Exposure to higher temperatures from the existing MLPP discharge regularly occurs in this area directly outside the mouth of the harbor, especially to the south (CalAm and RBF Consulting, 2005).

Directly adjacent to the intertidal sandy beaches is the shallow, gently sloping, sandy subtidal benthic[1] habitat. This habitat area typically extends to about 100 feet of water depth and the associated species composition and abundance changes gradually with depth. This habitat is not as physically dynamic as sandy intertidal habitat and is normally not subject to large fluctuations in water quality parameters like salinity and temperature. However, this region is still subject to wave and current action, which sorts bottom sediments and removes organic material.

Pelagic Habitat

Seasonal upwelling makes Monterey Bay extremely productive in terms of phytoplankton primary production. Seasonal blooms regularly occur (Pennington & Chavez, 2000) as optimal conditions (e.g. temperature, nutrient concentrations, salinity) develop for each species. Some phytoplankton species, such as *Cochlodinium* cause harmful algal blooms when they reproduce to very high densities and produce toxins (Armstrong-Howard et al, 2007). For example, *Cochlodinium* produces domoic acid, which is a neurotoxin that can bioaccumulate in the food chain and result in sea lion and marine bird deaths. Since 2004, *Cochlodinium*, has been present at elevated levels in Monterey Bay and can cause potentially harmful red tides (Kudela et al., 2008).

Phytoplankton are the primary producers in a food web that supports a variety of species including the Blue Whale (*Balaenoptera musculus*). Phytoplankton are eaten by many species of zooplankton, which are then eaten by blue whales and small schooling fish (e.g., sardine, herring). Common zooplankton in Monterey Bay include euphausiids, commonly known as krill.

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[1] Benthic refers to the sea bottom.

Large aggregations of euphausiids often precede the arrival of blue whales that come to feed on these crustaceans at the edge of the Monterey Submarine Canyon. The euphausiids feed on the phytoplankton that grow after upwelled nutrient rich water has come to the surface. Typical euphausiid species present in these groups are *Euphausia pacifica, Thyanoessa spinifera,* and *Nyctiphanes simplex* (Croll *et al.*, 2005).

The phytoplankton and zooplankton of Monterey Bay support a diverse group of fish. The nearshore midwater zone contains over 80 species of fish, sharks, and rays including flatfish such as halibut, sand dabs, flounder, turbot, and sole, which are closely associated with sandy habitats, as well as surfperch, rockfish, gobies and sculpins which are normally associated with rocky habitats (Caffrey et al., 2002). Midwater schooling fish include anchovy, herring, smelt, sardines and silversides. The close proximity of Monterey Submarine Canyon to the shoreline means that certain fish, sharks and marine mammals that would normally be found only in deeper offshore waters will also be frequent inhabitants (CalAm and RBF Consulting, 2005).

Elkhorn Slough Habitat

The mid-water habitat of Elkhorn Slough is similar in character to the nearshore Monterey Bay mid-water environment, especially at flood tide when nearshore water occupies the mouth of the slough. Many organisms found in the nearshore coastal environment use Elkhorn Slough mid-water habitat as nursery or spawning grounds and are therefore temporary inhabitants (Caffrey et al., 2002). There are many larvae of slough inhabitants that are present in this midwater area such as benthic bivalves, polychaetes, and crustaceans (Caffrey et al., 2002). Fish larvae are found to consist mostly of gobies, pacific herring, white croaker, anchovy, perch, and topsmelt (Caffrey et al., 2002).

The lower slough soft bottom benthic environment contains sandy and muddy substrate from the main harbor channels and the intertidal mudflats. A small eelgrass bed is present in the vicinity of the Moss Landing Project; historically in this area there was a large and productive eelgrass bed (Caffrey et al., 2002). Degradation in water quality from increased nutrient loads and blooms of aggressive macroalgae and phytoplankton are postulated as one reason for the loss of eelgrass biomass in addition to erosion and turbidity increases resulting from the creation of the Moss Landing Harbor entrance (Caffrey et al., 2002).

In the subtidal substrate, polychaetes are the dominant invertebrates followed by amphipods, ostracods, and then cumaceans, decapod crustaceans, and bivalve mollusks (Caffrey et al., 2002). The fatty innkeeper worm (family Echiura), the predatory moon snail, assorted seastars, and the herbivorous sea hare all inhabit the lower slough (Caffrey et al., 2002). There are also several recreationally important bivalves (via human consumption) present in the slough sediments including basket cockles, gaper clams, Washington clams, and littleneck clams. Common crustaceans that are inhabitants of the slough include cancer crabs, pea crabs, intertidal shore crabs, and burrowing ghost shrimp (Caffrey et al., 2002).

The intertidal mudflats that are prevalent in Elkhorn Slough are crucial feeding grounds for many fish and bird species including Tidewater Goby (*Eucyclogobius newberryi*), California Snowy Plover (*Charadrius alexandrinus nivosus*), and the California Brown Pelican (*Pelecanus* *occidentalis californicus*) (CECE, 2000). Several fish species, sharks and rays, as well as marine mammals, including otters and harbor seals, feed on the marine invertebrates dwelling in and on channel sediments.

Finally, the rock jetties that create the permanent mouth of Elkhorn Slough, as well as Moss Landing Harbor, provide habitat for a rich community of algae, invertebrates, and fish (Caffrey et al., 2002). Mussels, rock scallops, crabs, sea urchins, tunicates, and octopus are likely inhabitants of this habitat and provide a food source to harbor seals, sea otters, and California sea lions. The tidal flushing of Elkhorn Slough has subjected the rock jetty habitat to variable temperatures and salinities.

Marine Special Status Species

The high productivity of Monterey Bay and adjacent waters supports numerous protected species of mammals, birds, turtles and fishes (**Table 4.3-1**).

Mammals

All marine mammals are protected under the Marine Mammal Protection Act. The special status mammals that are likely to occur in the project area include the Southern Sea Otter (*Enhydra lutris nereis*) and Humpback whale (*Megaptera novaeangeliae*) (Table 4.3-1). The Southern Sea Otter, a federally threatened species, is common along the Monterey Bay Coast and very likely to pass through the project area. The Humpback Whale, a federally endangered species, is sometimes seen at the head of Monterey Canyon and is somewhat likely to be present in the project area.

Stellar Sea Lion (*Eumetopias jubatus*), Guadalupe Fur Seal (*Arctocephalus townsendi*), and Blue Whale (*Balaenoptera musculus*) are not likely to be seen in the project area, but may occur seasonally in Monterey Bay. The Fin Whale (*Balaenoptera physalus*), Sperm Whale (*Physeter macrocephalus*), North Pacific Right Whale (*Eubalaena glacialis*), and the Sei Whale (*Balaenoptera borealis*) are unlikely to be present in the project area, but are seasonally seen farther offshore in Monterey Bay. Species also seen can include the California Sea Lion (*Zalophus claifornianus*), Harbor Seal (*Phoca vitulina*), Elephant Seal (*M. angustirostris*), and Ggrey Whale (*Eschrictuius rogustus*).

Birds

The Migratory Bird Act provides protection for most native birds. The special status marine birds, and those protected under the Migratory Bird Act, that are possible or likely to occur in the project area include the California Brown Pelican (*Pelecanus occidentalis*), Western ~~California~~ Snowy Plover (*Charadrius alexandrinus nivosus*), and Marbled Murrelet (*Brachyramphus marmoratus*) (Table 4.3-1). The Brown Pelican is a state and federally endangered species that has known roosts in Moss Landing Wildlife Management Area, Elkhorn Slough National Estuarine Research Reserve, Moss Landing Harbor, and Monterey Harbor and Jetty. The Elkhorn Slough mudflats have been designated as critical habitats for the Snowy Plover. The Snowy Plover is a species of special concern and a federally threatened species. The Marbled Murrelet is

TABLE 4.3-1
FEDERAL AND STATE PROTECTED MARINE ANIMALS IN PROJECT AREA

Common Name	Scientific Name	Status[1]	Habitat	Regional Occurrence	Probability of Occurrence in Project Area (Not likely, somewhat likely, possible, very likely)
Marine Mammals					
Southern Sea Otter	*Enhydra lutris nereis*	Federally Threatened (FT)	Top carnivore, or keystone species, of the nearshore coastal zone, frequent in kelp forests.	Year-round-Common	Very likely. Otters are common along Monterey Bay Coast[3]. It is likely that otters will pass through the study area.
Steller Sea Lion	*Eumetopias jubatus*	FT	Occasional visitor in fall and winter, usually among the California Sea Lions on the Coast Guard jetty in Monterey harbor.	Seasonal-Occasional	Not likely. A small population breeds on Año Nuevo Island, just north of Monterey Bay.[3]
Guadalupe Fur Seal	*Arctocephalus townsendi*	State Threatened (ST), FT	Guadalupe fur seals breed along the eastern coast of Guadalupe Island, approximately 200 km west of Baja California. In addition, individuals have been sighted in the southern California Channel Islands, including two males who established territories on San Nicolas Island. Guadalupe Fur Seals have been reported on other southern California islands, and the Farallon Islands off northern California with increasing regularity since the 1980s.	Seasonal-Very Rare	Not likely.
Elephant Seal	*Mirounga angustirostris*	MMPA[2]	Elephant seals spend most of their time at sea and are known to be one of the deepest divers of all marine mammals. A small population breeds on Año Nuevo Island, just north of Monterey Bay.	Seasonal-Common	May occur seasonally in Fall and Winter in Monterey Bay.[3] Unlikely to occur in project area.
California Sea Lion	*Zalophus californianus*	MMPA[2]	One of the main haul-out sites for Sea Lions is the Coast Guard breakwater in the Monterey Harbor, where there can be over 1,000 sea lions resting on the rocks or in the water. Sea Lions breed to the south, on the Channel Islands, during the summer.	Year-round-Common	Very likely. Seasonal in Fall and Winter.[3] however many have stayed year round at the new Harbor District Pier at the Mouth of Elkhorn Sough.
Harbor Seal	*Phoca vitulina*	MMPA[2]	These seals are easily observed along the Monterey shoreline where they haul out during low tides, or while they rest in the water and feed within the kelp forest.	Year-round-Common	Very likely. Regularly seen in Elkhorn Slough at Low tides. Common during April and May while breeding in Carmel Bay.[4]
Grey Whale	*Eschrichtius rogustus*	MMPA[2]	These whales have one of the longest animal migrations known, traveling over 12,000 miles from their summer feeding grounds in the Bering Sea to their winter breeding grounds in Baja California and back again.	Seasonal-Common	Very likely. Grey whales are present off Monterey Bay from December to May and come very close to shore.[4]

TABLE 4.3-1 (Continued)
FEDERAL AND STATE PROTECTED MARINE ANIMALS IN PROJECT AREA

Common Name	Scientific Name	Status	Habitat	Regional Occurrence	Probability of Occurrence in Project Area (Not likely, somewhat likely, possible, very likely)
Marine Mammals (cont.)					
Blue Whale	*Balaenoptera musculus*	Federally Endangered (FE)	In Monterey Bay, Blue Whales often occur near the edges of the submarine canyon where krill tends to concentrate. Blues feed only on krill and are found in the Bay between June and October, during times of high krill abundance. Blue whales begin to migrate south during November.	Seasonal-Common	Not likely. Due to their occurrence mainly offshore, it is not likely they would be seen in the project area.[4]
Humpback Whale	*Megaptera novaeangeliae*	FE	The central California population of Humpback Whales migrates from their winter calving and mating areas off Mexico to their summer and fall feeding areas off coastal California. Humpback Whales occur in Monterey Bay from late April to early December.	Seasonal-Common	Somewhat likely. Sometimes seen at the head of Monterey Canyon just outside the Moss Landing Harbor during the spring.[4]
Fin Whale	*Balaenoptera physalus*	FE	Fin whales are more common farther from shore. Fin whales are occasionally encountered during the summer and fall in Monterey Bay and the surrounding waters.	Seasonal-Common	Not likely. Due to their occurrence mainly offshore, it is not likely they would be seen in the project area.[4]
Sperm Whale	*Physeter macrocephalus*	FE	Sperm whales are found in many open oceans. Sperm whales live at the surface of the ocean but dive deeply to catch the giant squid.	Seasonal-Rare	Not likely. Offshore mostly deep water.[3]
North Pacific Right Whale	*Eubalaena glacialis*	FE	Like most baleen whales, they are seasonally migratory. They inhabit colder waters for feeding, and then migrate to warmer waters for breeding and calving. Although they may move far out to sea during their feeding seasons, right whales give birth in coastal areas.	Seasonal-Very Rare	Very unlikely.[5]
Sei Whale	*Balaenoptera borealis*	FE	This species has been sighted in offshore waters throughout the latitudinal range of the MBNMS, though usually they occur seaward of the Sanctuary's western boundary. Sightings have become rare since the 1980s. Sei whales are observed generally in deep water habitats including along the edge of the continental shelf, over the continental slope, and in the open ocean.	Seasonal-Very Rare	Very unlikely.[6]

TABLE 4.3-1 (Continued)
FEDERAL AND STATE PROTECTED MARINE ANIMALS IN PROJECT AREA

Common Name	Scientific Name	Status	Habitat	Regional Occurrence	Probability of Occurrence in Project Area (Not likely, somewhat likely, possible, very likely)
Marine Birds					
California Brown Pelican	*Pelecanus occidentalis*	State Endangered (SE), FE	The brown pelican can be found in coastal areas like sandy beaches and lagoons. It can also be found around waterfronts and marinas.	Year-round-Common	Very likely. Known Roosts: Moss Landing Wildlife Management Area, Elkhorn Slough NERR, Moss Landing Harbor, Salinas River mouth, Monterey Harbor & Jetty.[7]
~~California~~ Western Snowy Plover	*Charadrius alexandrinus nivosus*	Species of Special Concern (SSC), FT	Elkhorn Slough mudflats have been designated as critical habitat for the western Snowy Plover.	Seasonal-Occasional	Possible. Seasonally people need to be cautious of nesting in dunes.[8]
Marbled Murrelet	*Brachyramphus marmoratus*	SE, FT	This species occurs in the eastern North Pacific Ocean from the Aleutian Islands and southern Alaska to southern California. The species' distribution is nearly continuous in Alaska and British Columbia. However, there are major breaks in the distribution in Oregon and California. At sea, this species is typically found in coastal habitats, primarily within 5 km of shore, including bays, sounds, fjords and estuaries, and occasionally on rivers and lakes (usually within 20 km of ocean) during breeding season.	Year-round-Very Rare	Somewhat likely. During the non-breeding season, this species is most frequently observed in the northern portions of Monterey Bay between Moss Landing and Santa Cruz Harbor.[3]
Marine Turtles					
Leatherback Sea Turtle	*Dermochelys coriacea*	FE	Offshore pelagic environment.	Seasonal-Occasional	Somewhat likely. Leatherback Sea Turtles are most commonly seen between July and October, when Monterey Bay's sea surface temperature warms to 15-16° C and large jelly fish, the primary prey of the turtles, are seasonally abundant, offshore[3]
Green Sea Turtle	*Chelonia mydas*	FT	Green turtles primarily use three types of habitat: oceanic beaches (for nesting), convergence zones in the open ocean, and benthic feeding grounds in coastal areas.	Seasonal-Rare	Very unlikely. In the eastern North Pacific, green turtles have been sighted from Baja California to southern Alaska, but most commonly occur from San Diego south.[3]
Olive Ridley Sea Turtle	*Lepidochelys olivacea*	FT	The olive ridley is mainly a "pelagic" sea turtle, but has been known to inhabit coastal areas, including bays and estuaries.	Seasonal-Very Rare	Not likely. In the Eastern Pacific, they occur from Southern California to Northern Chile.[3]
Loggerhead Sea Turtle	*Caretta caretta*	FT	Loggerheads occupy three different ecosystems during their lives--the terrestrial zone, the oceanic zone, and the "neritic" zone.	Seasonal-Very Rare	Not likely. In the U.S., occasional sightings are reported from the coasts of Washington and Oregon, but most records are of juveniles off the coast of California.[9]

TABLE 4.3-1 (Continued)
FEDERAL AND STATE PROTECTED MARINE ANIMALS IN PROJECT AREA

Common Name	Scientific Name	Status	Habitat	Regional Occurrence	Probability of Occurrence in Project Area (Not likely, somewhat likely, possible, very likely)
Fish					
Chinook Salmon (winter-run)	*Oncorhynchus tshawytscha*	SE, FE	Chinook salmon are anadromous and semelparous. This means that as adults, they migrate from a marine environment into the fresh water streams and rivers of their birth (anadromous) where they spawn and die (semelparous).	Seasonal	Possible. Chinook salmon are normally entering the Sacramento River from November to June and spawning from late-April to mid-August, with a peak from May to June.[11]
Chinook Salmon (Central California Evolutionary Significant Unit[2])	*Oncorhynchus tshawytscha*	FT, SSC	Juvenile Chinook may spend from 3 months to 2 years in freshwater before migrating to estuarine areas as smolts and then into the ocean to feed and mature. They prefer streams that are deeper and larger than those used by other Pacific salmon species.	Seasonal	Possible. Historically, the range may have extended to the Ventura River in California, but currently does not extend south of San Francisco Bay, California. Chinook salmon in this ESU exhibit an ocean-type life history, with marine distribution predominantly off the California and Oregon coasts.[11]
Coho Salmon (Central California Evolutionary Significant Unit)	*Oncorhynchus kisutch*	SE~~T~~, FT	Coho spend approximately the first half of their life cycle rearing and feeding in streams and small freshwater tributaries. Spawning habitat is small streams with stable gravel substrates. The remainder of the life cycle is spent foraging in estuarine and marine waters of the Pacific Ocean.	Seasonal	Possible. Historically, there was a run in Pajaro and Salinas River but not since the 1990s. Current runs in Waddell and Scott Creek and the San Lorenzo River, Soquel And Aptos Creeks. In Monterey County the only runs are in the Carmel and Big Sur rivers, which are also small runs.[11]
Steelhead Trout (South Central Coast Evolutionary Significant Unit)	*Onchorhynchus mykiss irideus*	FT; SSC	They can be anadromous or freshwater resident (and under some circumstances, apparently yield offspring of the opposite form). Resident forms are usually called rainbow, or redband, trout. Those that are anadromous can spend up to 7 years in fresh water prior to smoltification, and then spend up to 3 years in salt water prior to first spawning.	Seasonal	Possible. This ESU occupies rivers from the Pajaro River, Santa Cruz County to (but not including) the Santa Maria River.[11]
Green Sturgeon	*Acipenser medirostris*	FT; ST	Like salmon, sturgeon are anadromous, migrating to the ocean and returning to freshwater to spawn. Only three known spawning grounds remain, in the Sacramento and Klamath rivers in California and the Rogue River in Oregon.	Coastal Marine Habitat	Possible. Closest known location Sacramento River Delta.[10]
Tidewater Goby	*Eucycloglobius newberryi*	FE	Despite the common name, this goby inhabits lagoons formed by streams running into the sea. The lagoons are blocked from the Pacific Ocean by sand bars, admitting salt water only during particular seasons, and so their water is brackish and cool. The tidewater goby prefers salinities of less than	Seasonal	Possible. Seasonally present in Elkhorn Slough, Bennett Slough, and Salinas River.[12]

TABLE 4.3-1 (Continued)
FEDERAL AND STATE PROTECTED MARINE ANIMALS IN PROJECT AREA

Common Name	Scientific Name	Status	Habitat	Regional Occurrence	Probability of Occurrence in Project Area (Not likely, somewhat likely, possible, very likely)
Fish (cont.)					
			10 ppt (less than a third of the salinity found in the ocean) and is thus more often found in the upper parts of the lagoons, near their inflow.		

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[1] FE=Federally Endangered, SE= State Endangered, FT=Federally Threatened, ST=State Threatened' SSC= Species of special concern.
[2] Marine Mammal Protection Act prohibits the harassment or taking of any marine mammal, regardless of whether it is threatened or endangered.
[3] Internet source: http://creagrus.home.montereybay.com/MtyBay.html, http://creagrus.home.montereybay.com/MtyBaybirds4.html, http://creagrus.home.montereybay.com/MtyBayseals.html, http://creagrus.home.montereybay.com/sea_turtles.html, http://creagrus.home.montereybay.com/MtyBaybeaked.html.
[4] Internet Source: http://www.montereybaywhalewatch.com/whales.htm, http://www.montereybaywhalewatch.com/pinniped.htm
[5] Internet Source: http://www.acsonline.org/factpack/RightWhale.htm
[6] Internet Source: http://www.sanctuarysimon.org/monterey/sections/specialSpecies/sei_whale.php
[7] Internet Source: http://www.sanctuarysimon.org/regional_docs/site_build/special_spp_brpe_figures.pdf
[8] Internet Source: http://montereybay.noaa.gov/reports/2002/eco/beach.html
[9] Internet Source: http://www.nmfs.noaa.gov/pr/species/turtles/loggerhead.htm
[10] Internet Source: http://www.biologicaldiversity.org/news/press_releases/2009/green-sturgeon-05-21-2009.html
[11] Internet Source: http://www.nmfs.noaa.gov/pr/species/fish/
[12] Internet Source: http://en.wikipedia.org/wiki/Tidewater_Goby

SOURCE: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEAnimals.pdf.
~~SOURCE: KLI, 2005, Habitat and Probability of Occurrence in Study Area information from various sources from the internet.~~

a state endangered and federally threatened species that is somewhat likely in the project area. The California Clapper Rail (*Rallus longirostris obsoletus*) is a federally endangered species that is not likely to occur in the project area.

Sea Turtles

The special status marine turtles that have a probability of occurring seasonally in the project area include the Leatherback Sea Turtle (*Dermochelys coriacea*), Green Sea Turtle (*Chelonia myda*), Olive Ridley Sea Turtle (*Lepidochelys olivacea*), and the Loggerhead Sea Turtle (*Caretta caretta*). The Leatherback Sea Turtles are federally endangered and most commonly seen in Monterey Bay from July to October. The other turtles are federally threatened species and rarely are seen in Monterey Bay.

Fish

The special status fish that could occur ~~have a probability of occurring~~ seasonally in the project area include the Chinook Salmon (*Oncorhynchus tshawytscha*), Coho Salmon (*Onchorhynchus kisutch*),Steelhead Trout (*Onchorhynchus mykiss irideus*), Green Sturgeon (*Acipenser medirostris*), and Tidewater Goby (*Euchycloglobius newberryi*). The Chinook Salmon is a state endangered, federally endangered, and federally threatened species ~~that is possible to occur in the project area~~. The Coho Salmon is a state endangered and a federally threatened species ~~that is possible to occur in the project area~~. The Steelhead Trout and the Green Sturgeon are ~~is a~~ federally threatened species ~~that is possible to occur in the project area~~. The Tidewater Goby is a federally endangered species that could~~is possible to~~ occur seasonally in Elkhorn Slough.

Salinity Tolerance

Changes to ambient salinity and subsequent degradation of the marine environment are among the primary concerns associated with coastal desalination projects (Damitz et al, 2006). Numerous studies have been performed to evaluate the effects of elevated salinity on marine organisms but broad generalizations are difficult because different methods have been used and salinity effects are species-specific (**Table 4.3-2**).

4.3.2.3 Existing Marine Environment at Project Sites

MLPP Intake

The Moss Landing Project would obtain water from the MLPP disengaging basin. The MLPP is currently permitted to intake up to 1.226 billion gallons per day (bgd) of seawater through two sets of existing intake facilities located in the Moss Landing Harbor: a northern intake (Units 1 and 2) and a southern intake (Units 6 and 7). The proposed desalination plant would only utilize water from the northern intake facility, which leads to Units 1 and 2 of the MLPP and discharges into the disengaging basin. This intake has a design capacity of 360 million gallons per day (mgd) and was permitted for use by the power plant by the California Energy Commission in 1999 and by the Central Coast Regional Water Quality Control Board (RWQCB) in 2000.

TABLE 4.3-2
RESULTS FROM STUDIES ON THE EFFECTS OF ELEVATED SALINITY ON MARINE ORGANISMS

Author, Year	Species	Salinity Tested	Results	Comments
ABA, 1992	*Dendraster excentricus* (sand dollar)	33–48 ppt	Lethal between 43–48 ppt	Local sand-bottom species, “chronic effects to growth and reproduction as well as survival may be a better indication of (salinity) toxicity and (therefore) require a longer test”, report unavailable for this evaluation
Pantell, 1993	*Menidia beryllina* (inland silverside)	23:1 SF Bay water:Brine 20:1 POTW Effluent:Brine	Mortality observed at greater brine concentrations	Freshwater species, test salinities not reported
	Skeletonema costatum (diatom)	23:1 SF Bay water:Brine 20:1 POTW Effluent:Brine	Growth effects observed at greater brine concentrations	Marine species, test salinities not reported
	Bivalve larvae	23:1 SF Bay water:Brine 20:1 POTW Effluent:Brine	Development effects observed at greater brine concentrations	Species not specified, test salinities not reported
	Citharichthys stigmaeus (sand dab)	23:1 SF Bay water:Brine 20:1 POTW Effluent:Brine	Mortality observed at greater brine concentrations	Local sand bottom species, test salinities not reported
Gross, 1957	*Pachygrappts* (rock crab)	61 ppt 56 ppt	Lethal in 2 hrs Survived >72 hrs	Locally found, but only in rocky habitats
	Emerita analoga (sand crab)	50 ppt 44 ppt	Lethal in 2 hrs Survived >24 hrs	Locally sand bottom species, proposed target species for the proposed project
	Olivella pycna (olive snail)	33–48 ppt	Not lethal	Local sand-bottom species, report unavailable for this evaluation
Iso et al., 1994	*Venrupis philippinarum* (little neck clams)	Various up 70 ppt	Survived and behaved normally at 50 ppt, lethal at 60 ppt after 48 hr and at 70 ppt after 24 hr	Grown commercially in California
	Pagrus major (sea bream)	Various up 70 ppt	Survived well in 45 ppt, behaved normally at 40 ppt, <70 ppt lethal in 1 hr	Not found locally
	Pseudopleuronectes yokohamae (marbled flounder)	Various up 70 ppt	Egg hatching delayed but successful up to 60 ppt, larvae survived up to 50 ppt, 55 ppt lethal after 140 hours	Not found locally
McMillan and Mosely, 1967	Seagrass	Up to 74 ppt	Four species grew	No seagrasses in vicinity of proposed project, reference unavailable for this review
Pillard et al, 1999	*Mysidopsis bahia*	43 ppt	LC50 = 48 hours	Estuarine species
	Cyrpinidon variegates	70 ppt	LC50 = 48 hours	Estuarine species
	Menidia beryllina	44 ppt	LC50 = 48 hours	Estuarine species

TABLE 4.3-2 (Continued)
RESULTS FROM STUDIES ON THE EFFECTS OF ELEVATED SALINITY ON MARINE ORGANISMS

Author, Year	Species	Salinity Tested	Results	Comments
Voutchkov, 2006	*Dendraster excentricus* (sand dollar)	37–40 ppt	Survived for 5.5 months, no effects on growth or fertility	Local sand-bottom species, reference unavailable for this review
	Strongylocentrotus purpuratus (purple urchin)	37–40 ppt	Survived for 5.5 months, no effects on growth or fertility	Local, but only in rocky habitats, reference unavailable for this review
	Haliotus rufescens (red abalone)	37–40 ppt	Survived for 5.5 months, no effects on growth or fertility	Rare locally, only found in rock habitats, reference unavailable for this review
Reynolds et al, 1976	*Leuresthes tenuis* (California grunion prolarvae)	41 ppt	LC50 = 24 hours	Southern California species
	Leuresthes tenuis (larvae)	40 ppt	LC50 = 18 hours	Southern California species
SCCWRP, 1993	*Macrocystis pyrifera* spores (giant kelp)	43 ppt	Germination and growth not affected	Locally found, but not found for miles around the proposed project
	Rhepoxynius abronius (amphipod)	38.5 ppt	Survived 10 days	Local, proposed target species for the proposed
	Strongylocentrotus purpuratus (purple urchin)	90:10 Seawater:Brine	No effect on fertilization	Local, but only in rocky habitats, test salinities not reported
Thessen et al., 2005	*Pseudo-nitzschia* spp. (diatom)	Up to 45 ppt	7 clones of 3 species grew up to 45 ppt	Local, species of *Pseudo-nitzschia* cause domoic acid poisoning

SOURCE: ABA Consultants. 1992; Pantell, 1993; Gross, 1957; Iso et al., 1994; McMillan and Moseley, 1967; Pillard et al., 1999; Voutchkov, 2006; Reynolds et al., 1976; SCCWRP, 1993; Thessen et al., 2005.

Over 60 fish taxa and over 30 invertebrate taxa have been identified within Moss Landing Harbor during the course of entrainment and impingement studies associated with the existing MLPP intakes (Tenera, 2007). Fish species known to occur in the harbor include Pacific herring (*Clupea harengus*), northern anchovy (*Engraulis mordax*), sanddabs (*Citharichthys* spp.), topsmelt (*Atherinops affinis*), shiner surfperch (*Cymatogaster aggregate*), white croaker (*Genyonemus lineatus*), and Pacific staghorn sculpin (*Leptocottus armatus*). Invertebrate species found in the harbor include crab species of commercial importance such as Dungeness crab (*Cancer magister*), brown rock crab (*Cancer antennarius*), red rock crab (*Cancer productus*), and yellow rock crab (*C. anthonyi*).

Impingement and Entrainment Studies

Section 316(b) of the Federal Clean Water Act (CWA) requires the Environmental Protection Agency (EPA) to ensure that the location, design, construction, and capacity of cooling water intake structures for power plants reflect the best technology available to protect aquatic organisms from being killed or injured by impingement or entrainment (USEPA, 2004). Impingement refers to aquatic organisms being pinned against screens or other parts of a cooling water intake structure. Entrainment refers to aquatic organisms being drawn into cooling water systems and subjected to thermal, physical, or chemical stress. MLPP, similar to many other power plants, takes in water for cooling and, in the process, impinges and entrains numerous fish and aquatic organisms.

A Section 316(b) resource assessment to assess impingement and entrainment at the MLPP intakes was conducted in 1999-2000 (Tenera, 2000). The assessment focused primarily on entrainment effects of the intake on the populations of some marine and estuarine resources. One hundred percent mortality is generally assumed for entrained organisms. Moss Landing Harbor contains naturally low species diversity and the larvae of only eight fish species made up 95 percent of the organisms entrained during twelve months of weekly site surveys (Tenera, 2000). Unidentified larval gobies (Gobiidae) accounted for 53 percent of the entrained larvae. Three of the eight species (approximately five percent of the larvae) have commercial or recreational value: the Pacific herring, white croaker, and Pacific staghorn sculpin. The results of the 316(b) assessment also showed that the MLPP intake entrains the megalops (final larval stage) of six identified and one unidentified crab species. Four of these crab species are of commercial importance: Dungeness crab, brown rock crab, red rock crab, and yellow rock crab.

During 2005-2006, an impingement study of MLPP intakes was conducted (Tenera, 2007). The assessment found that eight fish species, including silversides such as topsmelt, plainfin midshipman (*Porichthys notatus*), pipefishes (*Syngnathus* spp.), northern anchovy, and sanddabs comprised over 90 percent of the fishes impinged by the Unit 1 and 2 intakes (Tenera, 2007). One green sturgeon (*Acipenser medirostris*) was found on the traveling screens of the Unit 1 and 2 intakes. The southern Distinct Population Segment of this species is listed as a threatened species under the federal Endangered Species Act. Furthermore, one juvenile Chinook salmon (*Oncorhynchus tshawytscha*) was found in the intake. However, the specimen was examined by the National Marine Fisheries Service Santa Cruz laboratory and was determined to be a hatchery-raised fish that was released in Moss Landing Harbor as part of a re-stocking program (Tenera, 2007).

To minimize adverse impacts of the intake system to the Elkhorn Slough watershed, the MLPP was required to modify the intake system (RWQCB, 2000) and currently utilizes angled traveling screens which reduce approach velocities and help maintain the intake free of debris that might otherwise entangle and impinge aquatic organisms. Additionally, the MLPP's new power generation technology installed at that time is designed to reduce permitted intake volumes, thereby reducing potential entrainment. In addition to the intake modifications, RWQCB, California Energy Commission, and the MLPP developed an acquisition and aquatic habitat enhancement program called the Elkhorn Slough Enhancement Program. This program was designed to mitigate for the adverse environmental effects of the intake system on the Elkhorn Slough watershed resources so that the MLPP would be in compliance with Section 316(b) of the CWA. The objectives of the Elkhorn Slough Enhancement Program are:

- Implement an aggressive conservation acquisition program for Elkhorn Slough that includes acquiring fee interests, conservation easements, or management agreements on lands that directly impinge on the slough or that contribute damaging inputs to the slough;
- Restore wetlands, particularly degraded wetlands, that will contribute to the improvement of water quality and increase wetland habitats for aquatic species; and
- Establish an investment fund to provide a permanent endowment to accomplish short-term and long-term stewardship of the selected mitigation projects in perpetuity.

The MLPP is also required by its National Pollution Discharge Elimination System (NPDES) permit to fund the Coastal Waters Evaluation Program developed by the MBNMS. This study is funded by the MBNMS through the Sanctuary Integrated Monitoring Network program (SIMoN, 2008).

4.3.2.4 MLPP Outfall

The presence of the Monterey submarine canyon at the mouth of Elkhorn Slough adds to the complex array of physical seasonal changes that occur near the MLPP outfall, including sediment scouring and accumulation, temperature and salinity shifts due to tidal forcing and refraction of large storm induced waves. The shallower reaches of this habitat zone are typified by crustacean dominated marine communities and the deeper reaches, where wave disturbance lessens, by polychaetes (Hodgson and Nybakken, 1973, Oliver et al., 1980). More specifically, the marine organisms that inhabit this habitat include haustoriid and phoxocephalid amphipods; capitellid, siphoned, and magelonid polychaetes; some cumaceans and ostracods, mollusk bivalves (both Tellinid and venerid) and sand dollars (echinoderms). Most of these organisms are detritivore deposit feeders and suspension feeders (CalAm and RBF Consulting, 2005).

Moss Landing Marine Laboratories (MLML) conducted a study of the immediate area surrounding the MLPP outfall structure and compared the results to a study conducted in 1975–1976 (MLML, 2006). This included the intertidal sandy beach nearshore from the MLPP outfall as well as benthic samples near the outfall structure. The recent study found no significant difference in the abundance of the intertidal total fauna, crustaceans, or polychaetes between 1975–76 and 2003–05 (MLML, 2006). There were, however, significantly fewer types of species in 2003–05.

4.3.2.5 MRWPCA Outfall

The immediate area of the discharge surrounding the North Marina project location has been described as a high-energy sandflat in south-central Monterey Bay. The outfall extends approximately 11,300 ft from the shore to a depth of 100 feet. ~~and can discharge up to 21 million gallons~~ Dry weather permitted discharge is 29.6 mgd and wet weather peak is 75.6 mgd of treated sewage~~ a day~~. The end of the outfall lies approximately 3 miles southwest of the mouth of the Salinas River and is within the area affected by the sediment plume from the river (ABA Consultants, 1999). A long-term monitoring study of the ocean outfall reported no effects from the outfall discharge on benthic communities, the biological accumulation of contaminants in tissue, and observations of the physical and chemical properties of the sediments and water column except close to the discharge (ABA Consultants, 1999). A community of tubiculous polychaetes (*Diopatra ornata*) has formed a distinct band within two meters along the south side of the outfall resulting in a small “artificial reef-like” community which appears to utilize the increased sediment stability provided by the outfall pipe. This occurrence has increased the diversity and abundance of organisms near the outfall (ABA Consultants, 1999). The monitoring program also reported that the benthic community structure within the study area had shifted over time with a general increase in mobile epifauna and opportunistic species and a decrease in sessile species and predators, which was consistent with patterns seen in other parts of Monterey Bay and not linked to the outfall (ABA Consultants, 1999).

4.3.3 Regulatory Setting

4.3.3.1 Federal

Clean Water Act

Under the Clean Water Act, the EPA seeks to restore and maintain the chemical, physical, and biological integrity of the nation’s waters by implementing water quality regulations. Section 4.1, Surface Water Resources, includes a discussion of Sections 303(d) and 402(p) of the Clean Water Act. Section 303(d) requires states to identify impaired water bodies. In the project area, impaired water bodies that eventually drain into Monterey Bay include Elkhorn Slough, Moro Cojo Slough, Salinas Reclamation Canal, Tembladero Slough, Old Salinas River estuary, Salinas River, and Moss Landing Harbor. Section 402(p) requires NPDES permits to control water polluting into waters of the United States. MLPP and MRWPCA have NPDES permits for their respective discharges into Monterey Bay.

Section 316(b)

Section 316(b) of the Federal Clean Water Act requires the Environmental Protection Agency to ensure that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available to protect aquatic organisms from being killed or injured by impingement or entrainment (USEPA, 2004). Once-through cooling systems have come under increased federal and State regulatory scrutiny over the past five years.

On June 13, 2006, the SWRCB released a scoping document for proposed revisions to its policy on CWA Section 316(b) regulations (SWRCB, 2006). Subsequently, on July 9, 2007, EPA suspended federal regulations for cooling water intake structures at existing power plants (USEPA, 2007). As this federal action substantially changed the regulatory landscape for Clean Water Act Section 316(b) regulation, the SWRCB released a revised scoping document in March 2008 (SWRCB, 2008). The MLPP NPDES permit has been on administrative extension since 2005 and will not be approved by the RWQCB until a decision is made about Section 316(b) (von Langen, 2008).

National Marine Sanctuary Program Regulations

NOAA has entered into a Memorandum of Agreement with the state of California, Environmental Protection Agency, and the Association of Monterey Bay Area Governments regarding the MBNMS regulations relating to water quality within state waters within the sanctuary (MBNMS, 2008c). With regard to permits, the MOA encompasses:

- National Pollutant Discharge Elimination System permits issued by the State of California under Section 13377 of the California Water Code
- Waste Discharge Requirements issued by the State of California under Section 13263 of the California Water Code.

The MOA specifies how the review process for applications for leases, licenses, permits, approvals, or other authorizations will be administered within State waters within the Sanctuary in coordination with the State permit program.

The MBNMS implements the Water Quality Protection Program for the sanctuary and tributary waters. The program is a partnership of 27 local, state, and federal government agencies (MBNMS, 2008b). The program calls for education, funding, monitoring, and development of treatment facilities and assessment programs to protect water quality. The goal of the program is to enhance and protect the chemical, physical, and biological integrity of the sanctuary. The project discharge would be located within the MBNMS and subject to the MBNMS regulations.

Magnuson-Stevens Fishery Conservation and Management Act

The Sustainable Fisheries Act of 1996 (Public Law 104-297) amended the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to establish new requirements for Essential Fish Habitat (EFH) descriptions in federal Fishery Management Plans (FMPs) and to require federal agencies to consult with the National Marine Fisheries Service (NMFS) on activities that may adversely affect EFH. The Magnuson-Stevens Act requires all fishery management councils to amend their FMPs to describe and identify EFH for each managed fishery. The Act also requires consultation for all federal agency actions that may adversely affect EFH (i.e., direct versus indirect effects); it does not distinguish between actions in EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside of EFH, such as upstream and upslope activities that may have an adverse effect on EFH. Therefore, EFH consultation with NMFS is required by federal agencies undertaking, permitting, or funding activities that may adversely affect EFH, regardless of the activity's location. Under section 305(b)(4) of the Magnuson-Stevens Act, NMFS is required to provide EFH conservation and enhancement recommendations to federal and state agencies for actions that adversely affect EFH. However, state agencies and private parties are not required to consult with NMFS unless state or private actions require a federal permit or receive federal funding. Although the concept of EFH is similar to that of critical habitat under the FESA, measures recommended to protect EFH by NMFS are advisory, not proscriptive.

Components of the CWP are located within areas identified as EFH for various life stages of marine and estuarine fish species (*e.g.*, various rockfishes, flatfishes, sharks, northern anchovy, Pacific sardine, Chinook salmon, coho salmon, *etc.*) managed by federal FMPs. In addition, project components within Moss Landing/Elkhorn Slough are located in an area designated as coastal estuary Habitat Areas of Particular Concern (HAPC) for various federally managed fish species within the Pacific Groundfish FMP. HAPCs are described in the EFH regulations as subsets of EFH that are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area.

4.3.3.2 State

California Coastal Act

The California Coastal Act is discussed in Section 4.1, Surface Water Resources. The California Coastal Act includes policies intended to protect marine water quality and biology. Almost all development within the coastal zone requires a coastal development permit from the California Coastal Commission or a local agency with a certified Local Coastal Program.

California Ocean Plan

The California Ocean Plan is discussed in Section 4.1, Surface Water Resources. The Ocean Plan establishes water quality objectives and beneficial uses for waters of the Pacific Ocean adjacent to the California Coast (SWRCB, 2005). The plan establishes effluent quality requirements for specific waste discharges. The Moss Landing Project and the North Marina project would discharge into Monterey Bay and are subject to all Ocean Plan water quality objectives and requirements. The most relevant objectives to this project include:

- Marine communities, including vertebrate, invertebrate, and plant species shall not be degraded;

- Waste management systems that discharge into the ocean must be designed and operated in a manner that will maintain the indigenous marine life and a healthy and diverse marine community; and

- Waste discharged to the ocean must be essentially free of substances that will accumulate to toxic levels in marine waters, sediments or organisms.

California Thermal Plan

The *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* (or Thermal Plan) adopted by the SWRCB in 1995 establishes temperature requirements for existing and new discharges in California coastal waters, interstate waters, enclosed bays, and estuaries. Water quality objectives for existing discharges into coastal waters require that elevated temperature wastes comply with limitations necessary to assure protection of the beneficial uses and areas of special biological significance (SWRCB, 1995). See Section 4.1, Surface Water Resources, for details of the temperature requirements of the Thermal Plan.

~~4.3.3.3 Local~~

~~*National Marine Sanctuary Program Regulations*~~

~~NOAA has entered into a Memorandum of Agreement with the state of California, Environmental Protection Agency, and the Association of Monterey Bay Area Governments regarding the MBNMS regulations relating to water quality within state waters within the sanctuary (MBNMS, 2008c). With regard to permits, the MOA encompasses:~~

- ~~National Pollutant Discharge Elimination System permits issued by the State of California under Section 13377 of the California Water Code~~
- ~~Waste Discharge Requirements issued by the State of California under Section 13263 of the California Water Code.~~

~~The MOA specifies how the review process for applications for leases, licenses, permits, approvals, or other authorizations will be administered within State waters within the Sanctuary in coordination with the State permit program.~~

~~The MBNMS implements the Water Quality Protection Program for the sanctuary and tributary waters. The program is a partnership of 27 local, state, and federal government agencies (MBNMS, 2008b). The program calls for education, funding, monitoring, and development of treatment facilities and assessment programs to protect water quality. The goal of the program is to enhance and protect the chemical, physical, and biological integrity of the sanctuary.~~

4.3.4 Impacts and Mitigation Measures

4.3.4.1 Significance Criteria

Significance thresholds for marine biological resources are not specifically identified in Appendix G of the CEQA Guidelines. Based on input regarding the Coastal Water Project from the California Coastal Commission, Monterey Bay National Marine Sanctuary, Central Coast RWQCB, and the SWRCB and based on existing reports such as the California Ocean Plan and California Thermal Plan, the project impact would be considered significant if the project would:

- Substantially impinge or entrain aquatic species through the water intake system so as to result in a substantial adverse impact on marine life;

- Substantially adversely affect sensitive or special status species directly or through degradation of the marine habitat;

- Substantially adversely affect marine life due to increasing salinity at the edge of the zone of initial dilution[2] by 10 percent or more above the ambient salinity or above the toxic levels to benthic organisms;

- Substantially adversely affect marine life due by increasing the temperature of the natural receiving waters at the discharge point by 20°F or more and shall not result in increases in the natural water temperature exceeding 4°F at the shoreline, the surface of any ocean substrate, or the ocean surface beyond 1,000 feet from the discharge system; or

- Expose humans or marine life to pollutant concentrations that exceed or increase an existing exceedance of applicable water quality objectives in the California Ocean Plan~~, such as the Ocean Plan 30-day average for dieldrin of 0.00004 micrograms per liter (μg/L)~~ (SWRCB, 2005).

4.3.4.2 Approach to Analysis

Impingement and Entrainment

Since the Moss Landing Project will utilize water from MLPP's existing once-through cooling system, any entrainment and impingement impacts associated with the desalination source water intake have already been minimized and mitigated through MLPP's Section 316(b) permitting process and are therefore considered a baseline condition for purposes of this EIR. As such, the impact analysis presented below assesses only the potential for additional entrainment or impingement impacts that may occur as a result of project implementation. However, the once-through cooling systems have come under increased federal and State regulatory scrutiny over the past years (see Regulatory Setting). Use of MLPP's cooling water discharge by the proposed Moss Landing Project could become infeasible prior to or during project implementation if the once-through cooling system were limited or curtailed. If and when such a change were to occur, operation of the Moss Landing Project as a "stand-alone" desalination facility with an independent ocean water intake would need to be considered. An analysis of the potential impacts of such a "stand-alone" facility on marine biological resources is presented in Section ~~8~~9, Cumulative Impacts, of this Draft EIR.

Discharge Impacts

The marine biological resources discharge impact analysis utilized the same data as the marine water quality analysis. Details on this methodology are in Section 4.1, Surface Water Resources. The brine discharge analysis is divided into salinity, temperature, treatment chemicals, and source

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[2] The zone of initial dilution is defined as the zone immediately adjacent to a discharge where buoyancy-driven and momentum mixing produce rapid dilution of the discharge.

water quality impacts. Exceedances of the significance criteria noted above have been estimated using models of discharge characteristics, including salinity and contaminant concentrations.

For the purpose of this analysis, the Moss Landing Project discharge is the brine that would be discharged from the desalination process combined with the cooling water that continually flows out of the MLPP. An analysis of the potential impacts of a “stand-alone” facility on marine biological resources is presented in Section ~~8~~9, Cumulative Impacts, of this Draft EIR as noted above for impingement and entrainment impacts. There are no regulatory standards or objectives that apply specifically to impacts to marine biological resources due to discharge from desalination plants. Therefore, the impacts to marine organisms from the discharges from the Moss Landing Project and North Marina Project were studied based on parameters (e.g., salinity, temperature, treatment chemicals, and source water quality—discussed below), that have established or proposed regulatory standards and are representative of the existing marine water quality and natural habitat/environment.

4.3.4.3 Impacts and Mitigation Measures

The following impact analyses focus on potential effects of project discharge on marine biological resources associated with implementation of the Moss Landing or the North Marina Project. The evaluation was made in light of project plans, current conditions at the project sites, applicable regulations and guidelines, and previous environmental assessments. **Table 4.3-3** presents a summary of the potential marine biological resources impacts of each project and its components.

TABLE 4.3-3
SUMMARY OF POTENTIAL MARINE BIOLOGICAL RESOURCES IMPACTS

Facility	**Impact 4.3-1**	**Impact 4.3-2**
Moss Landing Site:		
Plant: Moss Landing Project	-	-
Intake: Moss Landing Project	LTS	-
Discharge: Moss Landing Project	-	SM
North Marina Site		
Plant: North Marina Project	-	-
Intake: North Marina Project	-	-
Discharge: North Marina Project	-	SM
Moss Landing Project	LTS	SM
North Marina Project	-	SM

SM – Significant Impact, can be Mitigated
LTS – Less-than-significant Impact
– – No Impact

Impact 4.3-1: Intake of source water for the proposed desalination facility could potentially result in nominal additional entrainment of marine and estuarine aquatic organisms.

Moss Landing Project

Under the Moss Landing Project, the proposed desalination facility would not alter the operations of the MLPP. The volume and velocity of water entering the MLPP intakes would remain unchanged. The proposed desalination facility at Moss Landing would only use cooling water that is already screened by the MLPP. The desalination facility would also include 3-millimeter screens that would return any marine organisms 3 millimeters or larger back to the MLPP outfall, thus further reducing impingement impacts. Therefore, there would be a less-than-significant impact due to impingement as a result of project implementation.

A nominal amount of additional entrainment mortality may occur as a result of the proposed project operation. Although entrainment at the MLPP's maximum flow of 1.226 bgd is already permitted under the assumption of 100-percent mortality, a small number of organisms are known to survive the once-through cooling cycle at MLPP. The majority of organisms entrained by the MLPP are killed or severely distressed by the cooling water process. Any organisms that survive the once-through cooling cycle and enter the RO stream would likely be killed as part of the desalination process. However, the amount of water diverted for the Moss Landing Project would represent approximately 2 percent of the MLPP's permitted maximum flow of 1.226 bgd. Due to the relatively small amount of water that would be diverted from the disengaging basin to the proposed desalination facility, impacts from additional entrainment mortality are not anticipated to be significant under the maximum cooling water intake scenario. Under the MLPP intake scenario of 100 mgd, a minimum flow scenario, the water diverted to the desalination facility would amount to approximately 23 percent of the total intake volume and would therefore represent a proportionally, but not numerically, larger entrainment impact than under the maximum flow scenario. However, MLPP operations under minimum flow are rare and intake flows have historically been over 110 mgd for 98 percent of the time based on available data (CalAm and RBF Consulting, 2005). Furthermore, as discussed above, the current MLPP cooling water intake was fully permitted under a 100-percent mortality assumption and entrainment impacts were minimized and mitigated during the MLPP Section 316(b) permitting process in 2000. As such, all additional mortalities that would potentially occur due to entrainment into the desalination process have already been mitigated under MLPP's existing permits. The desalination facility would also include 3-millimeter screens that would return any marine organisms 3 millimeters or larger back to the MLPP outfall, thus further reducing entrainment impacts. Potential entrainment and impingement impacts on marine biological resources resulting from implementation of the Moss Landing Project are less-than-significant.

Significance: Less than Significant.

North Marina Project

Under the North Marina Project, the desalination facility at North Marina would utilize slant wells for the intake of seawater. The use of slant wells would eliminate entrainment and impingement impacts, because the intake of seawater would occur entirely beneath the ocean floor. Thus, no entrainment and impingement impacts would occur under the North Marina Project.

Significance: No Impact.

Impact 4.3-2: The project discharge from the desalination facility could degrade marine habitat and species.

Moss Landing Project

The Marine Biological Resources impact analysis utilized the same data as the marine water quality analysis. Details on this methodology are in Section 4.1, Surface Water Resources. The brine discharge analysis is divided into salinity, temperature, treatment chemicals, and source water quality. Salinity tolerance investigations and toxicity testing of reverse osmosis concentrate at Moss Landing was not available. The marine water quality discussion in Section 4.1, Surface Water Resources, provides information on calculations and modeling that is referenced in this section. The project discharge would comply with NPDES permit and monitoring requirements of the RWQCB.

Salinity

Salinity at both the cooling water intake and the MLPP outfall varies seasonally according to local inputs of freshwater and oceanographic conditions (see **Appendix C**). Benthic organisms are sensitive to changes in salinity, but because benthic organisms adapt to such salinity variation over time, it is possible that relatively short-term salinity fluctuations that could be associated with the discharge would exceed salinity objectives being considered by water quality regulators. Therefore, the analysis of salinity effects primarily considers the short-term salinity fluctuations.

To assess the effects on the salinity levels, Visual Plumes modeling was conducted (CalAm and RBF Consulting, 2005). Visual Plumes is an accepted diffused discharge model. However, Visual Plumes does not adequately model the behavior of a negatively buoyant plume (i.e. a plume that sinks towards the bottom), nor can it describe the behavior of plumes that do not fully develop because of contact with the water surface, which occurs at MLPP. Consequently, in the absence of appropriate near-field dilution modeling, a conservative approach was taken that considered only the effects of the project discharge and assumed that the discharge would settle to the bottom around the MLPP diffuser prior to dilution and would not be diluted by either waves or currents. The project discharge is a combination of both the MLPP discharge and the desalination facility's brine discharge.

For the conservative approach, project discharge dilution calculations were completed (**Appendix C**). The salinity of the project discharge at MLPP was calculated as a function of the intake salinity and MLPP flow rate, and the rate of product water generation. The salinity data, which were collected at 5-minute intervals (and subsequently subsampled to hourly) at the Moss Landing Marine Laboratories small boat dock from February 16, 2007 to April 30, 2008 (approximately 14.5 months), were used as a proxy for the salinity at the intake (**Appendix C**). The inflow rate for the MLPP from February 16, 2003 to April 30, 2004 was used. As discussed previously, 10 mgd of product water would be generated under the Moss Landing Project with brine discharge of 12.2 mgd. There was no overlap in time between the flow rate and salinity time series; however, the combination provides a range and frequency of values of the salinity for the project discharge.

Salinity values at the outfall were not readily available, therefore the salinity values at the intake were assumed to be the same as the ambient Bay salinity. The amount that the salinity of the discharge exceeds the salinity of the intake is a function of the power plant intake rate and the rate of freshwater production. Exceedances of 110 percent of the intake salinity occur 1.3 percent of the time during power plant operation, with a maximum duration of 26 hours, and only when MLPP discharge was less than 110 mgd (**Appendix C**). The power plant was not operating 1.1 percent of the time period that was analyzed to make these discharge salinity calculations. The average MLPP discharge is approximately 625 mgd and maximum is 1.225 bgd.

The duration of the exceedances of greater than 110 percent (i.e., 26 hours) of the salinity at the intake is considered high. Toxicity tests to study the tolerance levels or survival of benthic organisms were not conducted. However, some studies have been completed that indicate a salinity tolerance threshold of roughly 40 ppt. Therefore, the high duration of exceedance of the ambient salinity levels is considered to result in a significant impact. Elevated salinity could result in adverse impacts to marine organisms. This could be a significant impact, but the implementation of Mitigation Measure 4.1-4a and Mitigation Measure 4.3-2a would reduce impacts of elevated salinity to a less-than-significant level. Mitigation Measure 4.1-4a requires a comprehensive monitoring program for the Moss Landing desalination facility, which includes monitoring the ambient salinity at the seabed near the discharge location and monitoring the discharge flow rates and salinity levels at the seabed. The data from this monitoring requirement would inform changes to the operation of the desalination plant that would either eliminate or reduce any detected impacts to marine benthic organisms. Mitigation Measure 4.3-2a requires sampling of benthic organisms to determine changes and survival of the biological communities at different salinity levels including at elevated salinities.

Temperature

The project discharge would not exceed the significance thresholds stated above and would not adversely affect marine habitat and species. The existing discharge from MLPP is approximately 20°F above ambient Monterey Bay water. The desalination operation at MLPP would not increase the project discharge temperature. However, the project discharge would be denser, would contain additional salt, and would be less buoyant, resulting in a slight increase in temperature near the seabed and a slight decrease in temperature at the surface near the outfall. The impact of changes in temperature to marine organisms due to the project would be less than significant.

Treatment Chemicals

Based on the calculations presented in the Surface Water Resources discussion, Section 4.1, the increase in sulfate and chloride due to addition of treatment chemicals would be less than 1 percent over ambient concentrations, significantly below the threshold of 10 percent. Therefore, impacts to marine organisms would be less than significant.

Source Water Quality-Contaminants

Using DDTs and dieldrin as ~~a~~ surrogates for organic contaminants in Moss Landing Harbor, the estimated maximum concentrations in the project discharge ~~was~~ were compared to ambient concentrations reported by Central Coast Long-term Environmental Assessment Network (CCLEAN, 2007). The maximum concentration of DDTs and dieldrin in the combined effluent represent~~s~~ a 20 percent increase in the concentration of ~~dieldrin~~these contaminants, which could cause a significant impact to marine organisms. The implementation of Mitigation Measure 4.1-4b, would reduce impacts of increased levels of contaminants to a less-than-significant level by requiring changes in operations during periods of high concentrations of contaminants.

It is known that Moss Landing Harbor is contaminated by a variety of chemicals, many of which readily adsorb to suspended sediment particles (Hardin, et al., 2007). If coagulants or flocculants are not used in the treatment of source water prior to microfiltration, the backwash water (see Figure 3-11) would be part of the project discharge. The mass of suspended particles in the project discharge would not change, however the microfiltration process particles could create larger aggregates (> 62 microns) that could settle to the seabed around the MLPP outfall. If these larger aggregates settle and carry high concentrations of organic contaminants, the contaminated aggregates could become incorporated into the benthic food web by deposit feeding organisms. Although Monterey Bay is a dynamic environment and the quantity of larger aggregates from the backwash would be a small fraction of the total project discharge, the implementation of Mitigation Measure 4.1-4b and 4.3-2b is necessary to document whether local conditions around the discharge allow contaminated particles to settle and would provide the data needed to inform operational changes that would reduce the impact to a less-than-significant level.

In summary, the discharge from the Moss Landing Project could affect the marine organisms in Monterey Bay at varying levels depending upon the parameter of concern. The analysis examines potential impacts on marine organisms due to elevated levels of salinity, temperature, treatment chemicals, and source water quality from the project discharge. The potential impact to marine habitat and species due to elevated salinity would be significant. With implementation of Mitigation Measure 4.1-4a, Mitigation Measure 4.1-4b, and Mitigation Measure 4.3-2a the impact would be less than significant. The desalination process would not result in a significant increase in temperature or treatment chemicals. Implementation of Mitigation Measure 4.1-4a and Mitigation Measure 4.1-4b would reduce the impacts to marine habitat and species associated with elevated salinity and contaminants in the source water from the Moss Landing Project discharge by providing the data necessary to either document an absence of impact or to inform operational changes that would reduce the impact to a less-than-significant level.

Source Water Quality-Dissolved Oxygen

Under existing conditions, the MLPP discharge is required to adhere to the dissolved oxygen limits of the Ocean Plan. Although areas in Moss Landing Harbor sometimes have low dissolved oxygen, the dissolved oxygen would not substantially decrease or adversely affect marine biological resources due to the desalination process. Therefore, the impact is less than significant.

Mitigation Measures

Mitigation Measure 4.3-2a: The project sponsor shall include the following measure in the comprehensive monitoring program prepared in compliance with Mitigation 4.1-4a at Moss Landing desalination facility:

- Conduct periodic opportunistic sampling of benthic organisms, at least 5 times per year, to determine changes in the biological communities associated with increased salinity levels from the brine discharge (more than 110 percent of ambient levels). The periodic sampling shall include the full range of natural discharge salinity variation (e.g. spring, summer, fall, winter, after large rain event), focusing especially on times following periods of reduced power plant discharge. This sampling should be performed adjacent to the locations required in Mitigation 4.1-4a and 4.1-4b and should include a minimum level of sample replication. Averages of organism abundances for the two locations should be tested for differences using a paired t-test; and

- If the benthic sampling reveals changes to the biological communities associated with salinity differences, determine salinity effects by doing lab assays on several selected individual species where the salinity and duration of exposure is varied systematically.

If project discharge salinity is more than 110 percent of ambient levels and above the toxic level to benthic organisms, either the operations of the desalination facility shall be reduced or additional dilution shall be provided until the project discharge salinity in Monterey Bay is less than 110 percent of ambient levels and are lower than toxic levels.

Mitigation Measure 4.3-2b: If coagulants or flocculants are not used at the Moss Landing desalination facility, the project sponsor shall include the following measure in the comprehensive monitoring program prepared in compliance with Mitigation 4.1-4a:

- Measure sediment size distribution of the inflow and the backwash water with a technique that measures sizes up to 2 mm, such as a Coulter Counter.

If the backwash water has particles greater than or equal to 62 microns, than an additional filter or method to reduce particle size shall be used prior to discharge.

Significance after Mitigation: Less than Significant.

North Marina Project

The brine discharge associated with the North Marina Project could result in degradation of marine benthic habitat. The marine water quality discussion in Section 4.1, Surface Water Resources, provides information on calculations and modeling that is referenced in this section.

The project discharge would comply with the limits established in the NPDES permit and monitoring requirements of the RWQCB.

Salinity

The analysis of impacts of elevated salinity to marine organisms is based primarily on the Flow Science, Inc. model results for North Marina (**Appendix Q~~D~~**). The method of analysis is described in Section 4.1, Surface Water Resources. Based on the modeling results reported for a point at the edge of zone of initial dilution, the maximum seabed salinity predicted by the semi-empirical method would be 36.0~~8~~ ppt, which is approximately ~~7.5~~5.2 percent above the average ambient salinity of 34.2 ppt. The maximum seabed salinity predicted by the Visual Plumes method would be 35.1~~4~~ ppt, which is approximately ~~3.6~~2.5 percent above the average ambient salinity of 34.2 ppt used in the modeling.

The semi-empirical method assumes lower dilution, higher maximum plume salinity at the seafloor, and higher percentage above ambient salinity. According to both modeling methods, for the North Marina Project, the discharge plume would have a maximum salinity at the seafloor that is within 10 percent of the ambient salinity. Therefore, the impacts due to increased salinity are less than significant.

Temperature

The temperature of the discharge for the North Marina Project would likely be similar to the ambient temperature in Monterey Bay. The desalination project would not include a substantial change in water temperature. Therefore, the temperature impact on benthic organisms from the brine discharge for the North Marina Project would be less than significant.

Treatment Chemicals

Although the water from the intake wells would have characteristics similar to seawater, the well water would have fewer suspended solids or particles than harbor water. Regardless, the North Marina Project may require a pretreatment process that includes coagulation and flocculation to remove particles. Sulfuric acid and ferric chloride would be used for the pretreatment process. Sodium bisulfate would be used for dechlorination in the reverse osmosis process. Using the estimated ambient concentrations of chloride and sulfate of 19,000 mg/L and 2,700 mg/L, respectively, and applying the modeled dilution of brine (~~14~~16:1) predicted by the semi-empirical model (**Appendix Q~~D~~**), the resulting sulfate concentration in the receiving water would be 2,704~~5~~ mg/L (i.e., an increase of approximately 0.15~~17~~ percent), which would not be substantial. The resulting chloride concentrations in the receiving water would be 19,001 mg/L (i.e., an increase of approximately 0.01 percent). Both chloride and sulfate increases in concentrations would be significantly less than 10 percent above ambient. Based on the calculations done in the Section 4.1, Surface Water Resources, and the 10 percent criteria, the treatment chemicals would have a less-than-significant impact on marine habitat and species (i.e., never exceed 110 percent of ambient concentrations).

Source Water Quality-Contaminants

Increased levels of contaminants, such as dieldrin and DDTs, could result in adverse impacts to marine habitat and species. The source water concentration of dieldrin and DDTs would probably be similar to the ambient water concentration of dieldrin and DDTs in Monterey Bay, adjacent to the outfall. ~~The source water concentration of dieldrin varies from 0 μg/L to 0.000023 μg/L.~~ Using the maximum source water concentration of dieldrin and DDTs, ambient concentration of dieldrin and DDTs, and applying the modeled dilution of the discharge (~~14~~16:1) predicted by the semi-empirical model (see **Appendix ~~D~~Q**), maximum seabed concentration of dieldrin and DDTs were~~was~~ calculated. The maximum seabed concentration would be ~~0.000026 μg/L. This concentration is~~ significantly lower than the 30-day averages ~~of 0.00004 μg/L~~ allowed by the California Ocean Plan (SWRCB, 2005). Based on the calculations done in the Section 4.1, Surface Water Resources, source water quality contaminants such as dieldrin and DDTs would have a less-than-significant impact on marine habitat and species.

Source Water Quality-Dissolved Oxygen

Using the estimated range of ambient concentrations of dissolved oxygen of 4.25 to 8.00 mg/L (KLI, 1998; KLI, 1999) in Monterey Bay at the approximate depth of the MRWPCA outfall and applying the modeled dilution of brine (~~14~~16:1), the project discharge would reduce the dissolved oxygen levels approximately 3.11 ~~3.53~~percent to 4.41~~5.00~~ percent at the maximum estimated source-water dissolved oxygen concentration of 2 mg/L. Even with a dissolved oxygen concentration of 0.5 mg/L in the source water, the decrease in dissolved oxygen in the diluted discharge would be approximately 5.19~~5.88~~ percent and 5.51~~6.25~~ percent for ambient concentrations in Monterey Bay of 4.25 mg/L and 8.00 mg/L. The percentage decrease in dissolved oxygen would be less than 10 percent for all scenarios.

The ambient dissolved oxygen concentration in Monterey Bay near the MRWPCA outfall may be as low as 4.25 mg/L. When ambient dissolved oxygen is equal to or less than 5.0, any decrease in dissolved oxygen caused by the discharge would violate the dissolved oxygen objective of the California Ocean Plan (i.e., could be significant). Based on the calculations done in Section 4.1, Surface Water Resources, and the Ocean Plan objective, the impact to marine habitat and species would be significant. With implementation of Mitigation Measure 4.1-4c, which requires the project sponsor to develop and implement an aeration system that would provide dissolved oxygen at the MRWPCA outfall of 5.0 mg/L or higher, the impact to marine organisms would be less than significant.

In summary, the project discharge from the proposed desalination facility at North Marina could affect the marine habitat and species in Monterey Bay. Based on the discussion above, the project discharge at North Marina would result in less than significant salinity, temperature, and concentration of source water quality contaminants impacts to marine habitat and species. The impact from discharging water with low dissolved oxygen could be significant. The implementation of Mitigation Measure 4.1-4c would reduce impacts of low dissolved oxygen to a less-than-significant level. The impact of the project discharge on marine habitat and species in Monterey Bay would be less than significant.

Significance after Mitigation: Less than Significant.

4.3.5 References

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4.4 Biological Resources

4.4.1 Introduction

This chapter identifies the existing vegetation, wildlife, fisheries, and wetland resources at the Coastal Water Project sites and surrounding areas, and identifies the federal, state, and local regulations pertaining to these biological resources within the region. Marine biological resources are discussed separately in Section 4.3, *Marine Biological Resources*. The potential for the project to impact sensitive biological resources was assessed and mitigation measures were identified to reduce potentially significant impacts to a less-than-significant level.

Vegetation, wildlife, fisheries, and wetland documentation presented in this section are based on field reconnaissance surveys of the pipeline routes and facilities conducted on September 10-12, 2007 and existing sources of biological information. References used in the preparation of this section include, but are not limited to, the following sources:

- *Proponent's Environmental Assessment for the Coastal Water Project*, California American Water and RBF Consulting, 2005 (extensive text incorporated after peer review);
- *California American Water Monterey County Coastal Water Project Terrestrial Biological Resources Phase II Report*, H. T. Harvey & Associates, 2005;
- *2006 Interim California Tiger Salamander and California Red-legged Frog Protocol-Level Survey Report for the Coastal Water Project, Monterey County, California*, Denise Duffy & Associates, 2006;
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- *Monterey Peninsula Water Management District Aquifer Storage and Recovery Project (Draft EIR/EA), Jones & Stokes*, 2006.
- *Carmel River Flow Threshold Study*, Jones and Stokes, 2003a
- *Monterey Peninsula Water Management District Water Supply Project Draft Environmental Impact Report (Board Review Draft),* Jones & Stokes, 2003b;
- *Monterey Peninsula Long-Term Water Supply Contingency Plan (Plan B) Component Screening Report*, EDAW, 2000.

Other sources of information included applicable biological literature, the Monterey County General Plan (1998), the California Native Plant Society (CNPS) on-line Electronic Inventory (CNPS, 2008), and the California Department of Fish and Game's (CDFG) California Natural Diversity Data Base (CNDDB, 2008) for the Moss Landing, Marina, Salinas, Seaside, Spreckels, and Carmel Valley U.S. Geological Survey (USGS) 7.5-minute quadrangles.

4.4.2 Environmental Setting

This chapter discusses the terrestrial biological resources of the regional setting, as well as the resources identified at the specific location of the project components. The resources described include:

- Vegetation Communities and Associated Wildlife
- Wetlands and Other Waters
- Special Status Plants and Wildlife (both Federal or State Endangered or Threatened and State or Local Species of Concern)

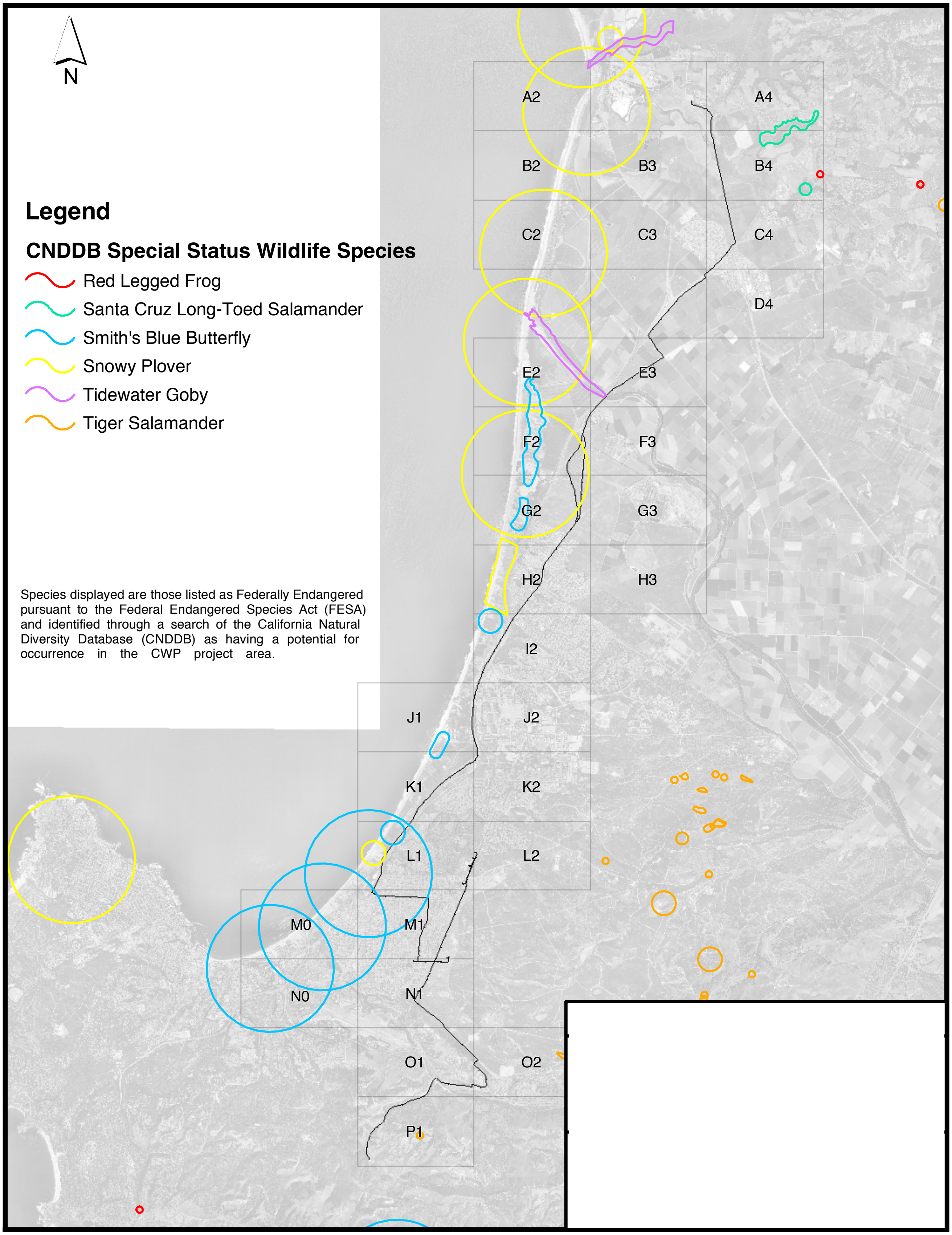
This chapter also includes a discussion of the aquatic resources of the Carmel River, even though none of the project components would be located in or near the river. However, the operations of the project would affect stream flows in the Carmel River, and therefore affect the river's aquatic biological resources.

In this chapter, and for clarity, reference to specific biological resources (such as species locations) is made through a map grid system. See **Figure 4.4-1** for an overview of the grid system. See **Table 4.4-2** on page 4.4-17 for special status species observations by grid unit.

4.4.2.1 Regional Terrestrial Biological Resources

The project area is located within Monterey County and traverses the North County, Greater Salinas, and the Greater Monterey Peninsula, a highly heterogeneous region encompassing a broad range of biological resources. The northernmost portion of the project area, including the Moss Landing Desalination Facility and associated infrastructure, is within the Pajaro River drainage basin near the outlet of Elkhorn and Moro Cojo Sloughs, which together comprise the second-largest estuary in California. Both fresh/brackish water and salt water wetlands are associated with this system. Segments of the proposed pipeline alignments skirt the coastline of the Monterey Bay National Marine Sanctuary, crossing stabilized back dune slopes near the city of Marina, as well as productive cultivated fields just inland in the Salinas River Valley. The Salinas River, draining the Gabilan and Santa Lucia Mountains to the south and east, is a perennial watercourse in its lower reaches and supports important remnants of riparian habitat. In the southern portion of the project area, the Fort Ord Reuse Authority (FORA) comprises extensive areas of relatively undisturbed maritime chaparral, a unique plant community associated with stabilized Pleistocene sand dunes. The project area in general is at the confluence of the San Francisco Bay, Central Coast, and South Coast Range floristic provinces: the flora of Monterey County are some of the most diverse in California. Finally, the Monterey Bay region represents the population range limits of many rare species endemic to northern and southern portions of the state.

In general, the project area is situated in level to gently sloped topography entirely within five miles of the ocean on the Moss Landing, Marina, Salinas, Seaside, Spreckels, and Carmel Valley



Species displayed are those listed as Federally Endangered pursuant to the Federal Endangered Species Act (FESA) and identified through a search of the California Natural Diversity Database (CNDDB) as having a potential for occurrence in the CWP project area.

SOURCE: RBF Consulting

Figure 4.4-1
CNDDB Wildlife Species

USGS Quadrangles. Elevations within the project area range from sea level to approximately 250 feet. The average annual precipitation in this portion of Monterey County ranges from 12 to 20 inches; annual temperatures average 59 degrees Fahrenheit.

4.4.2.2 Vegetation Communities and Associated Wildlife

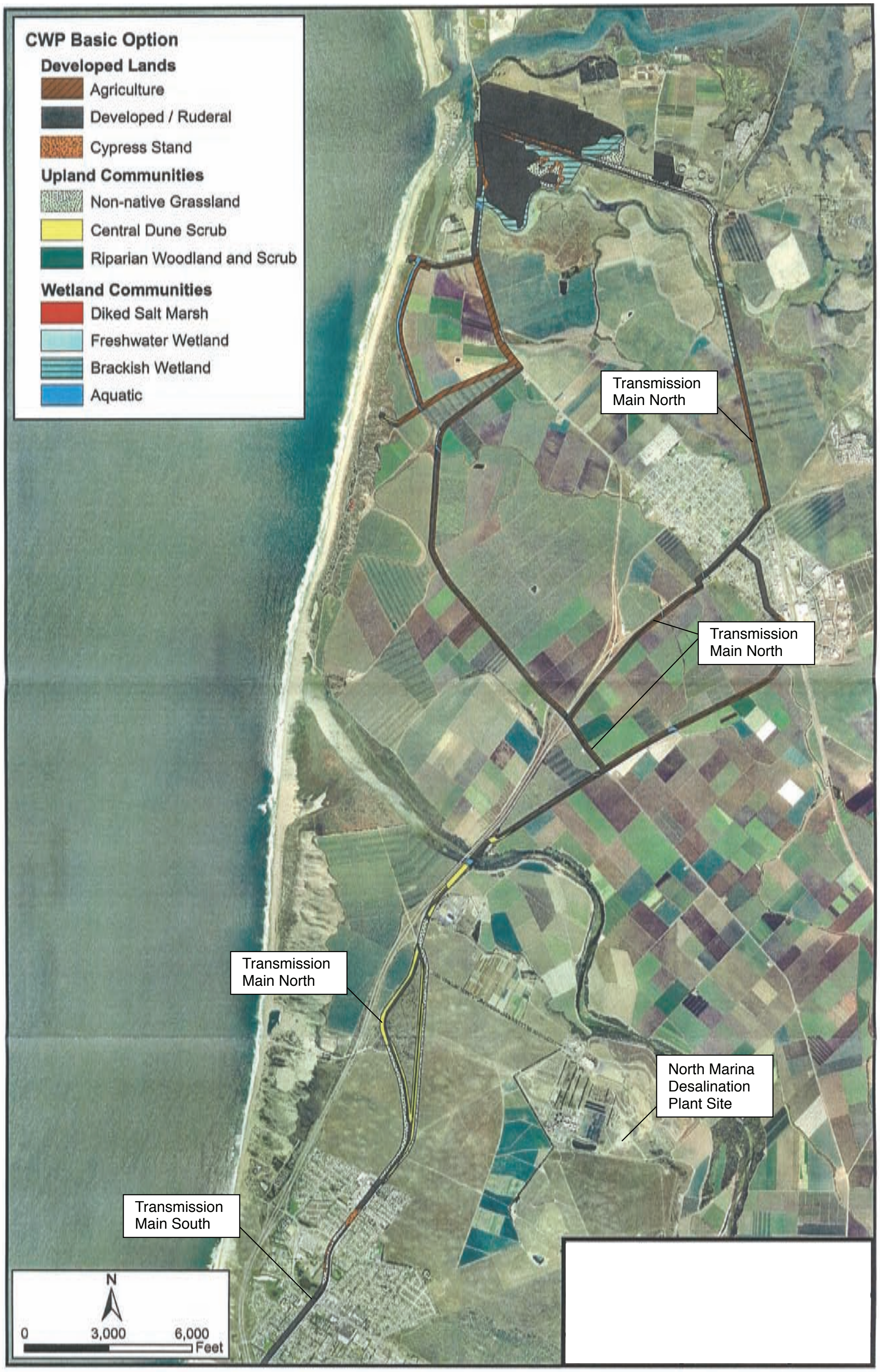
The vegetation/habitat classification presented herein is based on field observations and the CDFG *List of California Terrestrial Natural Communities Recognized by the CNDDB (*CDFG, 2003*)*. This EIR also relies on *A Manual of California Vegetation* (Sawyer and Keeler-Wolf, 1995), which maintains a more detailed inventory of terrestrial natural communities based on the dominant plant species present. Plant communities generally correlate to wildlife habitats. See **Figure 4.4-2a-c** for overview maps of vegetation communities in the northern, central, and southern project area (including the North Marina and various alternative pipeline routes). The Figure is intended as a general guide; additional and more detailed information is included in the text.

Some of the vegetation communities are sensitive natural communities are community types tracked by CDFG. The following communities occurring in the project area are considered sensitive natural communities: maritime chaparral, central dune scrub, coast live oak woodland, riparian woodland and scrub, salt marsh, and northern brackish marsh (or simply brackish marsh). These and other vegetation community types present in the region and at the project sites are described below. The section *Existing Environment at Project Sites* specifies how these types are distributed in the area of potential project impact.

Non-Native Grassland

Grassland habitat occurs south of the Salinas River from Del Monte Boulevard south to the City of Marina, and is interspersed with oak woodland, maritime chaparral, and developed areas in the southern portion of the project area. Grassland also occurs along Dolan Road and portions of the railroad ROW to the north. A sparse-to-dense community of annual pasture grasses, native wildflowers, introduced weedy forbs, and non-native grassland occurs on well-developed, finely - textured soils that are moist or waterlogged during the winter and very dry in the summer and fall. Common dominants of non-native grassland in the project area include ripgut brome (*Bromus diandrus*), annual fescue (*Vulpia myuros* ssp. *myuros*), and wild oat (*Avena fatua*); associated forbs include filaree (*Erodium botrys*), plantain (*Plantago lanceolata*), and wild radish (*Raphanus sativus*).

The diversity of plant species within this habitat varies greatly with levels of disturbance; on relatively undisturbed sites, remnant inclusions of coastal prairie may occur (none were observed on project sites or North Marina sites). Coastal prairie is one of the most endangered ecosystems in the United States and is given a high priority for conservation by the CDFG. Coastal prairie contains a significant proportion of native perennial grasses, primarily purple needlegrass (*Nassella pulchra*) and California oatgrass (*Danthonia californica*), annual grass species, and a high diversity of native forbs, including several special-status species.



SOURCE: H.T. Harvey & Associates

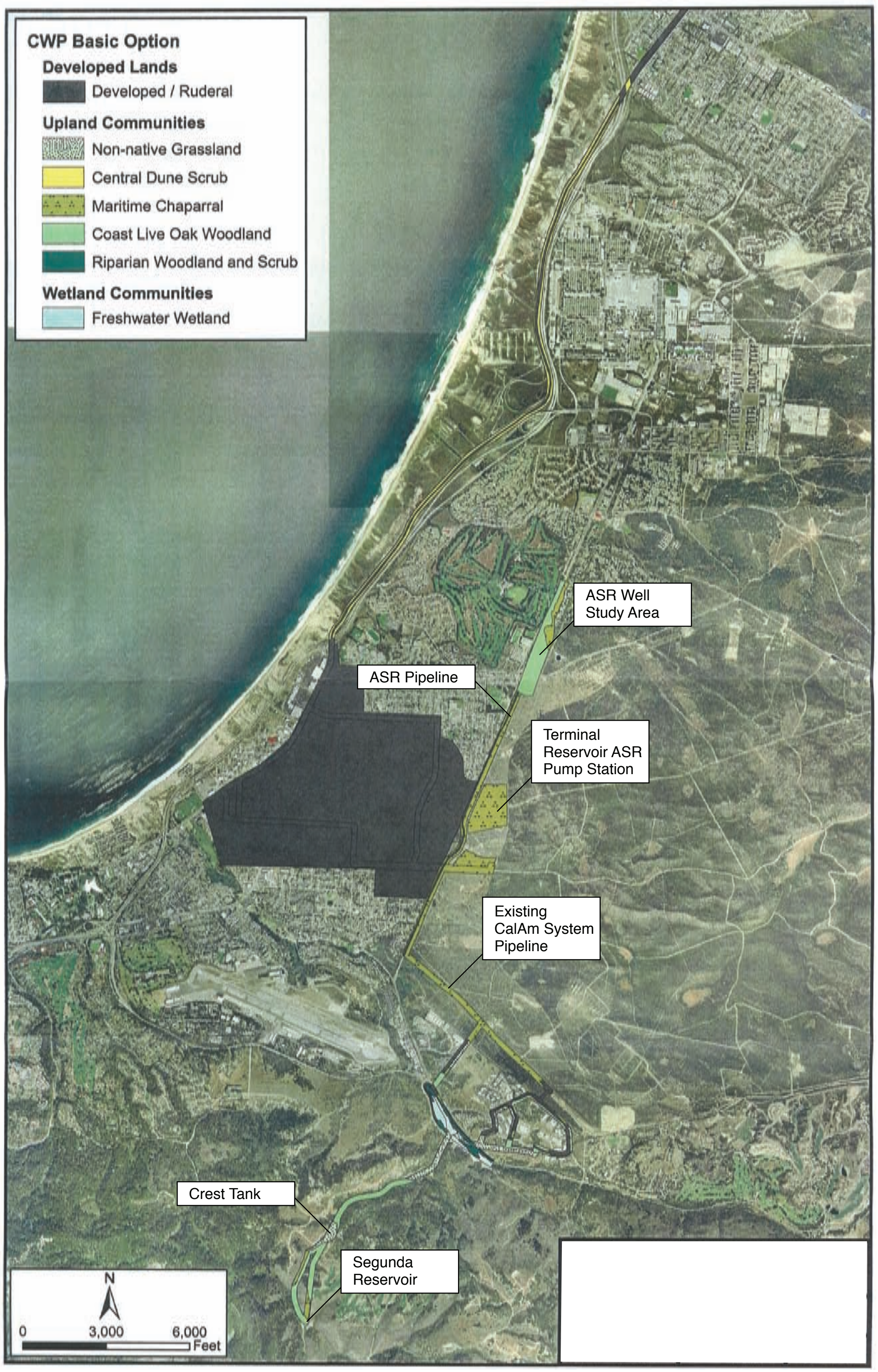
CalAm Coastal Water Project . 205335

Figure 4.4-2a
Vegetation Communities:
Northern Project Region

SOURCE: H.T. Harvey & Associates

CalAm Coastal Water Project . 205335

Figure 4.4-2b
Vegetation Communities:
Central Project Region



SOURCE: H.T. Harvey & Associates

CalAm Coastal Water Project . 205335

Figure 4.4-2c
Vegetation Communities:
Southern Project Region

Annual grassland provides little cover for wildlife, yet numerous species forage, and several species breed, in this habitat. Small mammals such as deer mice (*Peromyscus maniculatus*), California ground squirrels (*Spermophilus beecheyi*), and Botta's pocket gophers (*Thomomys bottae*) are common residents in annual grasslands in Monterey County. Larger mammals such as coyotes (*Canis latrans*) and bobcats (*Lynx rufus*) occasionally forage in this habitat as well.

A variety of birds use annual grasslands as foraging habitat, including Savannah sparrows (*Passerculus sandwichensis*), horned larks (*Eremophila alpestris*), western meadowlarks *(Sturnella neglecta*), lesser goldfinches *(Carduelis psaltria*), and barn swallows (*Hirundo rustica*). Western meadowlarks, horned larks, and mourning doves (*Zenaida macroura*) may nest in grasslands in the project area. Raptors, such as red-tailed hawks (*Buteo jamaicensis*) and northern harriers *(Circus cyaneus*) commonly forage over grasslands as well. Where ground squirrel burrows are present, burrowing owls (*Athene cunicularia*) may nest in annual grasslands, and California tiger salamanders (*Ambystoma californiense*) may be present if temporary freshwater is present for breeding. Western fence lizards *(Sceloporus occidentalis*), gopher snakes (*Pituophis melanoleucus*), and other snakes are also likely to occur in this habitat in the project area.

Central Dune Scrub

Central dune scrub occurs on stabilized backdune slopes in patches along much of the coastal strand in the project area, with dunes and central dune scrub being most developed on large dunes bordered approximately by Salinas River to the north and Marina State Beach to the south. Species characteristic of the habitat are found slightly more inland in a number of places, including to the west of Del Monte Road, north of Marina, and in small patches in undeveloped areas between Highway 1 and the ocean from Marina to Monterey. This uncommon plant community has been substantially altered in the vicinity of the proposed pipeline alignments by the encroachment of seafig and iceplant (*Carpobrotus* spp.), introduced to stabilize the shifting sands. However, some areas continue to support a dense, native scrub dominated by mock heather (*Ericameria ericoides*) and live-forever (*Dudleya caespitosa*), with beach aster (*Corethrogyne filaginifolia*), deerweed (*Lotus scoparius*), and coast buckwheat (*Eriogonum latifolium*) as important associates. On windward slopes, dune bush lupine (*Lupinus chamissonis*) and beach sagewort (*Artemisia pycnocephala*) become more prominent, while disturbed sites are colonized by coyote brush (*Baccharis pilularis*). Two endangered plant species, Monterey spineflower (*Chorizanthe pungens* var. *pungens*) and sand gilia (*Gilia tenuiflora* var. *arenaria*), colonize open sandy areas within central dune scrub within the project area.

Central dune scrub transitions to an unstable plant association of cakile (*Cakile maritima*), sand verbena (*Abronia spp*.), and beach primrose (*Camissonia cheiranthifolia*) on the active dune slopes to seaward. Yadon's wallflower (*Erysimum menziesii* ssp. *yadonii*) has potential to occur in these foredune habitats. Sand gilia, Yadon's wallflower, and Monterey spineflower may be associated with open 'blow-out' zones within foredune habitat.

Central dune scrub within the project area is likely to support several reptile species, including the southern alligator lizard (*Elgaria multicarinata*), western fence lizard, and California legless lizard (*Anniella pulchra*). Small mammals such as deer mice and brush rabbits provide prey for nonnative red foxes (*Vulpes vulpes regalis*). White-crowned sparrows (*Zonotrichia leucophrys*) are probably the most abundant breeding bird in this habitat. Horned larks and song sparrows (*Melospiza melodia*) are among other birds using this habitat. Where their host plants (*Eriogonum* sp.) are present, Smith's blue butterflies (*Euphilotes enoptes smithi*) occur in this habitat.

Central Maritime Chaparral

Central maritime chaparral is a regionally unique plant community limited to areas of sandy soils subject to summer fog. Throughout its range, maritime chaparral is dominated by endemic species of manzanita (*Arctostaphyos* spp.) and wild lilac (*Ceanothus* sp.), and supports a high proportion of other rare and endangered plants and wildlife. The former Fort Ord encompasses some of the largest, most intact areas of maritime chaparral remaining in the central coast. Maritime chaparral in the project area is unique due to its association with relict sand dunes of the mid-Pleistocene era, an extremely rare soil substrate that has been much reduced by urban development in the communities of Marina, Seaside, and Ord Village. In addition, the overall viability of this habitat is likely declining due to long-term suppression of fire and other natural disturbances, which help maintain the health and diversity of the maritime chaparral plant community. Many annual and herbaceous perennial species depend on such disturbance to control encroachment of woody species, and may now exist only in the soil seedbank. This seedbank is critical to the viability of such species; proper timing and degree of soil disturbance is therefore of primary importance.

In the project area, shaggy-barked and sandmat manzanita (*Arctostaphylos tomentosa* ssp. *tomentosa*, *A. pumila*), sticky monkeyflower (*Mimulus aurantiacus*), chamise (*Adenostoma fasciculatum*), black sage (*Salvia mellifera*), and poison oak (*Toxicodendron diversilobum*) dominate the maritime chaparral community, with many other perennials and shrubs common throughout. Special-status plants potentially occurring here are the endangered sand gilia and Monterey spineflower, among others.

Wildlife species likely to occur here include a variety of small reptiles, such as western fence lizards and alligator lizards, California horned lizards (*Phrynosoma coronatum frontale*), and California whipsnakes (*Masticophis lateralis*), as well as a variety of small mammals, including deer mice, brush mice (*Peromyscus boylei*), and black-tailed hares (*Lepus californicus*). Birds likely to occur here include the California thasher (*Toxostoma redivivium*), Western scrub-jay (*Aphelocoma californica*), wrentit (*Chamaea fasciata*), orange-crowned warbler, and Anna's hummingbird (*Calypte anna*).

Northern Coastal Scrub

Northern coastal scrub consists of a dense to moderately open shrub canopy with a sparse herbaceous understory. The dominant shrub in this community is coyote brush (*Baccharis pilularis*). Common shrub associates can also include poison oak, blue blossom (*Ceanothus thyrsiflorus*), and California coffeeberry (*Rhamnus californica*). The understory can consist of cow parsnip (*Heracleum lanatum*), bee plant (*Scrophularia californica* ssp. *californica*), California man-root (*Marah fabaceus*), common yarrow (*Achillea millefolium*), and soap plant (*Chlorogalum pomeridianum*).

In the project area, patches of northern coastal scrub occur in the Terminal Reservoir Site, the Aquifer Storage and Recovery (ASR) facilities area and the connecting pipeline corridor. Here it occurs in patches in more extensive areas of maritime chaparral, possibly reflecting the encroachment of woody species due to long-term fire suppression.

Coast Live Oak Woodland

On stable, more productive soils within maritime chaparral, patches of shrubby coast live oak woodland intergrade with dense chaparral vegetation. These woodland areas become more developed as soils transition to sandy loams on the northern portions of FORA lands, where the chaparral understory is replaced by non-native, annual grassland and oaks are the sole canopy species. Oaks vary in density from approximately 20 percent cover in savannah-like areas to more than 60 percent cover in the vicinity of Imjin Road. Coast live oak is associated with poison oak, sticky monkeyflower, common yarrow, and annual grassland species in these areas.

Oak woodlands in Monterey County support a considerable diversity of wildlife species. Mammals likely to be found here include western gray squirrels (*Sciurus griseus*) and dusky-footed woodrats, as well as other small rodents. Mule deer (*Odocoileus hemionus*) also occur in oak woodlands. Several avian species rely heavily on acorns for food, including acorn woodpeckers (*Melanerpes formicivorous*), western scrub-jays, and California quail (*Callipepla californica*). Chestnut-backed chickadees (*Poecile rufescens*), oak titmice (*Baeolophus inornatus*), Hutton's vireos (*Vireo huttoni*), dark-eyed juncos (*Junco hyemalis*), ash-throated flycatchers (*Myiarchus tuberculifer*), and Nuttall's woodpeckers (*Picoides nuttallii*) are among other birds that nest in this habitat. Several species of amphibians, such as the arboreal salamander (*Aneides lugubris*), can be found in oak woodlands, in which moisture is retained under fallen wood and in crevices in oaks. Reptiles may include the ringneck snake (*Diadophis punctatu*s) and western skink (*Eumeces skiltonianus*).

Riparian Woodland and Scrub

The Salinas River corridor supports regionally important stands of Central Coast riparian woodland and scrub. Dominant tree species in this habitat include Fremont cottonwood (*Populus fremontii*), California sycamore (*Platanus racemosa*), and valley oak (*Quercus lobata*) with subcanopies of boxelder (*Acer negundo* var. *californicum*), alder (*Alnus* sp.), and willows (*Salix* spp.) often occurring. Numerous shrubs, herbs, and vines also occur in the understory of this habitat, including mulefat (*Baccharis salicifolia*), poison hemlock, and blackberries (*Rubus* spp.). This habitat, typically consisting of several remnant individual trees, is also patchily distributed along former slough meanders along the northern alignments of the proposed pipeline.

Riparian vegetation provides habitat for a great diversity of wintering and migrating birds, such as ruby-crowned kinglets (*Regulus calendula*) and yellow-rumped warblers (*Dendroica coronata*), and breeding habitat for migrants including warbling vireos (*Vireo glivus*), orange-crowned warblers (*Vermivora celata*), and Wilson's warblers (*Wilsonia pusilla*). Downy woodpeckers (*Picoides pubescens*), black phoebes (*Sayornis nigricans*), spotted towhees (*Pipilo maculatus*), and black-headed grosbeaks (*Pheuticus melanocephalus*) are other birds typically found in mature riparian habitats. The mixed understory in this habitat supports a variety of mammals and reptiles, including raccoons, brush rabbits (*Sylvilagus bachmani*), dusky-footed woodrats (*Neotoma fuscipes*), deer mice, and garter snakes. The riparian habitat along Highway 68 could potentially support California red-legged frogs.

Developed and Agricultural Lands

Most of the project region comprises agricultural lands, rural residential property, and the municipal areas of Seaside and Marina, which provide little or no habitat for native plants and wildlife. Most of the Salinas River floodplain is regularly manipulated as crops are planted, harvested, rotated, and irrigated. Vegetation in these areas does not conform to natural habitat stages and consists primarily of non-native species adapted to disturbance, such as wild oat, bromes, mustards (*Brassica* spp.), mallows (*Malva* spp.), filarees, and others.

Developed habitats can support certain wildlife species adapted to the unique nesting and foraging opportunities found there, but wildlife abundance and diversity are generally low in this habitat. Striped skunks, raccoons, and Virginia opossums (*Didelphis virginiana*) occur regularly in urban habitats. Birds adapted to the urban landscape include house finches (*Carpodacus mexicanus*), northern mockingbirds (*Mimus polyglottos*), mourning doves, European starlings (*Sturus vulgaris*), house sparrows (*Passer domesticus*), and rock doves (*Columba livia*). Agricultural lands generally support few wildlife species because of their lack of diversity in vegetation and foraging opportunities. California ground squirrels often occur along margins of cropland, and raptors such as red-tailed hawks often forage for ground squirrels over this habitat. Fallow fields can attract other foraging birds, including Brewer's blackbirds (*Euphagus cyanocephalus*) and killdeer (*Charadrius vociferus*).

Brackish Marsh and Seasonal Wetland

Freshwater flows within creeks and sloughs in the Moro Cojo Salinas River, and Carmel River watersheds become slightly saline (brackish) in their lower reaches due to residual soil salinity and saltwater intrusions. The seasonally formed Carmel River Lagoon, at the mouth of the Carmel River, also becomes slightly saline, supporting brackish marsh. Conveyance facilities from Moss Landing to the Salinas River bisect significant, although disturbed, areas of this brackish marsh habitat. On the northern and southern sides of Dolan Road, the deepest marsh areas support freshwater plant species including cattail (*Typha latifolia*), tule (*Schoenoplectus acutus* var. *occidentalis*), and bulrush (*Bolboschoenus robustus*), while the drier, peripheral areas are colonized by the halophytic species pickleweed (*Salicornia virginica*), alkali heath (*Frankenia salina*), fat-hen (*Atriplex triangularis*), and saltgrass (*Distichlis spicata*). These mixed habitats were classified as brackish seasonal wetland, and are distinguished from diked saltmarsh (discussed below), which is dominated solely by pickleweed.

On the southern side of Dolan Road, an enhanced drainage ditch and deepwater channel (a former meander of Moro Cojo Slough) that supports freshwater emergent plants broadens into a flat, seasonally inundated plain of pickleweed and saltgrass. These species also co-dominate slightly higher seasonal wetlands on the northern side of Dolan Road, which also may support a substantial component of non-native, annual grasses during dryer years or in relatively well-drained microsites.

The special-status plants saline clover (*Trifolium depauperatum* var. *hydrophilum*) and Congdon's tarplant (*Centromadia parry*i spp. *congdonii*) potentially occur in this habitat. The transition from the deepwater habitat and associated freshwater species within remnant slough channels to peripheral halophytes and non-native grasses as drainage improves is also evident along the northern portion of the railroad alignment. Finally, perennial brackish marsh occurs at the pipeline crossings of Alisal, Tembladero, and Moro Cojo sloughs.

Wetlands provide habitat for a wide variety of animal species. Freshwater wetlands in northern Monterey County support western pond turtles (*Clemmys marmorata*) and various amphibians, including Pacific treefrogs (*Hyla regilla*) and California red-legged frogs (*Rana aurora draytonii*). Several species of birds forage in aquatic habitats, including snowy egrets (*Egretta thula*) and other waders, American white pelicans (*Pelecanus erythrorhynchos*), and many species of waterfowl. Red-winged blackbirds (*Agelaius phoeniceus*), tricolored blackbirds (*Agelaius tricolor*), and common yellowthroats (*Geothlypis trichas*) are among bird species that nest in vegetation surrounding wetlands. Small mammals, such as raccoons (*Procyon lotor*) and striped skunks (*Mephitis mephitis*), are likely to be found near wetlands, as well as several reptile species, especially garter snakes (*Thamnophis* spp.). Where wetlands are more brackish, fewer amphibians are likely to occur. Most amphibians do not tolerate salinities greater than a few parts per thousand, and pond turtles are also less common in brackish wetlands.

Freshwater Marsh

Small, isolated patches of freshwater emergent vegetation have colonized several drainage ditches and remnant creek channels in the northern portion of the project area. Although the hydrology of these features is now largely artificial, cattail, tule, and bulrush are well established in one area near Merritt Road. A roadside drainage ditch north of Salinas Street in the City of Seaside supports a mixed community of ruderal hydrophytes, such as umbrella nut-sedge (*Cyperus eragrostis*), poison hemlock (*Conium maculatum*), and bristly ox-tongue (*Heminthotheca echioides*), as well as non-native annual grasses. These habitats could support Pacific treefrogs and other common wetland-associated wildlife species.

Saltmarsh

Extensive areas of diked northern coastal saltmarsh occur north and west of the project area within Elkhorn and lower Moro Cojo Sloughs and at the Salinas River Lagoon and much of the northern portion of the proposed Transmission Main North that would pass through former tidal marsh. Installation of tidal-water control structures, channelization of the Salinas River, and conversion of area sloughs to agricultural practices during the last century have dramatically reduced the extent of this habitat in the region. Saltmarshes are unique vegetation communities that occur along the wave-sheltered margins of bays, lagoons, and estuaries, where strongly saline soils and the tidal cycle of inundation and drying limit plant diversity to a few halophytic species. In the Elkhorn/Moro Cojo Slough system, pickleweed is the sole dominant species, with fleshy jaumea (*Jaumea carnosa*) as an infrequent associate. High marsh occupies the ecotone between marsh and upland vegetation and is dominated by the facultative wetland plants alkali heath, saltgrass, and fat-hen. As discussed earlier, these areas were classified as brackish marsh. Ditches on either side of the railroad ROW continue to support remnant patches of pickleweed, and a large, relatively undisturbed expanse of this habitat occurs on the eastern side of the proposed pipeline alignment, just south of the Moro Cojo Slough crossing. Saltmarsh also occurs along the old Salinas River channel in the vicinity of the northern potential sea water wells under the Regional Project alternative.

Extensive saltmarshes near the project area, at the Salinas River mouth, and at Elkhorn Slough support substantial wildlife populations. The limited saltmarsh in the project area, however, is likely to support a lower abundance and diversity of wildlife. Foraging snowy egrets and great egrets (*Ardea alba*) are fairly common at Moro Cojo Slough, as are waterfowl, including Mallards (*Anas platyrhynchos*). At certain times of the year, American coots (*Fulica americana*) and red-necked phalaropes (*Phalaropus lobatus*) can be abundant here as well. Black-necked stilts (*Hemantopus mexicanus*) are abundant and likely nest here. Other wildlife species likely to occur include the western harvest mouse (*Reithrodontomys megalotis*) and several species of garter snake.

Aquatic

The bed and banks of Moro Cojo Slough, the Salinas River, and the Carmel River provide open aquatic habitat. Both the Salinas and Carmel rivers contain freshwater upstream of their respective lagoons. Moro Cojo Slough is brackish to saline where open water occurs. Several species of fish are likely to occur in the freshwater portions of the Salinas and Carmel rivers, including steelhead (*Onchorhynchus mykiss*), hitch (*Lavinia exilicauda*), Sacramento sucker (*Catostomus occidentalis*), and three-spine stickleback (*Gasterosteus aculeatus*). Tidewater gobies (*Eucuclogobius newberryi*) have been observed recently in Moro Cojo Slough (CNDDB, 2007) and could potentially occur in the lower Salinas River and Elkhorn Slough (including Moss Landing Harbor). Amphibians, such as California red-legged frogs occur in this habitat as well. In brackish and saline habitats, fish species could include topsmelt (*Atherinops affinis*), shiner surfperch (*Cymatogaster aggregata*), Pacific herring (*Clupea pallasi*), and starry flounder (*Platichtys stellatus*). For further detail, see Section 4.3 (Marine Biological Resources) and the discussion of the fisheries resources of the Carmel River, below.

4.4.2.3 Wetlands and Other Waters

Wetlands are ecologically productive habitats that support a rich variety of both plant and animal life. The importance and sensitivity of wetlands has increased as a result of their value as recharge areas and filters for water supplies and widespread filling and destruction to enable urban and agricultural development.

Project-area wetland and aquatic resources potentially under the jurisdiction of the U.S. Army Corps of Engineers (USACE) and California Coastal Commission (CCC) include Moro Cojo, Tembladero and Alisal Sloughs and associated brackish wetlands, as well as the Salinas River. **Table 4.4-1** summarizes the location, size, and type of these jurisdictional areas for the Moss Landing Project region, and represent the majority of the jurisdictional areas for the alternatives as well. However, the table is intended to display the extent of the resource and not actual impacts to it: additional and more detailed delineation work will be required (see Mitigation Measure 4.4-3). The regulatory jurisdiction within "other waters" (e.g., rivers, streams, and natural ponds) extends to the ordinary high water mark on opposing channel banks in non-tidal areas and to the high tide line in tidal areas. The ordinary high water mark is typically indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in character of soil, destruction of vegetation, exposed roots on the bank, deposition of leaf litter and other debris materials or lower limit of moss growth on banks.

TABLE 4.4-1
POTENTIAL CORPS JURISDICTIONAL AREAS IN THE MOSS LANDING PROJECT AREA

Wetland Type	Acres
Seasonal brackish marsh	46.54
Seasonal swale	1.44
Brackish marsh	5.39
Diked saltmarsh	1.15
Seasonal brackish marsh	18.26
Seasonal brackish marsh	0.50
Drainage ditch	0.58
Tembladero Slough crossing	0.31
Alisal Slough crossing	0.32
Alisal Slough crossing	1.06
Tembladero Slough crossing	0.36
Freshwater marsh	1.65
Salt marsh/open aquatic	11.35
Alisal Slough crossing	0.52
Agricultural ditches	0.30
Salinas River Crossing	1.08
Seasonal swales	15.40

SOURCE: Harvey, 2005

Where wetlands are present in non-disturbed settings, USACE jurisdiction extends to the limit of the wetland, as defined by the "three-parameter approach:" hydrophytic vegetation, hydric soils, and wetlands hydrology. The exception to identifying such habitats by three parameters is in the instance that Farmed Wetlands (i.e., wetlands that were drained, dredged, filled, or otherwise manipulated before December 23, 1986), occur within agricultural fields of the alignments. An "exception to the exception" occurs when hydric (water-influenced) soils underlie the feature. Several hydric soils occur within the study area (including Alviso, Clear Lake and Pacheco) and despite on-going agricultural activities in these fields the USACE may claim jurisdiction over activities deemed outside of normal farming practices (not normally disked or planted).

In contrast, CCC jurisdiction may extend to the limit of any one of the above parameters and therefore typically is much broader than USACE jurisdiction.

4.4.2.4 Wildlife Movement Corridors

Wildlife movement corridors link together areas of suitable wildlife habitat that are otherwise separated by rugged terrain, changes in vegetation, or by areas of human disturbance or urban development. Topography and other natural factors in combination with urbanization have fragmented or separated large open-space areas. The fragmentation of natural habitat creates isolated "islands" of vegetation that may not provide sufficient area to accommodate sustainable populations and can adversely impact genetic and species diversity. Movement corridors offset the effects of this fragmentation by allowing animals to move between remaining habitats, which in turn allows depleted populations to be replenished and promotes genetic exchange with separate populations. Within the project area, streams and drainages such as Moro Cojo, Tembladero, and Alisal Sloughs and the Salinas River serve as primary corridors for wildlife moving through agricultural and/or developed habitats.

4.4.2.5 Special Status Species

A number of species known to occur in the vicinity of the project area are protected pursuant to federal and/or State endangered species laws. In addition, Section 15380(b) of the California Environmental Quality Act (CEQA) Guidelines provides a definition of rare, endangered or threatened species that are not included in any listing[1]. Species recognized under these terms are collectively referred to as "special-status species." For purposes of this Draft EIR, special-status species include:

- Plant and wildlife species listed as rare, threatened or endangered under the federal or State endangered species acts;
- Species that are candidates for listing under either federal or State law;
- Species formerly designated by the USFWS as Species of Concern[2] or by CDFG as Species of Special Concern;
- Species protected by the federal Migratory Bird Treaty Act (16 U.S.C. 703-711);
- Bald and golden eagles protected by the federal Bald Eagle Protection Act (16 U.S.C. 668); and

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[1] For example, vascular plants listed as rare or endangered or as List 1 or 2 by the CNPS are considered to meet Section 15380(b).

[2] Federal Species of Concern is an informal term not defined in the federal Endangered Species Act. The Ventura Fish and Wildlife Office no longer uses this designation and recently stopped maintaining Species of Concern lists. Many former Federal Species of Concern are considered sensitive by CDFG and other agencies. Thus, former Federal Species of Concern are considered in this EIR.

- Species such as candidate species that may be considered rare or endangered pursuant to Section 15380(b) of the CEQA Guidelines.

Table 4.4-2 lists 34 special status plant species and 45 special status wildlife species reported to occur in the project area based on data in the California Natural Diversity Database (CDFG, 2008), California Native Plant Society (CNPS) Electronic Inventory (CNPS, 2008), special status species information from the U.S. Fish and Wildlife Service (USFWS, 2008), biological literature of the region, previous EIRs for other projects in the project vicinity (California American Water and RBF Consulting, 2005; H. T. Harvey & Associates, 2005; Jones & Stokes, 2003), and recent focused botanical surveys (Denise Duffy & Associates, 2007). Special status plants and wildlife are evaluated in this document based on a plausible likelihood of habitat loss or construction-related disturbance occurring during the implementation of the project. Special-status species with a moderate or higher potential to occur within the project area are included below.

Six plant species listed under the State or Federal endangered species acts potentially occur within the project area (see Table 4.4-2). These plants, sand gilia, seaside bird’s-beak (*Cordylanthus rigidus* var. *littoralis*), Yadon’s wallflower, Monterey spineflower, robust spineflower (*Chorizanthe pungens* var. *robusta*,) and Yadon’s rein orchid (*Piperia yadonii*), are endemic to sandy soils within maritime chaparral, dune scrub, and oak woodland along the coast of Monterey Bay. Eleven additional special-status (CNPS List 1B) species potentially occur in the project area.

Six federally listed animal species or species proposed for federal listing could potentially be affected by project implementation (see Table 4.4-2 and also the discussion of the Carmel River, below). Steelhead are known to occur in the Salinas River and Carmel river. Tidewater gobies (*Eucyclogobius newberryi*) have been found recently in Coro Mojo Slough and historically at the mouth of the Salinas River and Elkhorn Slough, where they could still occur. Three amphibians, the California tiger salamander, Santa Cruz long-toed salamander (*Ambystoma macrodactylum croceum*), and California red-legged frog occur in freshwater habitats in the project area. Long-toed salamanders are restricted to the area around Moss Landing (including Moro Cojo Slough), but the other two species occur throughout the area. Special-status amphibians are likely to occur in the freshwater marsh on Dolan Road, and, to a lesser extent, in grassland habitat south of the Salinas River. The remaining Federally listed species, the Smith’s blue butterfly, occurs only where its host plant, a native buckwheat, occurs. This plant species is known to occur to the west of Highway 1 in Seaside and Marina, but may also occur east of General Jim Moore Boulevard on the former Fort Ord.

In addition, eight non-listed special-status bird species, three special-status mammals, and three special-status reptiles are known to occur in the project area. Numerous native birds also are likely to occur in the project area. These birds, protected under the MBTA and the California Fish and Game Codes, are likely to nest locally from March through August, with most nesting occurring April through July.

TABLE 4.4-2
SPECIAL-STATUS SPECIES CONSIDERED FOR THE COASTAL WATER PROJECT AREA

Name	Status*	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
FEDERAL OR STATE ENDANGERED OR THREATENED SPECIES				
Plants				
Coastal dunes milk-vetch (*Astragalus tener var. titi*)	FE, SE, CNPS 1B.1	Coastal dunes, sandy areas in coastal bluff scrub, and mesic areas in coastal prairie habitats.	Known currently from only Monterey Penninsula.(near Pebble Beach)	Unlikely. Species not identified within project area.
Monterey spineflower (*Chorizanthe pungens var. pungens*)	FT, CNPS 1B.2	Sandy soils in maritime chaparral, cismontane woodland, coastal dunes, coastal scrub, and valley and foothill grassland habitats.	Documented on former Fort Ord lands and within sandy dunes west of Highway 1 in northern Monterey County. Occurs on sandy soils in grassland inland of Elkhorn Slough.	Present. CNDDB identified occurrences within grid units A3, M2, H2, M0, M1, L1, C4, D3, D4, I2, J1, J2, K1, K2, N1, and O2; observed in 2007 botanical survey within gridsheets F2, G2, L1, K1, J1, and I2.
robust spineflower (*Chorizanthe robusta var. robusta*)	FE, CNPS 1B.1	Sandy or gravelly soils in coastal dunes, coastal scrub, and openings in cismontane woodland habitats.	Apparently now limited to Santa Cruz County, but reportedly occurred on coastal strand in vicinity of Seaside (in addition to coastal sites in Marin County).	Low-Moderate. CNDDB identified potential occurrence within grid units C2, C3, C4,D4, D3, E3, F3, F2, G2, G3, J1, J2, H2, K2, and L2. Not observed in 2007 botanical surveys.
seaside bird's-beak (*Cordylanthus rigidus ssp. littoralis*)	SE, CNPS 1B.1	In areas with sandy soils and often in disturbed sites within closed-cone coniferous forest, maritime chaparral, cismontane woodland, coastal dunes, and coastal scrub habitats.	Documented in central and eastern portions of former Fort Ord lands and on sandy dunes west of Highway 1 near Seaside.	Low-Moderate. CNDDB identified potential occurrence within grid units B3, B4, C3, C4, D4, M0 L1, K1, M1, and N1. Not observed in 2007 botanical surveys.
Gowen cypress (*Cupressus goveniana ssp. goveniana*)	FT, CNPS 1B.2	Closed-cone coniferous forest and maritime chaparral habitats.	Del Monte Forest, Point Lobos, and Pacific Grove area.	Unlikely. Species not identified by CNDDB within project area.
Menzies's wallflower (*Erysimum menziesii ssp. menziesii*)	FE, SE, CNPS 1B.1	Coastal dune habitat.	Pacific Grove and Asilomar State Beach area.	Unlikely. Not observed in 2007 botanical surveys.
Yadon's wallflower (*Erysimum menziesii ssp. yadonii*)	FE, SE, CNPS 1B.1	Coastal dune habitat.	Active dunes at Salinas River mouth south to Sand City.	Moderate. CNDDB identified occurrences within grid units F2, G2, H2. Potential occurrence along the Salinas River to the Terminal Reservoir pipeline. Not observed in 2007 botanical surveys.
sand gilia (*Gilia tenuiflora ssp. arenaria*)	FE, ST, CNPS 1B.2	Sandy soils and openings in maritime chaparral, cismontane woodland, coastal dunes, and coastal scrub habitats.	Central dune scrub (stabilized) west of Highway 1 and maritime chaparral on former Fort Ord	Moderate. CNDDB identified potential occurrence within grid units A1, A3, C2, F2, G2, J2, B2, B3, H2, I2, L1, L2, M0, M1, and N1.

TABLE 4.4-2 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE COASTAL WATER PROJECT AREA

Name	Status*	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
FEDERAL OR STATE ENDANGERED OR THREATENED SPECIES (cont.)				
Plants (cont.)				
Santa Cruz tarplant (*Holocarpha macradenia*)	FT, SE, CNPS 1B.1	In sandy and often clayey soils in coastal prairie, coastal scrub, and valley and foothill grassland.	North of project area on coastal terraces in Watsonville and Santa Cruz.	Unlikely. Species not identified by CNDDB within project area. Southern limit of species range is north of project area.
Contra Costa goldfields (*Lasthenia conjugens*)	FE, CNPS 1B.1	Mesic areas in cismontane woodland, alkaline playas, valley/foothill grassland, and vernal pools.	In vernal pools and wet depressions on eastern portion of former Fort Ord lands.	Unlikely. Species not identified by CNDDB within project area
beach layia (*Layia carnosa*)	FE, SE, CNPS 1B.1	Coastal dune and sandy coastal scrub habitats.	Partially stabilized dunes along the Monterey peninsula (Pacific Grove to Carmel)	Unlikely. Species not identified by CNDDB within project area.
Tidestrom's lupine (*Lupinus tidestromii*)	FE, SE, CNPS 1B.1	Coastal dune habitat.	Partially stabilized dunes along the Monterey peninsula (Pacific Grove to Carmel)	Unlikely. Species not identified by CNDDB within project area.
11	FE, CNPS 1B.1	Sandy soils in coastal bluff scrub, closed-cone coniferous forest, and maritime chaparral.	Documented on former Fort Ord lands west of Highway 1, stabilized dunes near Marina.	Low-Moderate. CNDDB identified potential occurrence within grid units I2 and O1. Not observed in 2007 botanical surveys.
Hickman's cinquefoil (*Potentilla hickmanii*)	FE, SE, CNPS 1B.1	Coastal bluff scrub, closed-cone coniferous forest, vernally mesic meadows and seeps, and freshwater marshes and swamps.	Known from understory of Monterey Pine forest on the Monterey peninsula.	Unlikely. Species not identified by CNDDB within project area.
Monterey clover (*Trifolium trichocalyx*)	FE, SE, CNPS 1B.1	Openings or burned areas in closed-cone coniferous forest habitat with sandy soils.	Known from understory of Monterey Pine forest on the Monterey peninsula.	Unlikely. Species not identified by CNDDB within project area.
Invertebrates				
Vernal pool fairy shrimp (*Branchinecta lynchi*)	FT	Ephemeral freshwater vernal pools.	Distribution poorly known. Not recorded in northern Monterey County. No vernal pool habitat within project area; presumed absent.	Potential unlikely. Species not identified by CNDDB within project area.
Smith's blue butterfly (*Euphilotes enoptes smithi*)	FE	Dune habitats with host buckwheat plants.	Occurs west of Highway 1 at Fort Ord; could occur elsewhere if host plant occurs.	Moderate CNDDB identified potential occurrence within grid units F2, G2, H2, J1, L1, I1, I2, K1, and M1.
Fish				
Tidewater goby (*Eucyclogobius newberryi*)	FE, CSSC	Shallow lagoons and lower stream reaches with fairly still, but not stagnant water.	Known to occur in Moro Cojo Slough. May be present in the Salinas River Lagoon and Elkhorn/Bennett Slough.	Present. Known to occur in Moro Cojo Slough (A3, E3).

TABLE 4.4-2 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE COASTAL WATER PROJECT AREA

Name	Status*	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
FEDERAL OR STATE ENDANGERED OR THREATENED SPECIES (cont.)				
Fish (cont.)				
Steelhead, south-central California coast DPS (*Onchorhynchus mykiss*)	FT, CSSC	Free-flowing coastal rivers and streams. Spawning habitat: clear, cool streams with overhanging vegetation.	Occurs in coastal watersheds from the Pajaro River south to, but not including, the Santa Maria River.	Present. Know to occur within the Salinas River and Carmel River watersheds.
Amphibians				
Santa Cruz Long-toed Salamander (*Ambystoma macrodactylum croceum*)	FE, SE	Freshwater wetlands with surrounding riparian vegetation in the Pajaro Valley and Moss Landing areas.	Records east of Moss Landing, primarily in upper Moro Cojo Slough. Could occur in suitable habitat near Moss Landing.	Low potential. Stream crossings in northern project area. Identified by CNDDB within grid units A4, B4, and C4.
California Tiger Salamander (*Ambystoma californiense*)	FT, CSSC, SP	Vernal or temporary pools in annual grasslands, or open stages of woodlands. Typically burrows in ground squirrel burrows.	Found in grasslands and aquatic habitats on eastern Fort Ord.	Low potential. Identified by CNDDB within grid units A4, B4, and C4. No occurrences identified within project footprint. Could occur where habitat is suitable at areas of proposed stream crossings and wetlands.
California Red-legged Frog (*Rana aurora draytoni*)	FT, SP, CSSC	Streams, freshwater pools and ponds with overhanging vegetation. Requires pools of >0.5 m depth for breeding.	Suitable habitat may be absent from the project area, but where freshwater habitat is present, this species could occur	Moderate potential. Identified by CNDDB within grid units B4 and C4. No occurrences identified within project footprint. Could occur where habitat is suitable at areas of proposed stream crossings and wetlands.
Birds				
Brown Pelican (*Pelecanus occidentalis*)	FE, SE	Forages and roosts in coastal marine habitats. Does not breed locally.	No suitable habitat in project area.	Potential unlikely.
California Condor (*Gymnogyps californianus*)	FE, SE	Forages for carrion over a variety of open habitats.	Reintroduction program recently initiated at Big Sur. Foraging individuals could occur in northern Monterey County.	Potential unlikely. The project would not occur in areas of substantial foraging habitat.
Western Snowy Plover (*Charadrius alexandrinus nivosus*)	FT	Resident on coastal beaches and salt panne habitat.	No suitable habitat in project area.	Potential unlikely. CNDDB identified potential occurrence within grid units A3, B2, C2, C3, D3, F2, F3, G2, L1and B3.
American Peregrine Falcon (*Falco peregrinus*)	FD, SE	Forages for other birds over a variety of habitats. Breeds primarily on rocky cliffs.	Foraging individuals could occur throughout the project area. Does not currently nest in the project area.	Potential for occurrence of foraging individuals. The project would not occur in areas of substantial foraging habitat

TABLE 4.4-2 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE COASTAL WATER PROJECT AREA

Name	Status*	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
FEDERAL OR STATE ENDANGERED OR THREATENED SPECIES (cont.)				
Birds (cont.)				
Bald Eagle (*Haliaeetus leucocephalus*)	FD, SE	Forages in rivers and lakes for large fish. Does not breed locally.	Wintering birds could occur as occasional foragers, e.g., at the Salinas River.	Potential for occurrence of foraging individuals. The project would not occur in substantial foraging habitat
Southwestern Willow Flycatcher (*Empidonax trailii extimus*)	FE, SE	Breeds in mature riparian habitat. Now extirpated from coastal California.	No recent records of breeding birds west of the San Joaquin Valley. Migrant Willow Flycatchers in Monterey County would almost certainly be northern-breeding, unlisted, subspecies. Presumed absent.	Potential unlikely. Species not identified in project area.
Least Bell's Vireo (*Vireo bellii pusillus*)	FE, SE	Breeds in thick willow riparian groves. Range, once thought to be limited to southern California, is expanding.	Historic and a few more recent records from the Salinas River south of Greenfield.	Low, but species range is expamding.
Bank Swallow (*Riparia riparia*)	ST	Nests in colonies in sandy banks along riparian habitat.	No recent nesting records in northern Monterey County. Assumed absent during nesting season. Could forage at site during migration.	CNDDB identified potential occurrence within grid unit A3.
STATE SPECIES OF SPECIAL CONCERN				
Fish				
River lamprey *(Lampetra ayresi*)	CSSC	Sandy or loose, loamy soils, including stream terraces and coastal dunes.	Occur in large coastal streams and rivers from Alaska to San Francisco Bay, including the Sacramento-San Joaquin River system.	Moderate. Reported from the Carmel River, but possibly as result of misidentification. project Area is generally believed to be outside the known distribution range of the species.
Pacific lamprey *(Lampetra tridentata*)	--	Muddy bottoms, backwater areas, and low gradient areas of streams and rivers,	Pacific coast streams from Alaska to Baja California.	High. Reported from the Carmel River and Salinas River.
Reptiles and Amphibians				
Western pond turtle (*Clemmys marmorata*)	CSSC, SP	Permanent or nearly permanent water in a variety of habitats.	No records within the project area, but could occur where suitable habitat occurs (e.g., the Salinas River).	No occurrences identified within project footprint. Could occur where habitat is suitable at areas of proposed stream crossings and wetlands.
California legless lizard (*Anniella pulchra*)	CSSC	Adults need clean, gravelly riffles in permanent streams for spawning, while the ammocoetes require sandy backwaters or stream edges in which to bury themselves	Occurs in sandy soils throughout the project area. Records from Moss Landing, Fort Ord.	Potentially occurring.

TABLE 4.4-2 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE COASTAL WATER PROJECT AREA

Name	Status*	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
STATE SPECIES OF SPECIAL CONCERN (cont.)				
Reptiles and Amphibians (cont.)				
California horned lizard (*Phynosoma coronatum frontale*)	CSSC	Exposed, gravely-sandy substrates, usually containing scattered shrubs, clearings in riparian woodlands.	Likely to occur in sandy soils on Fort Ord and elsewhere in the project area.	Moderate potential. CNDDB identified potential occurrence within grid units G2, G3, and H2.
Birds				
American White Pelican (*Pelecanus erythrorhynchos*)	CSSC (nesting)	Breeds primarily in Great Basin, summer visitor to the Central Valley and coastal California.	Summer visitor to local wetlands.	Potentially occurring.
Double-crested Cormorant (*Phalacrocorax auritus*)	CSSC (nesting)	Nests colonially in trees or on cliffs near water. Forages in aquatic and marine habitats.	No breeding habitat in project area. Could occur as occasional forager.	Potential unlikely.
White-faced Ibis (*Plegadis chihi*)	CSSC (nesting)	Forages in wetland and agricultural habitats.	Does not breed locally. Could occasionally forage in project area.	Potential for occurrence of foraging individuals. The project would not occur in substantial foraging habitat
Burrowing Owl (*Athene cunicularia*)	CSSC	Grassland habitat with ground squirrel burrows (used for nesting).	Not currently known to breed in the project area, but suitable habitat is present. Could potentially nest in the area.	CNDDB identified potential occurrence within grid units A3, A4, B4, H2, and I2.
Northern Harrier (*Circus cyaneus*)	CSSC (nesting)	Forages in open to herbaceous stages of many habitats. Breeds in marshes and prairies.	Likely to forage over a variety of open habitats, could breed in undisturbed marshy habitats in the project area.	Potential for occurrence of foraging individuals. The project would not occur in undisturbed marshy habitats.
Cooper's Hawk (*Accipiter cooperii*)	CSSC (nesting)	Breeds in riparian woodlands and wooded canyons.	Unlikely to breed in the project area. Could occasionally forage throughout the area.	Potential for occurrence of foraging individuals. The project would not occur in substantial foraging habitat
Sharp-shinned Hawk (*Accipiter striatus*)	CSSC (nesting)	Nests in woodlands, forages in many habitats in winter and migration.	Winter visitor. Forages primarily over riparian and other wooded habitats.	Potential for occurrence of foraging individuals. The project would not occur in substantial foraging habitat
Osprey (*Pandion haliaetus*)	CSSC (nesting)	Forages and breeds near rivers and lakes.	Does not currently breed locally. Could forage at local rivers.	Potential for occurrence of foraging individuals. The project would not occur in substantial foraging habitat
Golden Eagle (*Aquila chrysaetos*)	CSSC, SP	Breeds on cliffs or in large trees or structures.	Does not breed locally. Regular forager over grassland habitat in the Salinas Valley, including Armstrong Ranch.	Potential for occurrence of foraging individuals. The project would not occur in substantial foraging habitat

TABLE 4.4-2 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE COASTAL WATER PROJECT AREA

Name	Status*	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
STATE SPECIES OF SPECIAL CONCERN (cont.)				
Birds (cont.)				
Ferruginous Hawk (*Buteo regalis*)	CSSC	Forages in grasslands and occasionally in other open habitats during migration and winter.	Uncommon winter visitor. Forages over grasslands and other open habitats.	Potential for occurrence of foraging individuals. The project would not occur in substantial foraging habitat
Prairie Falcon (*Falco mexicanus*)	CSSC (nesting)	Resident in dry open country, additional migrants in winter.	Does not breed locally. Uncommonly forages over grasslands and other open habitats	Potential unlikely.
Merlin (*Falco columbarius*)	CSSC	Uses many habitats in winter and migration.	Winter visitor. Could forage over a variety of habitats throughout project area.	Potential for occurrence of foraging individuals. The project would not occur in substantial foraging habitat
Mountain Plover (*Charadrius montanus*)	CSSC	Breeds in great plains, winters in Central Valley and other flat open habitats in California.	Rare winter visitor to Monterey County. Could occur on agricultural fields and other open habitats.	Potential unlikely.
Long-billed Curlew (*Numenius americanus*)	CSSC (nesting)	Forages in coastal wetlands and agricultural fields.	Does not breed locally. Could forage in several habitats in Project area.	Potential for occurrence of foraging individuals. The project would not occur in substantial foraging habitat.
California Gull (*Larus californicus*)	CSSC (nesting)	Nests in the Great Basin and San Francisco Bay area. Winters along the Pacific Coast and the Central Valley.	Common winter visitor in coastal, agricultural, and developed habitats.	Potential for occurrence. The project would not occur in substantial nesting habitat.
Vaux's Swift (*Chaetura vauxi*)	CSSC (nesting)	Nests in snags in coastal coniferous forests or, occasionally, in chimneys; forages aerially.	Likely to be present only during migration (spring and fall). Uncommon.	Low potential for occurrence in project area. The project would not occur in coniferous forest or substantial foraging habitat.
Black Swift (*Cypseloides niger*)	CSSC (nesting)	Nests on wet cliffs, often behind waterfalls. Forages aerially.	Likely to be present only during migration (spring and fall). Rare.	Potential unlikely.
California Horned Lark (*Eremophila alpestris actia*)	CSSC	Short-grass prairie, annual grasslands, coastal plains, and open fields.	Could forage and nest in grassland habitats within the project area.	Potential for occurrence of foraging individuals. The project would not occur in substantial foraging habitat.
Tricolored Blackbird (*Agelaius tricolor*)	CSSC (nesting)	Breeds near freshwater in dense emergent vegetation.	Could nest in suitable habitat near or within the project area.	Potential for occurrence near stream crossing.
California Yellow Warbler (*Dendroica petechia brewsteri*)	CSSC (nesting)	Breeds in riparian woodland and meadow edges.	Uncommon breeder in mature riparian areas.	Potential unlikely.

TABLE 4.4-2 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE COASTAL WATER PROJECT AREA

Name	Status*	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
STATE SPECIES OF SPECIAL CONCERN (cont.)				
Birds (cont.)				
Yellow-breasted Chat (*Icteria virens*)	CSSC (nesting)	Breeds in extensive riparian woodland habitat.	Uncommon breeder in mature riparian areas.	Low.
Loggerhead Shrike (*Lanius ludovicianus*)	CSSC (nesting)	Resident in dry open grasslands.	Uncommon resident in scrubby habitats.	Potential unlikely.
Mammals				
Monterey dusky-footed woodrat (*Neotoma fuscipes Luciana*)	CSSC	Riparian and other brushy habitats.	Could occur along the Salinas River.	Potentially occurring at the location of the Salinas River crossing.
Monterey shrew (*Sorex ornatus salicornius*)	CSSC	Riparian and other brushy habitats.	Distribution poorly known. Could occur in a variety of habitats in the project area.	Potentially occurring at the location of stream crossings.
American badger (*Taxidea taxus*)	CSSC	Grasslands and other open habitats with friable soils.	No records within the project area. Presumed absent.	Potential unlikely.
Pallid bat (*Antrozous pallidus*)	CSSC	Forages over many habitats.	Status in the project area unknown.	No occurrences identified within project area. The project would not impact substantial foraging habitat.
STATE PROTECTED SPECIES OR CNPS SPECIES				
Plants				
Hickman's onion (*Allium hickmanii*)	CNPS 1B.2	Closed-cone coniferous forest, maritime chaparral, coastal prairie, coastal scrub, and valley and foothill grassland habitats.	Scattered locations from southern Monterey Peninsula to eastern portion of former Fort Ord.	Low-Moderate. CNDDB records in grid unit O1.
Hooker's manzanita (*Arctostaphylos hookeri* ssp. *hookeri*)	CNPS 1B.2	Sandy areas in closed-cone coniferous forest, chaparral, cismontane woodland, and coastal scrub habitats.	Former Fort Ord, eastern portion.	Low.-Moderate. No species identified within project area.
Toro manzanita (*Arctostaphylos montereyensis*)	CNPS 1B.2	Sandy areas in maritime chaparral, cismontane woodland, and coastal scrub habitats.	Southwest of Salinas, Toro Regional Park, and the Monterey airport.	Low-Moderate. CNDDB identified potential occurrence within grid units N1, and N2, I2, K2, O1, O2. Not observed in 2007 botanical surveys.
Pajaro manzanita (*Arctostaphylos pajaroensis*)	CNPS 1B.1	Sandy soils in chaparral habitat.	Uplands above Elkhorn Slough, along General Jim Moore Boulevard, near Highway 1 at Lightfighter Drive.	Moderate. CNDDB identified potential occurrence within grid units K1, J1 and M1. Not observed in 2007 botanical surveys.

TABLE 4.4-2 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE COASTAL WATER PROJECT AREA

Name	Status*	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
STATE PROTECTED SPECIES OR CNPS SPECIES (cont.)				
Plants (cont.)				
sandmat manzanita (*Arctostaphylos pumila*)	CNPS 1B.2	Opening with sandy soils in closed-cone coniferous forest, maritime chaparral, cismontane woodland, coastal dunes, and coastal scrub habitats.	Throughout former Fort Ord lands, including along General Jim Moore Boulevard	Present. CNDDB identified potential occurrence within grid units H2,I2,L2,M1, O1,K1, L1, I1, J1, J2, K1, K2, N1, and 02. Observed in project area in 2007 botanical surveys.
Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*)	CNPS 1B.2	Valley & foothill grassland habitat, particularly in areas with alkaline substrates and in sumps or disturbed areas where water collects.	Known from grasslands east of the Salinas Valley; also documented near Castroville.	Low-Moderate. CNDDB identified potential occurrence within grid units C4, D4, and D3.
Jolon clarkia (*Clarkia jolonensis*)	CNPS 1B.2	Edges or recently burned areas of chaparral, coastal scrub, oak woodland or riparian woodland.	Historic records in coastal areas from Moss Landing to Monterey peninsula. Extant populations in Monterey County south of peninsula.	Unlikely. CNDDB non-specific historical record noted "along railway, near Del Monte, Seaside."
Monterey cypress (*Cupressus macrocarpa*)	CNPS 1B.2	Closed-cone coniferous forest habitat.	Monterey peninsula.	Unlikely. Species identified within project area.
Hutchinson's larkspur (*Delphinium hutchinsoniae*)	CNPS 1B.2	Broadleaved upland forest, chaparral, coastal prairie, and coastal scrub habitats.	Extreme eastern portion of former Fort Ord lands.	Unlikely. No species identified within project area.
Eastwood's goldenbush (*Ericameria fasciculata*)	CNPS 1B.1	Openings with sandy soils in closed-cone coniferous forest, maritime chaparral, coastal dunes, and coastal scrub habitats.	Dunes near Marina and Seaside, former Fort Ord lands along General Jim Moore Boulevard.	Moderate. CNDDB identified potential occurrence within grid units K2, L2,M0, G2, H2, L1, I2, M1, N1, and O2. Not observed in 2007 botanical surveys.
Pinnacles buckwheat (*Eriogonum nortonii*)	CNPS 1B.3	Sandy soil in chaparral and valley and foothill grasslands. Often found on recent burns.	East of project area in the vicinity of Soledad.	Unlikely. No occurrence identified within project area.
sand-loving wallflower (*Erysimum ammophilum*)	CNPS 1B.2	Sandy areas and openings in maritime chaparral, coastal dunes, and coastal scrub habitats.	Dunes near Marina and Seaside, former Fort Ord lands along General Jim Moore Boulevard.	Present. CNDDB identified potential occurrence within grid units F2, H2, M0, J1, K1, B2, C2, L1, I2, M1, and N1. Observed in project area in 2007 botanical surveys.
Kellogg's horkelia (*Horkelia cuneata ssp. sericea*)	CNPS 1B.1	In openings with sandy or gravelly substrates within closed-cone coniferous forest, maritime chaparral, and coastal scrub habitats.	Dunes near Marina and Seaside, former Fort Ord lands along General Jim Moore Boulevard.	Present. CNDDB identified potential occurrence within grid units F2, G2, G3, K2, L2, O1, C2, K1, L1, I2, M1, N1, and O2. Observed in project area in 2007 botanical surveys.

TABLE 4.4-2 (Continued)
SPECIAL-STATUS SPECIES CONSIDERED FOR THE COASTAL WATER PROJECT AREA

Name	Status*	Habitat	Regional Occurrence	Potential for Occurrence Within Project Area
STATE PROTECTED SPECIES OR CNPS SPECIES (cont.)				
Plants (cont.)				
Carmel Valley bush-mallow (*Malacothamnus palmeri* var. *involucratus*)	CNPS 1B.2	A burn-dependent species found on talus hilltops and slopes in chaparral, cismontane woodland, and coastal scrub. Sometime on serpentine substrates.	From Monterey Peninsula to Carmel Valley.	Moderate-High. One CNNDB occurrence record just north of Segunda Reservoir.
Marsh microseris (*Microseris paludosa*)	CNPS 1B.2	Closed-cone coniferous forest, cismontane woodland, coastal scrub, and valley and foothill grassland. Reports in project region form vernally wet areas.	Monterey peninsula.	Moderate. CNDDB record in area of grid units O1 and P1.
Monterey pine (*Pinus radiata*)	CNPS 1B.1	Closed-cone coniferous forest and cismontane woodland habitats.	Monterey peninsula.	Unlikely. Potential extant occurrences restricted to Monterey Peninsula west and south if the project area.
Pine Rose (*Rosa pinetorum*)	CNPS 1B.2	Closed-cone coniferous forest habitat.	Manzanita County Park and vicinity of Edward Morse botanical preserve; Monterey Peninsula.	Unlikely. No occurrences identified within project area.
Santa Cruz clover (*Trifolium buckwestiorum*)	CNPS 1B.1	On margins of broadleaved upland forest, cismontane woodland, and coastal prairie.	Vicinity of Highway 68 and Reservation Road.	Unlikely. No occurrences identified within project area.
saline clover (*Trifolium depauperatum* var. *hydrophilum*)	CNPS 1B.2	Marshes and swamps, vernal pools, and alkaline, mesic areas in valley and foothill grassland.	Large populations documented in vicinity of Moss Landing.	Low-Moderate. No occurrences identified within project area.
Pacific Grove clover (*Trifolium polyodon*)	CNPS 1B.1	Along small springs and seeps in grassy openings of closed-coned coniferous forest, coastal prairie, meadows and seeps, and valley and foothill grassland	Coast of Monterey Peninsula to hills in area of Segunda Reservoir.	Low-Moderate. Spring/seep conditions may not be present.
Birds				
White-tailed Kite (*Elanus leucurus*)	SP	Resident of river valleys, riparian woodlands, and adjacent fields.	Could breed locally, and forage over a variety of habitats.	Moderate potential to occur.

Special-Status Species Code Designations
FE = Federally listed as Endangered
FT = Federally listed as Threatened
FD = Federally delisted
SE = State listed as Endangered
ST = State listed as Threatened
SP = State listed as Fully Protected
CSSC = California Species of Special Concern

4.4.2.6 Special Status Species

The following sections describe the Special Status species of plants, terrestrial wildlife (including birds), and fisheries that may occur in the project area.

Plants

Federal or State Endangered or Threatened Plant Species

Monterey Spineflower (*Chorizanthe pungens var. pungens*). Monterey spineflower is a small, decumbent, annual herb in the buckwheat family (Polygonaceae) inhabiting the sandy soils of coastal and inland marine terraces in northern Monterey County. This species can be associated with disturbed areas within grassland habitat, such as roadcuts and eroded areas, or with shifting sands of coastal dunes. Important occurrences are associated with sand blowouts in areas partially stabilized by seafig. Monterey spineflower requires a relatively bare substrate for establishment and growth and is threatened by the encroachment of robust nonnative grasses and perennial species. Populations of Monterey spineflower are known from the former Fort Ord along General Jim Moore Boulevard (Corps, 1997) and within the Seaside and Marina dune system (i.e., Salinas River to Terminal Reservoir pipeline segment, Terminal Reservoir and Pump Station and ASR facilities). A population of Monterey spineflower was observed immediately adjacent to General Jim Moore Boulevard (Corps, 1997), potentially within the project impact area. The species was observed frequently in the 2007 botanical surveys along alignment segments from north Seaside to approximately 2 miles south of the mouth of the Salinas River (Denise Duffy & Associates, 2007).

CNDDB identified occurrences found within grid units L1, C4, D3, D4, I2, J1, J2, K1, K2, N1, and O2; 2007 botanical survey observations (Denise Duffy & Associates, 2007) are within gridsheets F2, G2, L1, K1, J1, and I2.

Seaside Bird’s-Beak (*Cordylanthus rigidus var. littoralis*). Seaside bird’s-beak is relatively large, many-branched, annual herb in the figwort family (Scrophulariaceae) that blooms from May through October. This species grows in the sandy soils of stabilized dunes and is associated with closed cone pine forest, oak woodland, or maritime chaparral. Like other annual plants of sandy soils, Seaside bird’s-beak apparently requires regular ground disturbance to provide bare substrate and control competition with non-native grasses and perennial species. Populations of Seaside bird’s-beak are known from the central and eastern portions of the former Fort Ord, as well as the Sand City, Marina, and Seaside dunes (i.e., Salinas River to Terminal Reservoir pipeline segment, Terminal Reservoir and ASR facilities). A known population of Seaside bird’s beak is located immediately adjacent to General Jim Moore Boulevard (Corps, 1997), within the project impact area.

CNDDB identified occurrences found within grid units L1, K1, M1, and N1.

Yadon’s Wallflower (*Erysimum menziesii ssp. yadonii*). Yadon’s wallflower is one of four geographically distinct subspecies of wallflower endemic to disjunct coastal dune systems from Monterey to Humboldt Bay. This biennial or perennial plant in the mustard family (Brassicaceae) produces rich yellow flowers from June through August. Populations of Yandon's wallflower are restricted to the stable foredunes around RMC Lonestar and Marina State Beach. Yadon's wallflower potentially occurs along the Salinas River to Terminal Reservoir pipeline segment.

Sand Gilia (*Gilia tenuiflora ssp. arenaria*). The endangered sand gilia is a small, erect annual in the phlox family (Polemoniaceae) blooming from April through June. A rare associate of the maritime chaparral, coastal scrub, and oak woodland communities of northern Monterey County, sand gilia favors bare substrates created by unstable soil conditions. Sand gilia often co-occurs with Monterey spineflower, which has similar ecological requirements; a more common associate is wand woollystar (*Eriastrum virgatum*). Changes in dune vegetation have greatly reduced the amount of suitable habitat for these disturbance-dependent species, and many remaining populations are associated with roadsides, eroded drainages, and in recently burned chaparral. Fewer than twenty known occurrences of sand gilia remain, the most important of which are located on the former Fort Ord lands. This species may occur along the Salinas River to Terminal Reservoir pipeline segment and within the Terminal Reservoir and ASR facility footprints. A population of sand gilia was mapped immediately adjacent to General Jim Moore Boulevard (Corps, 1997), potentially within the project impact area.

CNDDB identified occurrences found within grid units A1, B2, B3, H2, I2, L1, M1, and N1.

Contra Costa Goldfields (*Lasthenia conjugens*). Contra Costa goldfields is a small, ephemeral annual sunflower typically occurring in mesic depressions within open, grassy habitats. Plants are between 4 and 12 inches in height and bear one to several flowerheads from March through June. Both ray and disk flowers are yellow. Contra Costa goldfields is distinguished from other common, co-occurring Lasthenia species by its lack of a pappus (an appendage arising from the ovary) on individual flowers. Contra Costa goldfields occurs in 20 widely scattered populations in Alameda, Contra Costa, Mendocino, Monterey, Napa, and Solano Counties.

Several colonies of Contra Costa goldfields occur in the vicinity of Machine Gun Flats in the eastern portion of FORA lands (USFWS 2005). This species is not expected to occur in the CWP project area due to the lack of suitable vernal pool habitat. Designated Critical Habitat abuts the Terminal Pump Station study area, however it does not cross into the project area and primary constituent elements do not occur within the project area.

Yadon's Rein Orchid *(Piperia yadonii*). Yadon's rein orchid is a slender perennial herb in the orchid family (Orchidaceae) that blooms from May through August. This species occurs in Monterey pine forest with a sparse understory, and along ridges and other areas of shallow soil within maritime chaparral. Unlike many other rare plants associated with maritime chaparral, Yadon's rein orchid does not colonize bare ground following disturbance events; instead, this species requires bare areas that remain relatively stable over time, allowing plants to form symbioses with host-specific mycorrhizal fungi. Populations occur in the vicinity of the southern pipeline alignment, just east of Highway 1 on former Fort Ord lands.

CNDDB identified occurrence found within grid unit I2.

Robust Spineflower (*Chorizanthe robusta* var. *robusta*). The robust spineflower is an annual herb that blooms from April through September. This species grows in sandy or gravely soils of the coastal scrub and dune habitat. Robust spineflower is threatened by development, mining, recreation, and non-native plants. Populations of this species may occur on the coastal strand in the vicinity of the City of Seaside.

CNDDB identified occurrences found within grid units C4, D4, D3, E3, F3, F2, G2, H2, and I2.

State or Local Plant Species of Concern

Hickman's Onion (*Allium hickmanii*). Hickman's onion is a perennial, bulbiferous herb in the lily family (Liliaceae) blooming during April and May. This species is most often associated with shallow, sandy, or otherwise unproductive soils, such as shale and clay hardpan. Similarly, plant community associates vary widely; most populations are associated with grassland species, but some occur at the grassland/chaparral ecotone or within open oak woodland areas. Plants favor slightly mesic microhabitats within these communities. Coastal influence, and the supplemental moisture associated with summer fog, may be the most important variable affecting population distributions. Remnant patches of coastal prairie typically receive summer fog and are particularly likely to support Hickman's onion. Sixteen populations of Hickman's onion are documented in the search area, the closest of which occurs near the eastern limits of FORA near Reservation Road.

CNDDB identified occurrence found within grid unit O1.

Hooker's Manzanita (*Arctostaphylos hookeri* ssp. *hookeri*). One of the many, rare manzanita species endemic to the Monterey Bay region, Hooker's manzanita is associated with sandy shale soils and sandstone outcrops. It is an uncommon component of the maritime chaparral community, and is differentiated from other local manzanitas by its short, decumbent stature and shiny green leaves. The distribution of this subspecies extends from the hills east of Watsonville to Carmel; other rare subspecies of A. hookeri occupy coastal habitat to the north and south. Hooker's manzanita is documented to occur approximately three miles east of General Jim Moore Boulevard.

Toro Manzanita (*Arctostaphylos montereyensis*). Toro manzanita is known from fewer than ten occurrences near the Monterey Airport, Toro State Park, and on the former Fort Ord. According to previous surveys of FORA lands, Toro manzanita occurs just east of the pipeline segments within maritime chaparral along General Jim Moore Boulevard. The species is identified by its short-hairy, glandular appearance and relatively long petioles. It may occur in maritime chaparral or coastal scrub within the project area.

CNDDB identified occurrences found within grid units N1 and N2.

Pajaro Manzanita (*Arctostaphylos pajaroensis*). Pajaro manzanita is an important component of maritime chaparral in upland watershed of Elkhorn Sough and occurs with less frequency in the Fort Ord—Marina—Seaside area. However, the CNDDB states that a "large and important portion of the range of this species occurs at Fort Ord." Pajaro manzanita is readily distinguished by its clasping, square-based leaves and mint green color. A population of Pajaro manzanita was documented on the former Fort Ord in the general vicinity of General Jim Moore Boulevard, in the southern pipeline alignment.

CNDDB identified occurrences found within grid units K1, N1 and M1.

Sandmat Manzanita (*Arctostaphylos pumila*). Sandmat manzanita, as its name implies, is a low-growing, mounded shrub associated with sand dunes. The leaves of sandmat manzanita are smaller than other locally occurring manzanitas, and the bark is red and shreddy. Sandmat manzanita is an important component of maritime chaparral in the former Fort Ord and commonly occurs in the vicinity of General Jim Moore Boulevard, in the southern pipeline alignment. The species was observed scattered in a number of locations along an approximately one mile stretch of project alignment in the vicinity of Marina (Denise Duffy & Associates, 2007).

CNDDB identified occurrences found within grid units L1, I1, J1, J2, K1, K2, N1, and 02.

Eastwood's Goldenbush (*Ericameria fasciculata*). Eastwood's goldenbush is perennial, yellow-flowering shrub in the Sunflower family (Asteraceae) blooming from July through October. This goldenbush species is known from fewer than twenty occurrences in the Monterey Bay area, is another associate of sandy soils along the coast. Populations are documented in Marina, Seaside, and Monterey, and potentially occur along General Jim Moore Boulevard and near the proposed ASR wells and reservoir.

CNDDB identified occurrences found within grid units G2, H2, L1, I2, M1, N1, and O2.

Sand-loving Wallflower (*Erysimum ammophilum*). Sand-loving wallflower is an annual, yellow-flowered herb in the mustard family (Brassicaceae) with a blooming period from February through June. This species is another rare associate of the maritime chaparral community, growing on loose sandy soils of coastal and inland dunes. Populations of sand-loving wallflower are known to occur along the southern portion of General Jim Moore Boulevard and in stabilized dunes west of Highway 1. A few individuals of this species were observed just north of Marina, west of Lapis Road during 2007 botanical surveys (Denise Duffy & Associates, 2007).

CNDDB identified occurrences found within grid units B2, C2, L1, I2, M1, and N1.

Congdon's Tarplant (*Centromadia parryi* ssp. *congdonii*). This spiny, resinous, annual herb in the sunflower family occurs in grassland habitat, particularly in areas with alkaline substrates, and in sumps or disturbed areas where water collects. The blooming period extends from June through November. The range of this species has been reduced to Monterey, San Luis Obispo, and Santa Clara counties. Congdon's tarplant is known from grassland and disturbed areas in the vicinity of Castroville, Salinas, and the eastern portion of FORA lands. Such populations, if they occur, are unlikely to represent a significant proportion of total species numbers and range, and impacts on suitable habitat would likely be temporary. Furthermore, Congdon's tarplant is frequently associated with disturbed soils.

CNDDB identified occurrences found within grid units B4, C4, D4, and D3.

Kellogg's Horkelia (*Horkelia cuneata* ssp. *sericea*). A spreading perennial herb in the rose family (Rosaceae), Kellogg's horkelia is associated with relictual dunes and old marine terraces from San Mateo County south to Santa Barbara County. Populations of Kellogg's horkelia are located along General Jim Moore Boulevard, in the vicinity of the southern alignment. The species was observed in the project alignment along Del Monte Boulevard in northern Marina as well as a few locations along the project alignment in southern Marina.

CNDDB identified occurrences found within grid units C2, K1, L1, I2, M1, N1, and O2.

Saline Clover (*Trifolium depauperatum* var. *hydrophilum*). Saline clover is small, somewhat fleshy plant in the pea family (Fabaceae) with pink to purple flowers appearing from April through June. Populations are found along the coast from Sonoma County south to San Luis Obispo, as well as in the inland counties of Solano and Colusa. Saline clover requires moist soils, occurring on the edges of saltmarshes and within alkali meadows and vernal pools. Populations of saline clover occur along Moro Cojo Slough and associated wet meadows southeast of MLPP.

Terrestrial Wildlife

Federal or State Endangered or Threatened Wildlife Species

Smith's Blue Butterfly (*Euphilotes enoptes smithi*). The Smith's blue butterfly is a small butterfly endemic to the Central Coast of California. The species is reliant on two host plants, the coast buckwheat and seacliff buckwheat. They use flower heads of these plants for feeding, mating, and egg-laying. Adults emerge during summer (June-September), and live only about one week, during which time they mate. Eggs hatch shortly thereafter, and caterpillars feed on the host plant, then pupate for about 10 months (typically in the leaf litter below the plant) before emerging as adults the next summer. The two buckwheat species have slightly different distributions and flowering times, and the Smith's blue butterfly may eventually be split into to distinct subspecies with specific host plants.

Smith's blue butterfly habitat is threatened by coastal development and invasive non-native plants. The species was listed by the USFWS as Endangered in 1976. In the project area, Smith's blue butterflies are known to occur only west of Highway 1. Potential habitat occurs in grid units B2, C2, E2, F2, G2, H2, I2, J1, J2, K1, K2, L1, L2, M1, and N1.

California Red-legged Frog (*Rana aurora draytonii*). The California red-legged frog is a medium-sized frog with reddish-colored legs. The species is generally restricted to riparian and lacustrine habitats in California and northern Baja California. Red-legged frogs prefer deep, quiet pools (usually more than 0.7 meters deep) in creeks, rivers, or lakes below 1500 meters in elevation. Habitat requirements include fresh emergent, or dense, riparian vegetation, especially willows adjacent to shorelines. Predators, such as non-native fishes and bullfrogs (*Rana catesbeiana*) can extirpate local populations of red-legged frogs. Red-legged frogs can survive in seasonal bodies of water that are dry for short periods if a permanent water body or dense vegetation stands are nearby.

Adult red-legged frogs are normally active at night and breed in still water during the late winter or early spring after waters recede. Females attach eggs in a single cluster to a vegetation brace just under the surface of the water. The eggs hatch in just over a week and the resulting larvae feed on plant and animal material on the bottom of the pond. It takes at least four months for the larvae to metamorphose into juvenile frogs. On rare occasions, larvae overwinter.

The USFWS listed the California red-legged frog as threatened in 1996. There are few records for this species in northern Monterey County (CNDDB 2008), but red-legged frogs could occur in suitable aquatic habitat in the project vicinity. Potentially suitable habitat occurs in wetlands along Dolan Road (A3), a small wetland near Castroville (D4), Locke-Paddon Pond in Marina (H2), and riparian wetlands along Highway 68 (N1).

Santa Cruz Long-toed Salamander (*Ambystoma macrodactylum croceum*). The Santa Cruz long-toed salamander (long-toed salamander) is a medium-sized salamander endemic to southern Santa Cruz County and northern Monterey County. Long-toed salamanders typically breed in shallow, ephemeral, freshwater ponds, but spend most of their lives underground in small mammal burrows, or in other moist, protected areas, such as dense willow thickets. Known breeding populations occur in areas of sandy loam soils.

After the onset of winter rains, long-toed Salamander migrate from retreat sites to breeding ponds at night. Females attach eggs to submerged vegetation, and larvae emerge after 15 to 30 days. Larvae can metamorphose quickly if the breeding pond begins to dry up. The disjunct distribution and the very restricted range of the species make it susceptible to population declines. As a result, the USFWS listed the long-toed salamander as Endangered in 1967, and the state of California listed the long-toed salamander as Endangered in 1971.

Currently, the long-toed Salamander is known from fewer than 15 locations near Watsonville (USFWS 1999; CNDDB 2004). Few of these records are from south of Elkhorn Slough, but the species has been recorded in the vicinity of upper Moro Cojo Slough, the site of one of only three metapopulations of the species (USFWS 1999). The long-toed salamander could occur within the project area in suitable habitat in the vicinity of Moro Cojo Slough (A3, A4, B4).

California Tiger Salamander (*Ambystoma californiense*). California tiger salamander's preferred breeding habitat is temporary pond environments (e.g., vernal pool, ephemeral pool, or human-made ponds lasting for at least three months) surrounded by uplands that support small mammal burrows. The species utilizes permanent ponds provided that aquatic vertebrate predators are not present. Such ponds provide the breeding and larval habitat, while small mammal burrows (e.g., ground squirrel and pocket gopher) in the upland habitats support juvenile and adult salamanders during the dry season.

The USFWS listed this species as threatened in July 2004. The range of the California Tiger Salamander is restricted to the Central Valley and the South Coast Range of California from Butte County south to Santa Barbara County. They have disappeared from a significant portion of their range due to habitat loss from agriculture and urbanization and the introduction of non-native aquatic predators.

This species has been recorded near Moss Landing, and several records also exist for this species in the vicinity of FORA (Corps, 1992, CNDDB, 2006, USFWS, 2005). Most of these records at FORA are greater than 3 kilometers (km) inland (east) from General Jim Moore Boulevard (Corps, 1997- ref not seen), but one sighting is less than 1 km south of Inter-Garrison Road. Potential habitat for the species also occurs in grasslands on the Armstrong Ranch, near Lapis Road, adjacent to the Transmission Main South. Seasonal wetlands between Lapis Road and Highway 1 (G2) could potentially provide breeding habitat for the species, as well wetlands associated with Moro Cojo Slough (A3, A4, and B4). This species could occur in these map segments, as well as in grassland habitat in segments F3, G3, H2, and H3). In the Monterey Peninsula region several populations of non-native tiger salamander exist that do not warrant protection. These populations were created from bait stock and released by humans in suitable ponds. Genetic testing is required to reliably distinguish the difference between native and non-native salamanders.

Least Bell's Vireo (*Vireo bellii pusillus*). Prior to 1920, the California population of least Bell's vireo was common and considered abundant in dense riparian thickets, especially in upper Salinas Valley. By 1930 however, declines were widespread mostly due to parasitism by brown-headed cowbirds (Molothrus ater). The species was thought to be extinct in northern California by 1970. In 1980, the species was listed by the State of California as Endangered. In 1986, the species was Federally listed as Endangered, and critical habitat for the species was designated in 1994. Isolated and infrequent sightings of singing males in northern and central California have raised hope that the species may eventually recolonize historic habitat in northern California. In 1983, three singing males were found on the Salinas River in southern Monterey County, and there have been subsequent sightings of birds in that area (Roberson 2002). However, there are no records of this species in the Salinas Valley north of Greenfield (Roberson 2002), and the species is presumed absent from the project area.

State Wildlife Species of Special Concern

Western Pond Turtle (*Clemmys marmorata*). The western pond turtle is an aquatic turtle that usually leaves the aquatic site to reproduce, to aestivate, and to overwinter. This turtle requires some slack or slow water, although it occurs where enough food resources occur in faster moving water. Nesting areas usually occur in upland areas from March to July, in hard-packed clay soil. Hatchlings disperse from the nest with winter rains. There are few local records of pond turtles in northern Monterey County (CNDDB 2004), but the species could occur in suitable aquatic habitat within the project area. Potentially suitable habitat occurs in wetlands along Dolan Road (A3), a small wetland near Castroville (D4), Locke-Paddon Pond in Marina (H2), and riparian wetlands along Highway 68 (N1).

California Legless Lizard (*Anniella pulchra*). Legless lizards are fossorial animals that burrow in loose soil with a high sand content. California legless lizards occur in areas with sandy or loose loamy soils under sparse vegetation on beaches, in chaparral, and on stream terraces. They are often found under or in the close vicinity of surface objects such as logs, rock, old boards and compacted debris. Soil moisture is also essential for legless lizards. This species has been documented at several sites within the project area, including near Highway 1 at Fremont

Boulevard, and several areas south of Reservation Road (USACE 1997). Several hundred individuals were also collected at the site of Moss Landing Marine Laboratories, in Moss Landing (www.anniella.org). This species is expected to occur in sandy soils throughout the project area, including map index segments A2, A3, B2, B3, C2, E2, F2, G2, H2, I2, J1, J2, K1, K2, L1, L2, M0, M1, and N1.

California Horned Lizard (*Phyrnosoma coranatum frontale*). California horned lizards occupy loose sandy loam and alkaline soils in a variety of habitats including chaparral, grasslands, saltbush scrub, coastal scrub, and clearings in riparian woodlands. They primarily eat insects such as ants and beetles. Their population decline is mainly attributed to conversion of land for agricultural purposes. The human introduction of non-native Argentine ants, which are inedible to horned lizards and tend to displace the native carpenter ants, is another factor in their decline. Horned lizards were found at many locations on the former Fort Ord (Corps, 1992), and are expected to occur in sandy soils in various habitats, including map index segments A2, A3, B2, B3, C2, E2, F2, G2, H2, I2, J1, J2, K1, K2, L1, L2, M0, M1, and N1.

Western Burrowing Owl (*Athene cunicularia*). The burrowing owl is a small, terrestrial owl of open country. Burrowing owls favor flat, open grassland or gentle slopes and sparse shrubland ecosystems. In California, burrowing owls are found in close association with California ground squirrels. Ground squirrels provide nesting and refuge burrows, and maintain areas of short vegetation height, providing foraging habitat and allowing for visual detection of avian predators by burrowing owls. Burrowing owls are semi-colonial nesters, and group size is one of the most significant factors contributing to site constancy by breeding burrowing owls. The nesting season, as recognized by the CDFG, runs from February 1 through August 31. As of 2002, this species nested in Monterey County only near King City, and at the Salinas Airport (Robertson, 2002). However, suitable habitat occurs for the species in the grasslands between the Salinas River and Marina. The species formerly nested here, and could potentially nest here again in the future. Burrowing owls occur regularly during winter within the study area. Areas that have received regular use by owls include Dolan Road in Moss Landing and Armstrong Ranch, north of Marina. Burrowing owls occupy burrows for short periods of time during winter, and are still protected during this time. Potential habitat occurs in map index segments A3, A4, B4, F2, F3, G2, G3, H2, and H3; refer to 4.4-1.

Northern Harrier (*Circus cyaneus*). The northern harrier is commonly found in open grasslands, agricultural areas, and marshes. Nests are built on the ground in areas where long grasses or marsh plants provide cover and protection. Harriers hunt for a variety of prey, including rodents, birds, frogs, reptiles, and insects by flying low and slow in a traversing manner utilizing both sight and sound to detect prey items. Northern Harriers are common during winter in Monterey County, and nest in spring and summer. Suitable nesting habitat occurs in marshy undeveloped portions of the project area, in map index segments A3, B4 and E2. Harriers have nested in the past at the Salinas River National Wildlife Refuge (E2).

California Horned Lark (*Eremophila alpestris*). Horned Larks are songbirds resident in dry grasslands and deserts throughout California. They breed from March through July, with peak activity in May. Horned larks build grass-lined nests directly on the ground, in dry, open habitats with sparse vegetation. During sites visits on September 11, 2007, horned larks were observed foraging on Armstrong Ranch grasslands. The species is an uncommon breeder in the northern Salinas Valley, but likely nests in grasslands between the Salinas River and Marina. Horned larks could also potentially nest in other open habitats at the former Fort Ord (e.g., east of General Jim Moore Boulevard) (Corps, 1997- ref not seen). Potential breeding habitat occurs in map segments E2, F2, F3, G2, G3, H2, H3, K2, and L2.

Tricolored Blackbird (*Agelaius tricolor*). Tricolored blackbirds are found almost exclusively in the Central Valley and central and southern coastal areas of California. The tricolored blackbird is highly colonial and forms dense breeding colonies of up to tens of thousands of pairs. This species typically nests in tall, dense, stands of cattails or tules, but also nests in blackberry, wild rose bushes and tall herbs. Nesting colonies are typically located near standing or flowing freshwater. Tricolored blackbirds form large, often multi-species, flocks during the non-breeding period and range more widely than during the reproductive season. This species has been found nesting in the vicinity of the project at Locke-Paddon Pond in Marina (Roberson and Tenney 1993, Roberson 2002). This location in map grid H2 is the only site within the project area where tricolored blackbirds are likely to breed).

California Yellow Warbler (*Dendroica petechia brewsteri*). Yellow Warblers prefer deciduous, riparian habitats consisting of alders, cottonwoods, willows and other trees and shrubs. Most Yellow Warblers migrate to Mexico and South America in the fall and return to California to breed from May through August. Some birds spend winter in southern California lowlands. Nesting yellow warblers are likely to be found in suitable riparian habitat along the Salinas River (E3), and in willow thickets along Highway 68 (O1).

Yellow-breasted Chat *(Ictera virens)*. Yellow-breasted chats are migratory songbirds that favor dense riparian thickets for nesting. Population declines in the species are thought to be due to loss of nesting habitat and brown-headed cowbird parasitism of their nests. The yellow-breasted chat is a relatively rare breeding species in northern Monterey County, but could potentially occur in riparian habitat along the Salinas River and along Highway 68 (E3 and O1).

Loggerhead Shrike *(Lanius ludovicianus)*. Loggerhead shrikes are year-round residents in grassland and scrub habitats in California, where they forage primarily on large insects, lizards, and small mammals. Shrikes generally build their nests in shrubs in fairly open areas. In northern Monterey County, shrikes nest at several locations within the project area. This species is expected to occur in low densities in suitable habitat in the less developed portions of the project area, and could potentially nest in every map segment.

Pallid Bat (*Antrozous pallidus*). Pallid bats are pale to light brown in color, and, at about 24 grams, the Pacific race is one of the state’s largest bats. Coastal colonies commonly roost in deep crevices in rocky outcroppings, in buildings, under bridges, and in hollow trees. Colonies can range from a few individuals to over a hundred and are non-migratory. Some female/young colonies (typical of the coastal subspecies) may or may not use their day roost for their nursery as well as for winter roosting. Pallid bats can breed from March 15 through August 15. Although crevices are important for day roosts, night roosts often include porches, garages, barns, and highway bridges. Pallid bats may travel up to several miles for water or foraging sites if roosting sites are limited. Pallid bats prefer foraging on terrestrial arthropods in dry open grasslands, vineyards, orchards, or oaks near water and rocky outcroppings or old structures. Occurrence in this area of Monterey County is poorly known, but the species could forage over a variety of habitats, and could potentially roost in human-made structures. The most likely site within the project area where pallid bats are known to roost is under the Highway 1 or SPRR bridges over the Salinas River (E3).

Monterey Dusky-footed Woodrat *(Neotoma fuscipes luciana).* This species prefers hardwood forests, riparian habitats, and brushlands and often forages above ground. Food includes berries, fungi, leaves, flowers, and nuts. Woodrats construct large nests of sticks. The species could potentially occur in suitable riparian habitat on the margins of the Salinas River. It has also been found in oak woodland and coastal scrub habitat on the former Fort Ord. Map segments in which this species could occur include E3, N1, O1, O2, and P1.

Monterey Shrew (*Sorex ornatus salicornius* [= *Salinas ornate shrew* {*S. o. salarius*}]). The Monterey shrew (or Salinas ornate shrew) is a small insectivorous mammal. Although very little information is available regarding the habitat use or population status of this subspecies, it apparently uses riparian, wetland, and upland terrestrial habitats in the vicinity of the Salinas River mouth. This shrew could potentially occur near the Highway 1 crossing of the Salinas River.

Other Special-Status Bird Species

White-tailed Kite (*Elanus leucurus*). White-tailed Kites are State Fully Protected raptors that forage for small rodents and other prey primarily in open grassy or scrubby areas. They nest in large shrubs or trees adjacent to this habitat. Kites are likely to be found foraging in a variety of habitats throughout the project area. They have nested in the past near the Salinas River Mouth (Roberson and Tenney 1993, K. Neuman pers. comm.), and could potentially nest in portions of the project area that have suitable nesting habitat and low levels of human disturbance, including virtually all map segments in the CWP project area.

Other Bird Species

Several bird species that have special status only during the nesting season at breeding sites could pass through northern Monterey County during migration or occur as winter visitors, but no breeding habitat is present in the project area. These species include:

- American white pelican (*Pelecanus erythroryhnchos*)
- Double-crested cormorant (*Phalacrocorax auritus*)
- White-faced ibis (*Plegadis chihi*)
- Osprey (*Pandion haliaetus*)
- Cooper’s hawk (*Accipiter cooperii*)
- Sharp-shinned hawk (*Accipiter striatus*)
- Prairie falcon (*Falco mexicanus*)
- Merlin (*Falco columbarius*)

- California gull (*Larus californicus*)
- Long-billed curlew (*Numenius americanus*)
- Vaux's swift (*Chaetura vaux*i)
- Black swift (*Cypseloides niger*)

Other bird species that do not breed locally, but have special status as non-breeders, could occur in the project area. Several of these species are relatively uncommon locally, and are unlikely to occur in the project area. These include:

- Bald eagle (*Haliaeetus leucocephalus*)
- Golden eagle (*Aquila chrysaetos*)
- Peregrine falcon (*Falco peregrinus*)
- Ferruginous hawk (*Buteo regalis*)
- California condor (*Gymnogyps californianus*)
- Mountain plover (*Charadrius montanus*)
- Willow flycatcher (*Empidonax trailii*)
- Bank swallow (*Riparia riparia*)

Federally listed species that occur nearby, but for which there is no suitable terrestrial habitat in the project area, include:

- Brown pelican (*Pelecanus occidentalis)*
- Western snowy plover (*Charadrius alexandrinus nivosus*)

In addition, California clapper rails (*Rallus longirostris obsoletus)* occurred historically in saltmarsh habitat in Monterey County, but have been extirpated since the 1980's (Roberson, 2002).

Fisheries

Steelhead (*Oncorhynchus mykiss*)

Steelhead are anadromous (sea-run) rainbow trout that spawn in freshwater, spend the one first to three years (or more) of life in freshwater, and then migrate to the ocean where they continue to grow and mature before returning to spawn in their natal streams. In California coastal streams south of San Francisco Bay, adult steelhead begin their upstream migration with the first major storms in late fall and winter. In many coastal drainages, including the Carmel and Salinas rivers, the movement of adult steelhead is blocked until flows increase sufficiently to breach the sandbars that form at the mouths of the streams during the dry season. Following upstream migration, which may extend through mid-April, the female establishes a territory and digs a redd (gravel nest) with her tail, usually in usually the lower ends of pools or heads of riffles where subsurface flow provide sufficient water circulation to sustain eggs and alevins (yolk-sac fry) through the incubation period. The female lays the eggs in the redd where they are fertilized by one or more males.

Eggs buried in redds hatch in 3-4 weeks (at 10-15º C) and fry emerge from the gravel 2-3 weeks later, primarily in April through June. The fry initially live in quiet waters close to shore and soon establish feeding territories that they defend against other juveniles. As they grow during spring and summer, juvenile steelhead move to faster, deeper water in riffles, runs, and pools. They typically maintain positions near swift currents that carry drifting aquatic and terrestrial insects on which they feed. Some juveniles may move downstream to the lower reaches of streams or lagoons during the summer and fall to complete their freshwater rearing phase. After approximately one year of stream residence, most juveniles become smolts (juveniles adapted to seawater) and migrate downstream to the ocean in late winter and spring. Some juveniles remain in fresh water 2 to 3 years before they enter the ocean. Because juvenile steelhead rear for a year or more in freshwater, juveniles of different age groups are usually present year-round in California coastal streams.

Most steelhead spend 1-3 years in the ocean before returning to spawn. Some adults return to the ocean after spawning (kelts) and return to spawn again. Occasionally, juvenile steelhead mature in freshwater and spawn without migrating to the ocean. This occurs most frequently during droughts when juveniles are trapped in the river and cannot migrate to the ocean.

Steelhead populations within the Salinas River and Carmel River basins are part of the south-central California coast Distinct Population Segment (DPS) of the species. This DPS, which extends form the Pajaro River south to, but not including, the Santa Maria River, was listed as federal threatened species in 1997, and their threatened status was reaffirmed by the National Marine Fisheries Service (NMFS) in 2006. Critical habitat for this and other DPS's was most recently designated in 2005 and includes much of the Salinas and Carmel river watersheds.

Tidewater Goby (*Eucyclogobius newberryi*)

The tidewater goby is a benthic fish that inhabits shallow lagoons and the lower reaches of coastal streams. It differs from other species of gobies in California in that it is able to complete its entire life cycle in fresh to brackish water. This goby appears to be mainly an annual species, with only an occasional individual living longer than a year (Moyle *et al.*, 2002).

Tidewater gobies typically inhabit areas of slow-moving water, avoiding strong wave actions or currents. Particularly important to the persistence of the species in lagoons is the presence of backwater, marshy habitats, as well as annual sand bar formation, to avoid being flushed out to the ocean during winter flood flows (J. Smith, pers. comm.). However, populations often recover very quickly from such flood events (Lafferty *et al.*, 1999). Water temperatures generally range from 8-25°C and water depths are usually less than 3 feet (Moyle *et al*., 2002).

The tidewater goby is endemic to California and is distributed in brackish water habitats along the coast from Agua Hedionda Lagoon, San Diego County, in the south to the mouth of the Smith River (Tillas Slough), Del Norte County, in the north (Moyle *et al*., 2002). Although the species generally prefers low-salinity waters, tidewater gobies are capable of living in saline waters reaching 41 parts per thousand (ppt) (Moyle *et al*., 1995). Large populations have been observed in lagoons ranging from fresh water (e.g., Soquel Creek and Pescadero Creek) to ocean salinities (Corcoran Lagoon and Moran Lagoon) (Smith, pers. comm.).

Tidewater goby populations have declined over the last century. This decline is primarily attributable to coastal development and the conversion of seasonally closed lagoons to open bays and harbors. The species was federally listed as endangered in 1994. Tidewater gobies were observed in Moro Cojo Slough at the Highway 1 crossing in 2006 (CNDDB, 2008). The species has also been recorded at the mouth of the Salinas River and the mouth of Elkhorn Slough, although these observations date back to 1951 and 1984, respectively (CNDDB, 2008). Tidewater gobies could potentially occur within the project Area at the Moro Cojo pipeline crossings.

Lampreys (*Lampetra* sp.)

Pacific lampreys (*L. tridentata*) are anadromous and parasitic. Lampreys spawn in similar conditions as salmon and steelhead -- in riffle areas of gravel bottom streams within nests. However, occasionally they construct nests in sandy substrates. Most of the adults die after spawning. When lampreys hatch, they are a larval form called ammocoetes that are carried by the current to low velocity areas of soft mud or sand in pools, side channels, or other backwater habitats. They burrow themselves with their head up and filter feed on algae and organic matter. These worm-like filter-feeders spend 4-6 years in freshwater before transforming into young adults with eyes and teeth. The anadromous lampreys move to the ocean or estuaries where they grow and feed by parasitizing other fish. They spend a few months to several years in the ocean and then return to freshwater between February and June. Pacific lampreys are thought to overwinter and remain in freshwater habitat for approximately 1 year before spawning between March and July (Moyle, 2002). Pacific lampreys are known to occur in the Salinas and Carmel river watersheds (EDAW, 2000; Jones & Stokes, 2003b).

Little information is available on river lamprey (*L. ayresi*) life history, but their overall biology is believed to be similar to that of the Pacific lamprey. River lampreys have been reported from the Carmel River (EDAW, 2000; Jones & Stokes, 2003b). However, the distribution of this species is typically thought to range from Alaska to the San Francisco Bay, including drainages within the Sacramento-San Joaquin system (Moyle, 2002). Pacific and river lamprey ammocoetes are nearly indistinguishable from each other (USFWS, 2004) and the reported occurrences of river lampreys in the Carmel River may have in fact been misidentified Pacific lampreys. However, since their presence or absence in the Carmel River has not been independently verified, the species is assumed to be present for the purposes of this Draft EIR.

The USFWS was petitioned to list both species under the federal Endangered Species Act, but the agency found that formal listings were not warranted (USFWS, 2004). Nevertheless, USFWS routinely includes both species as covered species in federal Habitat Conservation Plans (HCPs) due to the likelihood that they may become listed in the future. The river lamprey is currently considered a California Species of Special Concern, but the Pacific lamprey is not. Both are considered special-status species for the purposes of this Draft EIR.

4.4.2.7 Existing Environment at Project Sites

This section discusses the potential for sensitive terrestrial biological resources at the locations of proposed facilities for the Moss Landing and North Marina project. Please note that the species and habitats mentioned are intended as examples, or those most likely to be present. Many more of the Special-Status species discussed above have a theoretical potential to be on the sites when construction begins. Also, no discussion is provided for Forest Lake Reservoir, Segunda Reservoir and other facilities which already exist and for which no change is proposed. Please note also that facility locations are expected to include maintenance access areas.

Refer to **Figure 3-5** and **Figure 3-26**, and other figures in the Project Description for location of project sites to be discussed below.

Moss Landing Project (MLPP) Desalination Plant (including Sourcewater and Return Flow Pipelines)

The desalination plant would encompass approximately 16 acres (697,000 square feet) and would be accessed from Dolan Road. New pipelines carrying sourcewater and return flow between an existing disengaging/equalization basin (with existing connections to intakes and outflow) and the desalination plant, would be installed along approximately 8000 feet of Dolan Road.

Non-native grassland is adjacent to portions of Dolan Road, in addition to a number of wetland types associated with ditches following either side of the road. On the northern and southern sides of Dolan Road, deep ditches support **freshwater marsh** areas dominated by cattail (*Typha latifolia*), tule (*Schoenoplectus acutus* var. *occidentalis*), and bulrush (*Bolboschoenus robustus*). Drier areas on the mid to upper banks of the ditches, classified in this document as **brackish seasonal wetland**, are colonized by the halophytic species pickleweed (*Salicornia virginica*), alkali heath (*Frankenia salina*), fat-hen (*Atriplex triangularis*), and saltgrass (*Distichlis spicata*).On the south side of Dolan Road, the drainage ditch/deepwater channel is a former meander of Moro Cojo Slough, which presently parallels Dolan Road approximately 700 to 1,500 feet to the south.

Grassland and grassland/seasonal wetland interface areas along Dolan Road and in vegetated areas of the desalination plant potentially support **Congdon's tarplant**, **saline clover** and **burrowing owl**. No special status species were observed in this area during 2007 reconnaissance surveys (ESA, 2007).

Moss Landing

Figure 4.4-3a (H.T. Harvey, 2005) displays wetlands potentially impacted within the northern project region. All areas with at least one wetland parameter present (i.e., hydric soils, hydrophytic vegetation, or evidence of wetland hydrology) were considered to be potential jurisdictional areas. The majority of wetlands occur along water conveyance facilities that bisect the Moro Cojo and old Salinas River floodplains. The natural hydrology of these watersheds has been dramatically altered to facilitate flood control and year-round cultivation, provide potable water for coastal development, and maintain tidal control. Moro Cojo Slough was formerly a fully tidal salt marsh with small pockets of seasonal freshwater wetlands; the banks of the main slough channel were diked in the last century to convert the marshes into pasture. This diking, along with groundwater pumping, has lowered the water table in most areas to depths beyond the plant rooting zone, but pockets of wetland vegetation remain in low-lying areas and along remnant slough meanders in the area. Similarly, soils in the vicinity of the old Salinas River channel and Tembladero Slough are fertile floodplain clays of the Clear Lake series, which are poorly drained soils typically saturated for long periods during the growing season. Portions of low-lying fields along Molera and Nashua Roads are underlain by hydric soils that likely once supported wetlands. These areas were monitored for three weeks during the rainy season to determine their status as potential farmed wetlands.

Farmed Wetlands are wetlands that were drained, dredged, filled, or otherwise manipulated before December 23, 1986, for the purpose of, or to have the effect of, making the production of an agricultural commodity possible, and *continue to meet specific hydrology criteria.* For this type of wetland, there must be at least a 50 percent chance that the farm tract is flooded or seasonally inundated for at least 15 consecutive days (Natural Resources Conservation Service, 1986). Due to unusually high precipitation during the survey period (over 150 percent of normal; National Weather service 2005), it was assumed that observed conditions represented a “worst-case scenario.”

Ponded water was observed in the furrows of the farm tracts in question immediately following heavy rains. However, water drained from the tracts within several days due to a series of permanent drainage improvements, including mechanical pumps, drainage tiles, ditches, and permanent furrows, which direct flows towards adjacent slough channels. Therefore, the duration of ponding in these fields does not meet the minimum hydrology criteria of a farmed wetland. Furthermore, saturation was observed only in the upper 3-5 inches of the soil, indicating that saturation and flooding are due to recent precipitation only and not to a high water table. Because the hydrology of these tracts has been permanently altered to facilitate agricultural commodity production, such that soils are not flooded or saturated for a sufficient length of time to support wetland vegetation, the tracts were considered to be converted wetlands and therefore not jurisdictional. For clarification, these areas failed to meet any of the three parameters used by the resource agencies in establishing potential jurisdiction under the 1987 Manual.

Potential jurisdictional areas include brackish seasonal wetlands associated with Moro Cojo Slough along both sides of Dolan Road, seasonally-flooded pasture, ditch wetlands, and diked remnant saltmarsh along the Union Pacific Railroad right-of-way, and the main channels of Moro Cojo Slough, Tembladero and Alisal Sloughs.

The MLPP open water intake and ocean outfall will use existing intake/outfall structures of the Moss Landing Power Plant. No vegetative communities or terrestrial special-status species, plant or wildlife, will be affected beyond baseline conditions.

Transmission Main North

From the desalination plant, the corridor proceeds east for approximately 2000 feet along Dolan Road. Habitats and species potentials along this section are as described above for Sourcewater and Return Flow Pipelines along Dolan Road. South from Dolan Road, the pipeline corridor follows the Union Pacific Railroad (UPRR) ROW to Benson Road, near the northeastern edge of Castroville. The corridor in this section passes adjacent to mostly **agricultural fields**, with some parcels of **non-native grassland**, and a few areas of **diked northern coastal salt marsh**. In addition, the corridor crosses Moro Cojo Slough with associated **coastal brackish marsh**. The railroad ROW itself consists of a relatively high stone-covered berm supporting the railroad, with

SOURCE: H.T. Harvey & Associates

CalAm Coastal Water Project . 205335

Figure 4.4-3a
Jurisdictional Wetlands:
Northern Project Region

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ruderal vegetation and non-native grassland occurring at, and extending beyond to varying degrees, its base.

The northern approximate half of this segment of the corridor passes through a relatively large CNDDB mapping-unit of coastal brackish marsh (CNDDB, 2008) associated with Moro Cojo Slough. Most of this mapping unit in the project vicinity has been diked and converted to agriculture, however brackish marsh persists more narrowly along Moro Cojo Slough, including at the corridor crossing of the slough. A relatively undisturbed large parcel to the southeast of the crossing is covered with pickleweed-dominated **diked northern coastal salt marsh**. Additionally, drainage swales to either side of the UPRR ROW through this area contain patches of this vegetation type.

At Benson Road, the pipeline corridor turns to the southwest and follows Salinas Road through Castroville, passing through mostly **developed** areas, including across a few of parcels of **ruderal** vegetation. The corridor continues south along Highway 156, passing through agricultural fields and crossing two relatively channelized sloughs- Tembladero and Alisal Sloughs. Both sloughs have patchy brackish wetland species along their banks. Alisal Slough also contains patches of riparian scrub in the vicinity of the corridor crossing.

The corridor continues southwest through agricultural lands, turning southeast along Nashua Road for approximately 2000 feet, then turning southwest along the TAMC railroad ROW, which the pipeline alignment follows for the most of the rest of this corridor segment. A little less than a mile after joining the TAMC railroad ROW, the corridor crosses the Salinas River, jogging briefly to cross along the Monte Road Bridge. The Salinas River corridor supports regionally important stands of **central coast riparian woodland and scrub**. South of the Salinas River, the corridor continues along the railroad ROW, going through more agricultural and developed areas until crossing over Del Monte Boulevard, approximately 4000 feet south of the Salinas River crossing.

Non-native grassland habitat occurs in extensive areas from the Del Monte Boulevard crossing south to the City of Marina (to the end of the Corridor section), primarily to the east of Del Monte Boulevard. To the west, between Del Monte Boulevard and Lapis Road, and extending narrowly further west to Highway 1, is an area of moderately disturbed **central dune scrub**.

Non-native grassland, and upper/drier areas of brackish seasonal wetland, provide potential habitat for **Congdon's tarplant**. Potential habitat includes the corridor along the UPRR ROW, and the corridor between the Del Monte Boulevard crossing and Marina. Habitat appears to be marginal for this species and none were observed during 2007 plant surveys [focused surveys along the Del Monte Boulevard segment (Denise Duffy & Associates, 2007); reconnaissance surveys along entire corridor (ESA, 2007)].

The areas of central dune scrub along the Lapis Road portion of the corridor supports relatively extensive patches of **Monterey spineflower**, observed during 2007 surveys (Denise Duffy & Associates, 2007; ESA, 2007). Buckwheat occurs, and with it potential habitat for **Smith's blue butterfly**.

North Marina Desalination Project Facilities

Desalination Plant. The North Marina Desalination Plant and associated pipelines are located within the Armstrong Ranch, encompassing the most extensive area of undeveloped **non-native grassland** in northern Monterey County. The long history of grazing in these grasslands has limited species diversity to predominantly introduced European annual grasses and forbs. Bare areas are quickly colonized by filaree and other invasive herbs, limiting the establishment of the diminutive native annuals otherwise prevalent on sandy soils. However, grassland within the impact areas potentially supports **Congdon's tarplant**, a CNPS List 1B species associated with sandy soils in the area. Habitat is marginal for this and other special-status plant species and none were observed during 2007 focused plant surveys (Denise Duffy & Associates, 2007) or reconnaisance surveys (ESA, 2007).

Western portions of Armstrong Ranch may support **burrowing owls**, **California tiger salamanders**, and **loggerhead shrike** but the proposed plant site itself does not contain ground squirrel burrows or wetlands, and is not likely to support these species.

Slant Well Sites. Six slant wells have been proposed near the MCWD Treatment Plant on Reservation Road. Of particular concern to terrestrial biological is the anticipated area of disturbance at the sites where drilling will occur on the back (eastern) portion of dunes. Vegetation types associated with the dunes are similar to those described for California State Parks Fort Ord property in Fort Ord Dunes State Park Preliminary General Plan and Draft Environmental Impact Report (ESA, 2004). These vegetation types include **central dune scrub**, **northern coastal scrub**, and **maritime chaparral**, in addition to unvegetated areas of beaches, bluffs, and blowout zone and areas dominated invasive sea fig. While the slant well lines will traverse beneath the dunes and most of these habitat types, the drilling sites are restricted to the back dunes, in areas occupied by **central dune scrub,** mixed with patches of invasive sea fig.

The central portion of the Marina Treatment Plant Site Study Area is developed and does not contain habitat. However, potential well sites may be located around the periphery, areas which support dune scrub habitat. A CNDDB record of Monterey spineflower occurs adjacent to the east side of the well's study area, and sand gilia and Yadon's wallflower records occur directly south of the site. No special-status species were observed in 2007 surveys.

Smith's blue butterfly could occur in coastal dune scrub near sourcewater intake facilities adjacent to coastal dunes (refer to index maps E2, F2, G2 and H2). **California legless lizard** (Anniella pulchra) could also occur is these areas, in addition to other areas with sandy soils. **California horned lizard** is likely to occur in sandy areas west of Highway 1. **White-tailed kite** could also potentially nest where large shrubs or trees occur in all other map segments study area.

Sourcewater and return flow pipelines will deliver water from the slant wells following an alignment along Reservation Road and Beach Road, before crossing fields in a northeast direction to the North Marina Desalination Plant. The return flow pipeline will follow an easement to the MRWPCA Treatment plant's ocean outfall. These alignments, for the most part, follow dirt or paved roads through or adjacent to **non-native grassland**, **agricultural fields**, and **developed** areas (residential areas and a water treatment plant. Restoration areas of dune scrub habitat are located adjacent to either side of the western extent of Reservation Road along the alignment approaching the intake well site.

In the grassland areas, potential for occurrence of **Congdon's tarplant**, **burrowing owl** and **California tiger salamander** is similar to that described above for the North Marina Desalination Plant Site. In areas containing central dune scrub, **Monterey spineflower, Yadon's wallflower, sand gilia**, and **sand-loving wallflower** have similar potentials for occurrence as described above for Slant Wells.

Wetlands

No potential USACE jurisdictional areas occur within North Marina project area.

Transmission Main South

The Transmission Main South pipeline corridor begins at Beach Road, and follows the TAMC railroad ROW through Marina. In this section, the ROW parallels the north side of Del Monte Boulevard, occurring as an approximately 100-foot wide passage of mostly **ruderal** vegetation, with areas of non-native grassland and ornamental trees. A population of Kellogg's horkelia was observed in the corridor in the northern part of Marina (Denise Duffy & Associates, 2007).

After traversing Marina, and then Highway 1, the corridor continues along the TAMC railroad ROW for approximately 4.5 miles before again traversing to the east side of Highway 1. This segment, including the narrow developed railroad bed and associated ruderal vegetation, passes through central dune scrub at the base of back dunes. A number of special-status species populations were observed during 2007 surveys (Denise Duffy & Associates, 2007; ESA, 2007). Monterey spineflower is found in scattered stands along the entire length if the segment. **Sandmat manzanita** occurs in relatively high density along about 2000 feet of corridor north of the vicinity of the Imjin Parkway/Highway 1 overpass. A few patches of Kellogg's horkelia occur in the corridor near the Light Fighter Drive/Highway 1 underpass. Michael's rein orchid (*Piperia michaelii*), a CNPS List 4.2 species, occurs rather frequently within the corridor south of this overpass. Monterey ceanothus (*Ceanothus cuneatus* var. *rigidus*), another CNPS List 4.2 plant, was observed just north of where the corridor passes again to the east side Highway 1 at the south end of this segment. Other special-status that have potential to occur that were not observed in 2007 surveys include **sand gilia**, **Yadon's rein orchid**, **robust spineflower**, **seaside bird's-beak**, **sand-loving wallflower**, **Eastwood's goldenbush**, **Pajaro manzanita**, and **Jolon clarkia**.

After crossing to the east side of Highway 1, the corridor jogs east and south through streets in the **developed urban area** of Seaside until reaching General Jim Moore Boulevard. From the crossing of General Jim Moore Boulevard to the Terminal Reservoir Site, the corridor passes through **maritime chaparral**. The habitat is similar to that of the Terminal Reservoir Site; see discussion of this site for discussion of habitat and special-status species.

California legless lizard could occur in coastal dune scrub, in addition to other areas with sandy soils. California horned lizard is likely to occur in sandy areas west of Highway 1.

Terminal Reservoir Site

The Terminal Reservoir Site will be located east of General Jim Moore Boulevard in an area that was formerly Fort Ord but is currently proposed to be annexed by the City of Seaside. The predominant vegetation type in the study areas is **central maritime chaparral**. The more southern study portion of this area has more developed woody vegetation in patches characteristic of **northern coastal scrub**.

Special-status plant species with potential to occur in the reservoir study areas include **Monterey Spineflower, seaside bird's-beak, sand gilia, sand-loving wallflower, Pajaro manzanita, Toro Manzanita, Kellogg's horkelia,** and **Eastwood's goldenbush**. **Coast horned lizard** is found in central maritime chaparral**.**

Contra Costa goldfields occur further east in the former Fort Ord, and designated critical habitat for the species abuts the study area. However, no habitat or primary constituent elements occur within the study areas.

Valley Green Pump Station

The Valley Green Pump Station is located in a residential developed area ~~of Monterey~~ in Carmel Valley at Valley Greens Drive. No special-status communities, plants, or wildlife is expected to occur at this location.

Aquifer Storage and Recovery (ASR) Facilities

The ASR Facilities would be located north of the Terminal Reservoir site, along General Jim Moore Boulevard. ~~Three~~ Two ASR sites are proposed, with placement along the stretch approximately between Military Avenue and Normandy Road. ~~McClure Way.~~ Habitat to the west of General Jim Moore Boulevard, where the facilities would be placed, is mostly developed with areas of **non-native grassland**. On the east side of the boulevard is primarily **coastal live oak woodland**, except for south of Military Avenue, where **central maritime chapparal** occurs east of the boulevard (a small area near the southernmost proposed ASR facility).

No special status plant species are expected to occur, except for potential in the area of central maritime chaparral. Potential plant species in this area are the same as those described below in "South Boundary Road to Terminal Reservoir and ASR." CNDDB records within Grid System reference M-1 include **American badger, globose dune beetle, Salinas harvest mouse, and western snowy plover**.

Monterey Pipeline

The eastern end of the Monterey Pipeline terminates at the North Marina to Terminal Reservoir pipeline segment at approximately the intersection of Del Monte Boulevard and La Salle Avenue. It continues southwest along Del Monte Boulevard through developed urban area until it passes beneath Highway 1. South of Highway 1 the pipeline route follows a bike path to the area of the Monterey municipal wharf, passing through approximately 1 ¾ miles of altered habitats on sandy soils including developed urban area, patches of eucalyptus forest, patches of oak woodland, and dune scrub restoration areas. West of the municipal wharf, the remainder of the pipeline passes through developed urban area of Monterey, except for an approximately 1000-foot stretch through non-native grasslands of the Presidio of Monterey.

No special-status plant or animal species are expected to occur along this pipeline route, although there is marginal potential for occurrence in the dune scrub restoration areas including **Monterey spineflower, Yadon's wallflower, sand gilia,** and **sand-loving wallflower**.

Carmel River

As indicated above, a discussion of the existing aquatic resources of the Carmel River is included in this DEIR even though none of the project components would be located in or near the river. However, the operations of the project would affect streamflows in the Carmel River, and therefore affect the river's aquatic biological resources. Implementation of the CWP would result in a reduction in CalAm's pumping of river subflows from the Carmel River by as much as 8,498 afy compared to existing conditions (1996 – 2006 annual average production) and by as much as 10,730 afy compared to pre-Order 95-10 conditions (1979-1988 annual average production).

The Carmel River originates in the Ventana Wilderness at an elevation of approximately 5,000 ft and flows northwest for 35 miles before reaching the ocean at Carmel Bay. The Carmel River Basin is comprised of the mainstem of the Carmel River plus seven major tributaries and drains an area of approximately 250 square miles. The Mediterranean climate of the Carmel River Basin is generally mild, with warm, dry summers and cool, wet winters.

The fish community in the Carmel River is relatively diverse. Twenty species have been identified within the river and lagoon, including 12 native and 8 introduced species (**Table 4.4-3**). Sculpins, brown trout (*Salmo trutta*), hitch, threespine stickleback, and steelhead are the most abundant species (EDAW, 2000). Species composition in the lower river and lagoon may change as a function of the connectivity of the mouth of the river with the ocean.

Two dams, both owned and operated by CalAm to regulate streamflow and supply water to users on the Monterey Peninsula, are located on the Carmel River. San Clemente Dam, which is near the confluence with San Clemente Creek at about River Mile (RM) 18, is 85 feet high and was completed in 1921. When the dam was built, the reservoir it formed had a total storage capacity of 1,425 AF at a spillway elevation of 525 feet above mean sea level (msl). However, due to sedimentation, the current capacity of the reservoir is less than 150 AF. San Clemente Dam contains an outdated fish ladder. Los Padres Dam, completed in ~~1949~~ 1951, is 148 feet high and is located at about RM 25. Its original reservoir capacity of 3,030 AF at a spillway elevation of 1,040 feet msl has been reduced to approximately 1,500 AF due to accumulated sediment. In 2003, CalAm indicated that it does not plan to dredge Los Padres Reservoir to maintain reservoir storage capacity (Jones & Stokes, 2003b). Therefore, given the average historical rate of sedimentation of approximately 30 AFY, Los Padres Reservoir is projected to fill with sediment within 60 years (Jones & Stokes, 2003b). A trap-and-truck operation is used to pass adult steelhead over Los Padres Dam. CalAm owns a third dam, Old Carmel River Dam, which is located approximately 1,800 feet downstream of Los Padres Dam. Constructed in 1883, the dam currently serves no operational purposes for CalAm. Old Carmel River Dam contains a fish ladder, but it does not function very well (NMFS, 2005).

TABLE 4.4-3
FISH SPECIES REPORTED FROM THE CARMEL RIVER BASIN

		Area of Occurrence	
Common Name	**Scientific Name**	**Mainstem/Tributaries**	**Lagoon**
Native Species			
Pacific lamprey	*Lampetra tridentata*	X	X
River lamprey	*Lampetra ayresi*	X	
Hitch	*Lavinia exilicauda*	X	
Sacramento blackfish	*Orthodon microlepidotus*	X	X
Steelhead/rainbow trout	*Oncorhynchus mykiss*	X	X
Brown trout	*Salmo trutta*	X	
Threespine stickleback	*Gasterosteus aculeatus*	X	X
Prickly sculpin	*Cottus asper*	X	X
Coastrange sculpin	*Cottus aleuticus*	X	
Staghorn sculpin	*Leptocottus armatus*		X
Shiner perch	*Cymatogaster aggregata*		X
Starry flounder	*Platichthys stellatus*		X
Introduced Species			
Goldfish	*Carassius auratus*	X	
Carp	*Cyprinus carpio*	X	
Black bullhead	*Ameiurus melas*	X	
Mosquitofish	*Gambusia affinis*	X	
Striped bass	*Morone saxatilis*		X
Green sunfish	*Lepomis cyanellus*	X	
Bluegill	*Lepomis macrochirus*	X	
Largemouth bass	*Micropterus salmoides*	X	

SOURCE: EDAW, 2000; ESA, 2008.

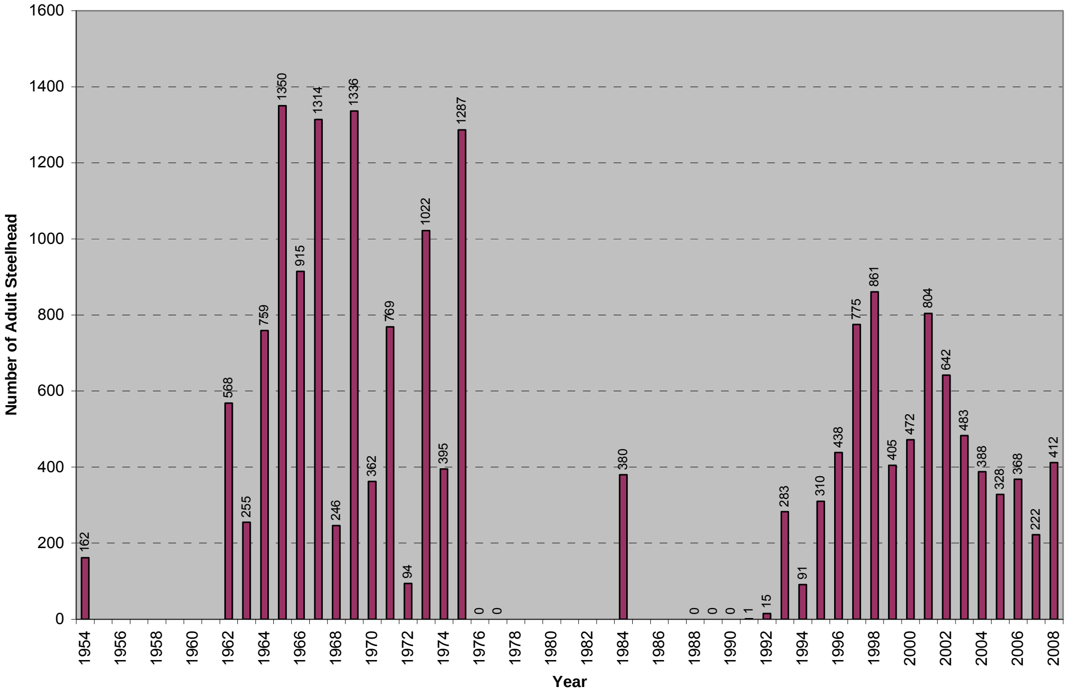
In 2003, the Department of Water Resources, Division of Safety of Dams (DWR-DSOD) required CalAm to lower the water surface elevation in SCD by drilling six ports in the dam and drawing off the upper 10 feet of water. This interim project was implemented to partially reduce the risks to life and property, if San Clemente Dam should fail due to a maximum credible earthquake. Until recently, ~~R~~removal of San Clemente Dam ~~is currently~~ was being planned as an independent project to address the dam's safety deficiencies (Entrix, 2006). However, in February 2009, CalAm withdrew from this cooperative effort with the California Coastal Commission and NMFS, and is currently pursuing a dam strengthening project.

San Clemente and Los Padres Dams are operated conjunctively to regulate streamflow and, in the past, to supply water to users in Carmel Valley and on the Monterey Peninsula through the Carmel Valley Filter Plant. No flood control storage is allocated in either reservoir, although some negligible flood control benefits may be attributable to these dams early in the flood season, when storage space is available as a result of summer drawdown for water supply and instream flow releases. The dams have a negligible effect on peak flows downstream later in the flood season, when the reservoirs are full. In general, Los Padres Dam is operated by CalAm to maintain as much water as possible in San Clemente Reservoir and to meet an SWRCB streamflow requirement of 5 cubic feet per second (cfs) below the dam. San Clemente Dam is operated by CalAm in accordance with quarterly water supply budgets developed in cooperation with MPWMD and a memorandum of agreement (MOA) that is developed each year by CalAm, MPWMD, and CDFG. The MOA is designed to maximize releases from San Clemente Reservoir to maintain rearing habitats for juvenile steelhead in the river downstream of San Clemente Dam (Jones & Stokes, 2003b).

Steelhead

Status in the Carmel River Basin

The steelhead run in the Carmel River at the time of the Spanish explorers was believed to be upwards of 12,000 fish (SWRCB, 1995). The river was over-fished during the mid-to-late 1800s, and the runs subsequently declined. During the mid-1970s, annual runs of steelhead at the San Clemente Dam fishway were estimated at 1,200 adults. During droughts in 1976-77 and the late 1980s, no steelhead passed San Clemente Dam. Opportunities for upstream migration were limited in 1987 and 1991, and no outflow through the river mouth occurred in 1988, 1989, and 1990. Thus, sea-run adults were unable to migrate upstream from the ocean to spawn during those years. However, some adults from the 1987 sea run were landlocked and spawned during spring 1988 and 1989 (Jones & Stokes, 2006). The Lagoon never opened during the four years from 1987 to 1990. Density of rearing juvenile steelhead reached very low levels by 1989, but increased in subsequent years. After lows of zero returning adult steelhead in 1989-90, one fish in 1991, and 15 in 1992, the run has increased to an average of a few hundred fish (**Figure 4.4-4**). During the past eleven years (1997-2008), the number of adults averaged 513, or about 66 percent of the historical average (780 adults) during the 1962 to 1975 period. While the number of adults has not returned to historical levels, it appears to have partially recovered from the effects of the 1987-91 and earlier drought. Nevertheless, recent population trends indicate that environmental factors continue to severely limit the recruitment of adults.

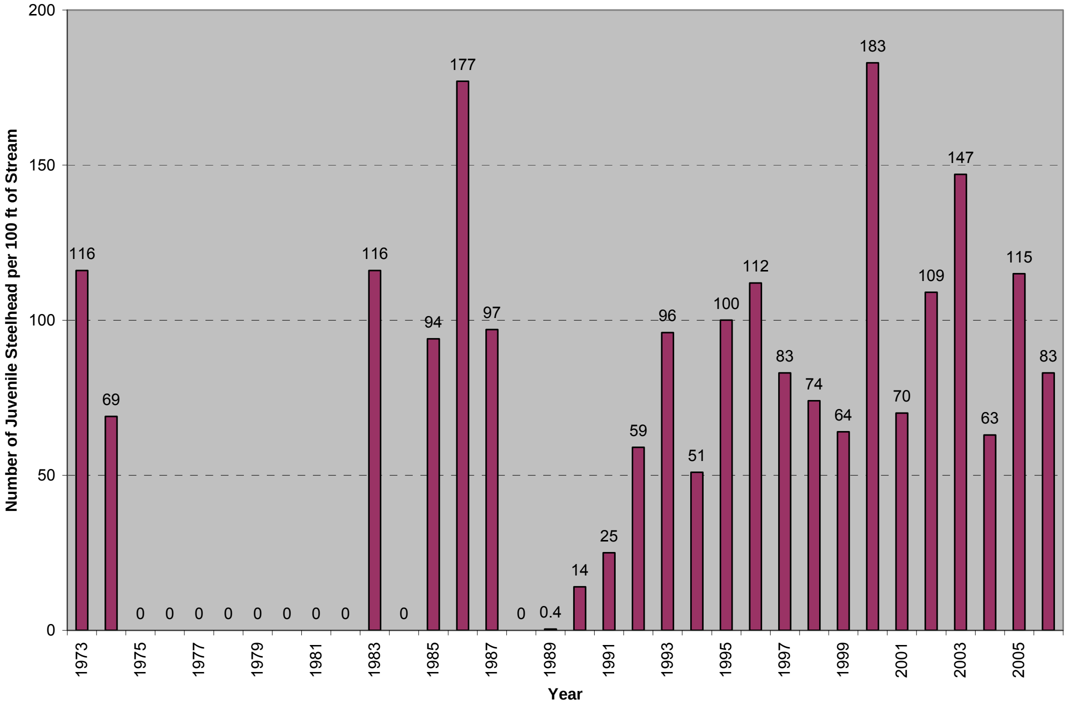


Coastal Water Project ▪ 205335

SOURCE: MPWMD, 2008

Figure 4.4-4
Number of Adult Steelhead at San Clemente Dam, 1954-2008

Meanwhile, MPWMD has surveyed the juvenile steelhead population in the Carmel River below Los Padres Dam since 1989. This information is crucial in assessing the success of adult reproduction and in determining whether freshwater habitats are fully seeded with juvenile steelhead. The population is surveyed at eight stations in the 15-mile-long reach between Robinson Canyon Road Bridge and Los Padres Dam. In this reach, the population density has increased from near zero in 1989 to recent (1997-2006) annual averages ranging from 63 to 183 fish per 100 lineal feet of stream (**Figure 4.4-5**). The recent densities are similar to, or slightly higher than, densities in other coastal streams in Central and Northern California (Jones & Stokes, 2006).



Coastal Water Project ▪ 205335

SOURCE: MPWMD, 2008

Figure 4.4-5
Average Carmel River Juvenile Steelhead
Population Density, 1973-2006

Current Habitat Conditions

The aquatic habitat of the Carmel River Basin has been altered by the construction and operation of San Clemente Dam and Los Padres Dam on the upper river, and development of an extensive groundwater pumping project on the lower river. The dams have impeded fish migration, affected instream temperature, and altered substrate conditions by blocking sediment transport. Groundwater extraction in the lower basin has altered flow conditions including eliminating surface flows during the dry season in most years and reducing surface flows at other times of year; eliminating or reducing riparian vegetation; and altering the amount and timing of inflow to the Carmel River Lagoon. The reduction or elimination of flow into the Lagoon during the spring, summer, and fall lowers water in the Lagoon to the detriment of fish and aquatic invertebrate communities (EDAW, 2000).

In most years, adult steelhead spawn in 62 miles of stream habitat: 24.5 miles of the mainstem, 30 miles of primary tributaries, and 7.5 miles of secondary tributaries. Spawning habitat in the mainstem upstream of the Narrows totals approximately 120,000 square feet: 50,000 square feet in the reach from the Narrows to San Clemente Dam (41 percent of total), 10,000 square feet from San Clemente Reservoir to Los Padres Dam (9 percent of total), and 60,000 square feet upstream of Los Padres Reservoir (50 percent of total). **Figure 4.4-6** illustrates the extent of steelhead spawning habitat in the Carmel River Basin. The quantity of spawning habitat in the mainstem below San Clemente Dam and between San Clemente Reservoir and Los Padres Dam is limited by the entrapment of spawning gravels in the existing reservoirs (Jones & Stokes, 2003b).

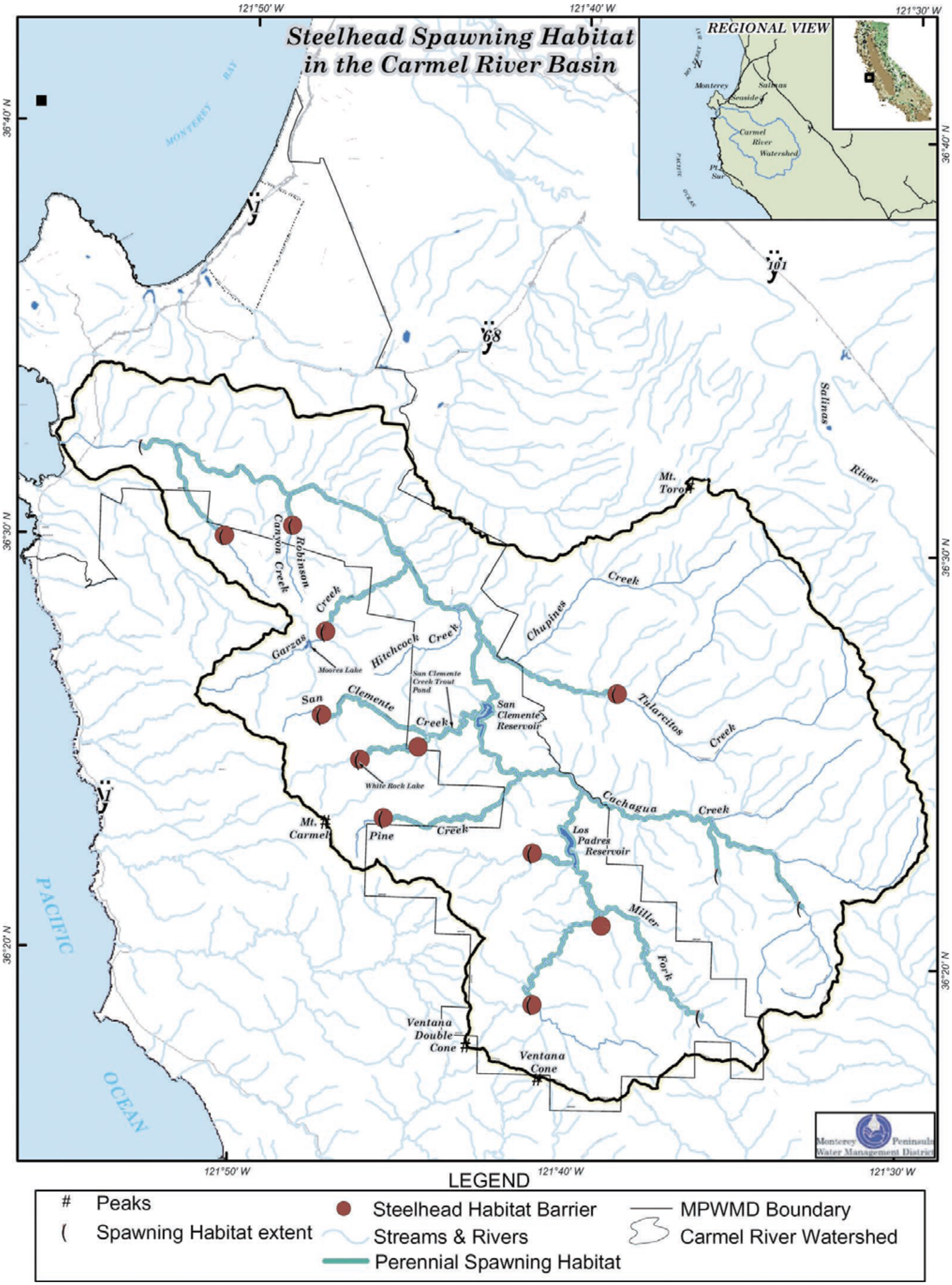
In most years, 49 miles of rearing habitat are available, with 20 miles on the mainstem, 24 miles on primary tributaries, and 5 miles on secondary tributaries. For young-of-the-year steelhead, 28 percent of the total rearing habitat is located in the reach from the Narrows to San Clemente Dam, 33 percent occurs between San Clemente Reservoir and Los Padres Dam, and 39 percent is located upstream of Los Padres Reservoir. For yearling and older steelhead, 23 percent of the total rearing habitat is in the reach from the Narrows to San Clemente Dam, 20 percent is from San Clemente Reservoir to Los Padres Dam, and 57 percent is upstream of Los Padres Reservoir (Jones & Stokes, 2003b) (**Figure 4.4-7**).

The rearing habitat in the mainstem of the Carmel River can be divided into three broad reaches based on the physical character of the channel and summer flow regimes (Jones & Stokes, 2003b):

Upper Mainstem. Most habitat upstream of Los Padres Dam is within the Ventana Wilderness area, where river flow is unregulated, roads have not caused erosion, the stream gradient is steep, and bedrock outcrops control the course of the channel. Deep pools separated by short, shallow glides and long, cobble/boulder riffles and runs are common.

Middle Mainstem. In the reach between the dams, the channel configuration is controlled by bedrock outcrops and large boulders. The substrate is a mixture of cobbles and boulders and lacks a natural source of gravel because most of it is trapped behind Los Padres Dam. During summer, water stored in Los Padres Dam is released into the channel and diverted or released at San Clemente Dam. By agreement with DFG and under a water right permit from the SWRCB, CalAm maintains a minimum flow of 5 cfs below Los Padres Dam. Because of variation in natural accretion, the augmented dry season flows range from 5 cfs in critical years to 15 cfs in wet years.

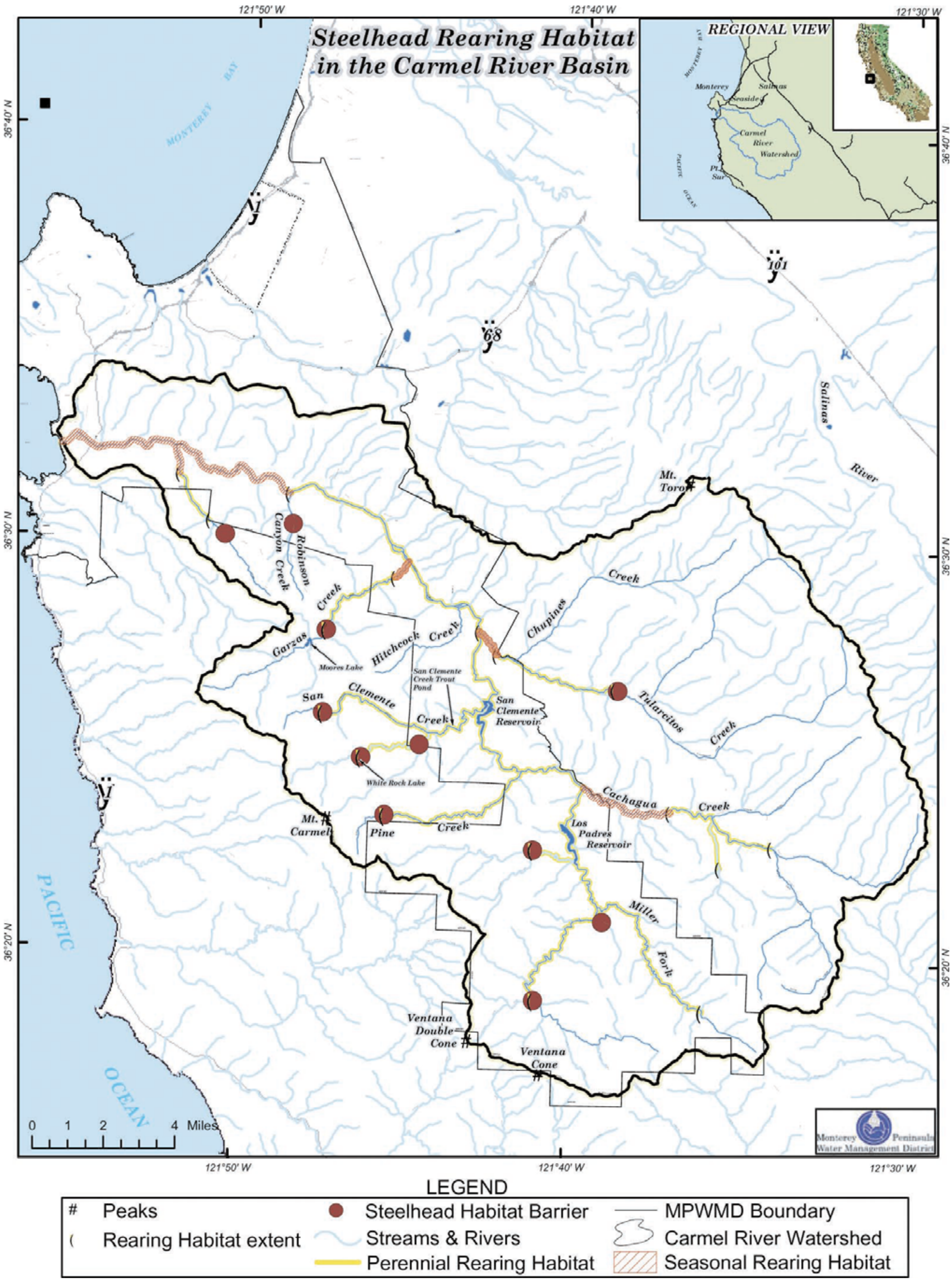
Lower Mainstem. Below San Clemente Dam downstream to near Paso Hondo Road (Powell’s Hole), the river is controlled primarily by bedrock outcrops. Below Powell’s Hole, the channel is primarily alluvial, where the river’s course and configuration periodically shift as a result of the interaction of alluvial deposits with floodflows that rearrange, scour, and deposit bedload along the course of the river.



SOURCE: MPWMD

CalAm Coastal Water Project . 205335

Figure 4.4-6
Steelhead Spawning Habitat in the Carmel River Basin



SOURCE: MPWMD

Figure 4.4-7
Steelhead Rearing Habitat in the Carmel River Basin

Limiting Factors

Past reviews of environmental problems in the Carmel River have led to a general understanding of the factors that constrain the steelhead population in the Carmel River:

- Inadequate passage facilities for adults and juveniles at Los Padres Dam – Fish were injured when passing over the dam at low to moderate flows.

- Diversion of surface flows at San Clemente Dam – Rearing habitat for young-of-the-year and yearling steelhead was reduced to critical levels below San Clemente Dam when river flow was reduced as a result of diversions at San Clemente Dam (based on an agreement with NMFS, CAW has not diverted water at San Clemente Dam during low flow conditions since 2001).

- Subsurface diversion of streamflow that percolates into the Carmel Valley Aquifer between San Clemente Dam and the Lagoon – The decline in spring flows reduces habitat for juveniles, impairs smolt emigration, and threatens emigrating fish by stranding them in drying pools.

- Reduction in the number of trees and canopy of the riparian forest downstream of Robles del Rio – A reduction in shade and canopy over the river in turn reduces the food available for juvenile steelhead, increases water temperatures, and reduces the quantity and quality of steelhead habitat.

- Increased erosion of sand and gravel from denuded riverbanks by winter flows – Erosion and deposition of sand and silt destroys steelhead habitat by filling spaces between cobbles and boulders that function as cover for juvenile fish and as habitat for the aquatic insects on which they feed.

- The interruption of streamflow at San Clemente Dam and blockage of smolt emigration – Raising the spillway gates in spring may impair steelhead emigration while the reservoir is filling and reduces streamflow downstream of the dam. This may result in temporary or seasonally complete blockage of smolt migration past San Clemente Dam~~ in some years~~. However, the spillway gates have not been raised since the 1990’s.

- Deposition of sand and reduced freshwater inflow into the Lagoon, coupled with infiltration of seawater – Increased volumes of sand and reduced inflow of freshwater reduce lagoon habitats for adults during winter, for smolts during spring, and for juveniles during summer and fall. These factors can result in high water temperatures, salinity, and carbon dioxide, low dissolved oxygen levels, shallow water depths, and high levels of bird predation.

- Insufficient flows for upstream migration of adults during droughts – Because of the extraction of groundwater during summer months, the aquifer either does not fill during drought years or fills later during the following wet season. This delays or eliminates flows needed for upstream migration in the following January, February, and March.

Instream Flow Requirements

Instream flows necessary for suitable steelhead migration, spawning, and rearing conditions in the Carmel River watershed have been investigated extensively. The following discussion of instream flow requirements for steelhead is based on a Jones and Stokes (2003a) summary of reports prepared by Dettman and Kelly (1986), Dettman (1989 and 1993), and Alley (1998). NMFS

(2002) reviewed the above information and developed minimum flow guidelines for previously considered off-stream storage projects for the Carmel River.

Adult Migration. Successful attraction of adult steelhead into the river and subsequent upstream migration require pulses of high winter flows to the Lagoon to stimulate movement of adults, flows of sufficient magnitude and duration to permit passage of adults past critical riffles in the lower river, and adequate outflows to keep the river mouth open between storms. Attraction flows are defined based on the sequence of daily flows that historically attracted adult steelhead into the lower Carmel River. Peak numbers of adult steelhead arriving at San Clemente Dam typically coincide with storm events that increase flows to 200 cfs or more for several days, although adults respond to lower flows of shorter duration later in the season (Dettman and Kelley 1986). Dettman and Kelley (1986) also recognized the importance of maintaining these flow pulses throughout the season (associated with the natural sequence of storms) to maximize migration opportunities for adults. Based on a review of this information, NMFS (2002) recommended a 200 cfs minimum attraction flow into the Lagoon during wet, normal, and below normal years during the period of December 15 through April 15. During dry and critically dry years, the recommended minimum attraction flows for February and March are 100 cfs and 75 cfs, respectively.

Following an attraction event, the ability of adults to reach spawning areas below San Clemente Dam can be influenced by passage conditions (water depths) at critical riffles and suitable resting habitat in the lower river. Based on a review of previous assessments and additional field measurements in 1991, Dettman (1993) concluded that a minimum flow of 60 cfs into the lagoon is needed to provide adequate conditions for adult passage in the lower river. NMFS (2002) agrees with this recommendation.

In addition, a minimum flow of 40 cfs is considered necessary for maintaining suitable resting habitat for adults during their migration (Dettman 1989). Stranding of adults in pools in the lower river is associated with flows less than or equal to 40 cfs. Such flows can delay migration and increase the susceptibility of adults to angling mortality (or poaching) and predation.

Spawning. Streamflow in combination with channel and substrate conditions determines the availability of suitable spawning sites for adult steelhead and, hence, the potential number of fry produced in a given reach. Based on an assessment of the relationships between flow and spawning habitat quantity and quality, measured in terms of weighted usable area (WUA) (Alley, 1998), spawning habitat for steelhead in the Carmel River is rated as “good” or “excellent” when streamflows measured at the Narrows are 43 cfs or higher. However, NMFS (2002) states that “to fully recover steelhead to the Carmel River, it is appropriate to recommend that optimal or very nearly optimal flow conditions be retained for the spawning life stage”. Thus, NMFS recommends that between attraction events, a minimum bypass flow of 100 cfs should be maintained between the Los Padres and San Clemente reservoirs, 90 cfs be maintained between San Clemente Dam and RM 5.5, and 60 cfs be maintained between RM 5.5 and the Lagoon.

Juvenile Rearing. Dettman and Kelly (1986) assessed the relationships between flow and rearing habitat quantity and quality (rearing habitat index) between the Narrows and San Clemente Dam and the relationships between the rearing habitat index and steelhead population density from studies conducted on other central coast streams where rearing habitat was assumed to be fully seeded with juveniles. Based on this study, the rearing capacity for young-of-the-year (age 0+) steelhead in the Carmel River between the Narrows and San Clemente Dam is rated as “good” or “excellent” when streamflows measured at the Narrows are 6.1 cfs or higher. NMFS (2002), recommend a minimum flow of 20 cfs at the Narrows *and* 5 cfs at the Lagoon between June 1 and November 30 to “protect and restore runs of steelhead and other aquatic resources”.

Smolt Outmigration. Smolt survival from upstream rearing areas to the lagoon during the spring emigration period is rated based on the average April and May flow at the lagoon. Previous studies indicate that the quality and quantity of habitat for yearling steelhead and the survival of emigrating smolts is related to the magnitude of spring flows (Dettman and Kelley, 1986). Based on a correlation between adult counts at San Clemente Dam and spring flows, the relationship between flow and rearing habitat for yearlings, and observations of the flows needed to keep the river mouth open during the spring, smolt survival in the Carmel River is rated as “good” or “excellent” when streamflows measured at the Lagoon are 40 cfs or higher. However, NMFS (2002) notes that the 40 cfs recommendation was formulated “within the constraint of providing high quality habitat, without severely depleting reservoir storage”, and instead recommends a minimum flow of 80 cfs into the Lagoon from mid-April through May.

4.4.3 Regulatory Framework

4.4.3.1 Special-Status Species

Federal Endangered Species Act (FESA)

The USFWS (jurisdiction over plants, wildlife, and resident fish) and NMFS (jurisdiction over anadromous fish and marine fish and mammals) oversee the FESA. Section 7 of the Act mandates that all federal agencies consult with the USFWS and NMFS to ensure that federal agencies actions do not jeopardize the continued existence of a listed species or destroy or adversely modify critical habitat for listed species. The federal agency is required to consult with the USFWS and NMFS if it determines a “may effect” situation will occur in association with the proposed project. The FESA prohibits the “take” of any fish or wildlife species listed as Threatened or Endangered, including the destruction of habitat that could hinder species recovery.

Under Section 9 of the FESA, the take prohibition applies only to wildlife and fish species. However, Section 9 does prohibit the removal, possession, damage or destruction of any Endangered plant from federal land. Section 9 also prohibits acts to remove, cut, dig up, damage, or destroy an Endangered plant species in nonfederal areas in knowing violation of any state law or in the course of criminal trespass. Candidate species and species that are proposed or under petition for listing receive no protection under Section 9 of the FESA.

Section 10 of the FESA requires the issuance of an “incidental take” permit before any public or private action may be taken that would potentially harm, harass, injure, kill, capture, collect, or otherwise hurt (i.e., take) any individual of an Endangered or Threatened species. The permit requires preparation and implementation of a habitat conservation plan that would offset the take of individuals that may occur, incidental to implementation of the project by providing for the overall preservation of the affected species through specific mitigation measures.

Federal Migratory Bird Treaty Act

The Migratory Bird Treaty Act states that without a permit issued by the U.S. Department of the Interior, it is unlawful to pursue, hunt, take, capture, or kill any migratory bird.

Federal Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) is the principal Federal legislation that guides marine mammal species protection and conservation policy. The MMPA delegates authority for oceanic marine mammals to the Secretary of Commerce, the parent agency of the National Oceanic and Atmospheric Administration (NOAA). Species of the order Cetacea (whales and dolphins) and species, other than walrus, of the order Carnivora, suborder Pinnipedia (seals and sea lions), are the responsibility of NOAA Fisheries (or the Service). The Department of the Interior's Fish and Wildlife Service is responsible for the dugong, manatee, polar bear, sea otter, and walrus. Marine mammals that are already managed under international agreements are exempt as long as the agreements further the purposes of the MMPA.

The MMPA prohibits, with certain exceptions, the take of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S.

Federal Essential Fish Habitat

The Sustainable Fisheries Act of 1996 (Public Law 104-297), amended the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to establish new requirements for Essential Fish Habitat (EFH) descriptions in federal Fisheries Management Plans (FMPs) and to require federal agencies to consult with the National Marine Fisheries Service (NMFS) on activities that may adversely affect EFH. The Magnuson-Stevens Act requires all fishery management councils to amend their FMPs to describe and identify EFH for each managed fishery. The Act also requires consultation for all federal agency actions that may adversely affect EFH (i.e., direct versus indirect effects); it does not distinguish between actions in EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside of EFH, such as upstream and upslope activities that may have an adverse effect on EFH. Therefore, EFH consultation with NMFS is required by federal agencies undertaking, permitting, or funding activities that may adversely affect EFH, regardless of the activity's location. Under section 305(b)(4) of the Magnuson-Stevens Act, NMFS is required to provide EFH conservation and enhancement recommendations to federal and state agencies for actions that adversely affect EFH. However, state agencies and private parties are not required to consult with NMFS unless state or private actions require a federal permit or receive federal funding. Although the concept of EFH is similar to that of critical habitat under the FESA, measures recommended to protect EFH by NMFS are advisory, not proscriptive.

NMFS strongly encourages efforts to streamline EFH consultation and other federal consultation processes. EFH consultation can be consolidated, where appropriate, with interagency consultation, coordination and environmental review procedures required by other statutes such as the National Environmental Policy Act (NEPA), Fish and Wildlife Coordination Act, Clean Water Act, FESA, and Federal Power Act. EFH consultation requirements can be satisfied using existing review procedures if they provide NMFS timely notification of actions that may adversely affect EFH and the notification meets requirements for EFH Assessments (i.e., a description of the proposed action, an analysis of the effects, and the Federal agency's views regarding the effects of the action on EFH and proposed mitigation, if applicable).

California Endangered Species Act

California implemented its own Endangered Species Act (CESA) in 1984. The state act prohibits the take of Endangered and Threatened species; however, habitat destruction is not included in the state's definition of take. Section 2090 of CESA requires state agencies to comply with endangered species protection and recovery and to promote conservation of these species. The CDFG administers the act and authorizes take through Section 2081 agreements (except for designated "fully protected species" – see below).

Regarding rare plant species, CESA defers to the California Native Plant Protection Act of 1977, which prohibits importing of rare and endangered plants into California, taking of rare and endangered plants, and selling of rare and endangered plants. State-listed plants are protected mainly in cases where state agencies are involved in projects under CEQA. In this case, plants listed as rare under the California Native Plant Protection Act are not protected under CESA but can be protected under CEQA.

California Fish and Game Code

Under Section 3503 of the California Fish and Game Code, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. Section 3503.3 of the California Fish and Game Code prohibits take, possession, or destruction of any birds in the orders Falconiformes (hawks) or Strigiformes (owls), or of their nests and eggs.

California Fully Protected Species

California law (Fish and Game Code Sections 3511 [birds], 4700 [mammals], 5050 [reptiles and amphibians] and 5515 [fish] allows the designation of a species as Fully Protected. This is a greater level of protection than is afforded by the California Endangered Species Act, since such a designation means the listed species cannot be taken at any time.

CEQA Guidelines Section 15380

Although threatened and endangered species are protected by specific federal and State statutes, CEQA Guidelines section 15380(b) provides that a species not listed on the federal or State list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled after the definition in the FESA and the section of the California Fish and Game Code dealing with rare or endangered plants or animals. This section was included in the Guidelines primarily to deal with situations in which a public agency is reviewing a project that may have a significant effect on, for example, a "candidate species" that has not yet been listed by either the USFWS or CDFG. Thus, CEQA provides an agency with the ability to protect a species from a project's potential impacts until the respective government agencies have an opportunity to designate the species as protected, if warranted.

4.4.3.2 Regulation of Waters Including Wetlands

U.S. Army Corps of Engineers and U.S. Environmental Protection Agency

Wetlands and other waters (e.g., rivers, streams, and natural ponds) are a subset of "waters of the U.S.,"[3] and receive protection under Section 404 of the Clean Water Act (CWA). The U.S. Army Corps of Engineers has primary federal responsibility for administering regulations that concern waters of the U.S. In this regard, the Corps acts under two statutory authorities: the Rivers and Harbors Act (Sections 9 and 10), which governs specified activities in "navigable waters,"[4] and the Clean Water Act (Section 404), which governs specified activities in waters of the U.S., including wetlands. The construction of structures, such as tidegates, bridges, or piers, or work that could interfere with navigation, including dredging or stream channelization, may require a Section 10 permit, in addition to a Section 404 permit if the activity involves the discharge of fill. The U.S. Environmental Protection Agency (U.S. EPA) has the ultimate authority for designating dredge and fill material disposal sites and can veto the Corp's issuance of a permit to fill jurisdictional waters of the U.S.

The Corps requires a permit if a project proposes placement of structures within navigable waters and/or alteration of waters of the U.S. Some classes of fill activities may be authorized under Regional General or Nationwide permits if specific conditions are met. Nationwide permits do not authorize activities that are likely to jeopardize the existence of a threatened or endangered species (listed or proposed for listing under the FESA). The Nationwide permit outlines general conditions and may specify project-specific conditions as required by Corps during the Section 404 permitting process. When a project's activities do not meet the conditions for a Nationwide Permit, an Individual Permit may be issued by the Corps.

The federal government also supports a policy of minimizing "the destruction, loss, or degradation of wetlands." Executive Order 11990 (May 24, 1977) requires that each federal

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[3] The term "waters of the U.S.," as defined in Code of Federal Regulations (33 CFR 328.3[a]; 40 CFR 230.3[s]), includes: (1) all waters that are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide; (2) all interstate waters, including interstate wetlands; (3) all other waters, such as intrastate lakes, rivers, streams (including intermittent streams), mud flats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce, including any such waters that are or could be used by interstate or foreign travelers for recreational or other purposes; or from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or which are used or could be used for industrial purposes by industries in interstate commerce; (4) all impoundments of waters otherwise defined as waters of the U.S. under the definition; (5) tributaries of waters identified in numbers (1) through (4); (6) territorial seas; and (7) wetlands adjacent to waters (other than waters that are themselves wetlands) identified in numbers (1) through (6).

[4] Navigable waters are defined as those waters that are subject to the ebb and flow of the tide or that are presently used, have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

agency take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

In recent years several Supreme Court cases have challenged the scope and extent of the Corps' jurisdiction over waters of the United States and have led to several reinterpretations of that authority. The most recent of these decisions are the case of *Solid Waste Agency of Northern Cook County* (SWANCC) *v. the Army Corps of Engineers* (January 9, 2001) and *Rapanos v. United States* (June, 2006). The SWANCC decision found that jurisdiction over non-navigable, isolated, intrastate waters could not be based solely on the use of such waters by migratory birds. The reasoning behind the SWANCC decision could be extended to suggest that waters need a demonstrable connection with a 'navigable water' to be protected under the CWA. The introduction of the term "isolated" has led to the consideration of the relative connectivity between waters and wetlands as a jurisdictionally relevant factor. The more recent Rapanos case further questioned the definition of "waters of the United States" and the scope of federal regulatory jurisdiction over such waters but resulted in a split decision which did not provide definitive answers but expanded on the concept that a "significant nexus" with traditional navigable waters was needed for certain waters to be considered within the jurisdiction of the Corps.

On June 5, 2007 the EPA and the Corps released guidance on CWA jurisdiction in response to the Rapanos Supreme Court decision, which can be used to support a finding of CWA coverage for a particular water body when either a) there is a significant nexus between the stream or wetland in question and navigable waters in the traditional sense; or b) a relatively permanent water body is hydrologically connected to traditional navigable waters and/or a wetland has a surface connection with that water. According to this guidance the Corps and the EPA will take jurisdiction over the following waters:

1. Traditional navigable waters, which are defined as all waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

2. Wetlands adjacent to traditional navigable waters; including adjacent wetlands that do not have a continuous surface connection to traditional navigable waters;

3. Non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months);

4. Wetlands adjacent to non-navigable tributaries as defined above; that have a continuous surface connection to such tributaries (e.g. they are not separated by uplands, a berm, dike, or similar feature).

The EPA and the Corps claim jurisdiction over the following waters, based on a fact-specific determination of significant nexus, as defined below, to a traditional navigable water: non-navigable tributaries that are not relatively permanent; wetlands adjacent to non-navigable tributaries that are not relatively permanent; and wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary.

The EPA and the Corps *generally* do not assert jurisdiction over the following features: swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow); ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water.

The EPA and the Corps have defined the significant nexus standard as follows:

1. A significant nexus analysis assesses the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical and biological integrity of downstream traditional navigable waters;
2. Significant nexus analysis includes consideration of hydrologic and ecologic factors including:
    a. volume, duration, and frequency of flow, including consideration of certain physical characteristics of the tributary,
    b. proximity to a traditional navigable water,
    c. size of the watershed,
    d. average annual rainfall,
    e. average annual winter snow pack,
    f. potential of tributaries to carry pollutants and flood waters to traditional navigable waters,
    g. provision of aquatic habitat that supports a traditional navigable water,
    h. potential of wetlands to trap and filter pollutants or store flood waters, and
    i. maintenance of water quality in traditional navigable waters.

Regional Water Quality Control Board

The Regional Water Quality Control Board (RWQCB) regulates waters of the state under the Porter-Cologne Water Quality Control Act. Under Section 401 of the Clean Water Act, the RWQCB has review authority of Section 404 permits. The RWQCB has a policy of no-net-loss of wetlands in effect and typically requires mitigation for all impacts to wetlands before it will issue a water quality certification. Dredging, filling, or excavation of isolated waters constitutes a discharge of waste to waters of the state, and prospective dischargers are required to submit a report of waste discharge to the RWQCB and comply with other requirements of Porter-Cologne.

California Department of Fish and Game

Under Sections 1600 - 1616 of the California Fish and Game Code, the California Department of Fish and Game (CDFG) regulates activities that would substantially divert, obstruct the natural flow, or substantially change of rivers, streams and lakes. The jurisdictional limits of CDFG are defined in Section 1602 of the California Fish and Game Code as, “bed, channel, or bank of any river, stream, or lake, or deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake….” The CDFG requires a Streambed Alteration Agreement for activities within its jurisdictional area.

California Coastal Commission

Portions of the project area are within the coastal zone, as defined by §30160 of the California Coastal Act of 1976. Land and water uses in this zone are regulated by the California Coastal Commission (CCC), which administers the Federal Coastal Zone Management Act (CZMA). The most significant provisions of the CZMA give the CCC regulatory control over all federal activities and federally licensed, permitted, or assisted activities if the activity affects coastal resources. In the context of terrestrial resources in the project area, these activities include both USACE fill permits and certain USFWS permits. Because the CCC typically defines wetlands based on the “one-parameter approach” (see page 4.4-16). CCC jurisdictional wetlands are typically greater in extent than those claimed by the Corps.

The project would need a Coastal Development Permit from the CCC and local cities with fully certified Local Coastal Programs, which requires discretionary review of detailed development plans for any proposed use, structure, or activity located within the coastal zone (unless specifically exempted) as established by the California Coastal Act.

Monterey Bay National Marine Sanctuary

The Monterey Bay National Marine Sanctuary (MBNMS) has jurisdiction over the project area. The MBNMS was designated in 1992 and is a federally protected marine area offshore of California’s central coast, stretching from Marin to the community of Cambria. The MBNMS encompasses a shoreline length of 276 miles and 5,322 square miles of ocean, and extends an average distance of 30 miles from shore. The MBNMS was established to protect resources, as well as for research, education, and public use. MBNMS is also mandated to facilitate multiple uses of the Sanctuary, provided that the uses are consistent with the primary goal of resource protection.

The marine biological resources and regulatory framework related to the Coastal Water Project are further discussed in Section 4.3, *Marine Biological Resources*, of this DEIR

4.4.3.3 Provisions and Policies Applying to Sensitive Habitats in both Wetlands and Uplands

California Coastal Act Provisions and ESHAs

The Coastal Act defines “environmentally sensitive habitat areas” (ESHAs) as “any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.” PRC Section 30107.5. The Coastal Commission generally treats wetlands, streams, riparian habitats, and open coastal waters as ESHAs, although exceptions may exist where the definition of ESHA is not satisfied. An ESHA may also be found in upland areas, for example stands of large, mature trees in an area otherwise lacking such habitat.

The principal Coastal Act policy pertaining to ESHAs is PRC Section 30240, which provides: "Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on such resources shall be allowed within such areas."

As discussed in connection with wetlands, above, the ESHA policies are applied by the Coastal Commission. The Commission will apply Coastal Act policies directly only in connection with review of federal activities and federal permit activities which affect coastal resources.[5]

Federal Policies on Riparian Communities in California

Riparian communities are associated with water and have a variety of functions, including providing high-quality habitat for resident and migrant wildlife, streambank stabilization, and runoff water filtration. Throughout the United States, riparian habitats have declined substantially in extent and quality compared with their historical distribution and condition. These declines have increased concerns about dependent plant and wildlife species, leading federal agencies to adopt policies to arrest further loss. USFWS Mitigation Policy identifies California's riparian habitats as belonging to resource Category 2, for which "no net loss" of existing habitat value is recommended (USFWS, 1981).

4.4.3.4 Applicable Plans and Policies

Monterey County Zoning Ordinance

Relevant local standards from the Monterey County Zoning Ordinance are summarized below.

Tree Removal

The Monterey County Zoning Ordinance Title 14 addresses oak and other native tree protection in place. In Monterey County oak trees within areas designated as Resource Conservation, Residential, Commercial, or Industrial cannot be removed without the approval of necessary permits. Exceptions include removal of oak trees pursuant to the purpose and standards required in areas designated as Agriculture, Industrial, and or Mineral Extraction. In addition, Title 20, Parts 2-5, addresses native tree removal and protection in the Coastal Zone and Title 21 outside the Coastal Zone. Chapter 16 of the Monterey County Municipal Code also addresses oak and other native tree protection.

Native trees in Monterey County, as defined in the ordinance, include Santa Lucia fir, black cottonwood, Fremont cottonwood, box elder, willows, California laurel, sycamores, oaks and madrones. Trees must be at least six inches in diameter two feet above the ground level in order to be subject to these regulations.

A landmark oak tree is defined as an oak tree that is 24 inches or more in diameter when measured two feet above ground level or one that is visually significant, historically significant,

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[5] The federal consistency review authority provided to the Commission by Section 1456 of the federal Coastal Zone Management Act (16 USC §1451, *et seq.*) would cover, for example, applications for permits under the federal Endangered Species Act or Clean Water Act, as well as federal agency activities which affect coastal zone resources.

or exemplary of its species. Removal of any landmark tree is prohibited unless approved by the County Director of Planning and Building Inspection.

4.4.4 Impacts and Mitigation Measures

This section describes the significance thresholds, approach to analysis, and potential impacts of the Moss Landing Project and North Marina Project. In addition, mitigation measures have been developed to minimize the potential impact of either project to less than significant levels.

4.4.4.1 Significance Criteria

To determine the level of significance of an identified impact, the criteria outlined in the CEQA *Guidelines* were used. The following is a discussion of the approaches to, and definitions of, significance of impacts to biological resources, drawn from several distinct *Guideline*s sections.

CEQA Guidelines (Section 15065) directs lead agencies to find that a project may have a significant effect on the environment if it has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish and wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare or threatened species, or eliminate important examples of the major periods of California history or prehistory.

CEQA Guidelines (Section 15206) further specifies that a project shall be deemed to be of statewide, regional, or area-wide significance if it would substantially affect sensitive wildlife habitats including, but not limited to, riparian lands, wetlands, bays, estuaries, marshes, and habitats for rare and endangered species as defined by Fish and Game Code Section 903.

CEQA Guidelines (Section 15380) further provides that a plant or animal species, even if not on one of the official lists, may be treated as “rare or endangered” if, for example, it is likely to become endangered in the foreseeable future.

Additional criteria to assess significant impacts to biological resources due to the proposed project are specified in the CEQA *Guidelines* Section 15382 (Significant Effect on the Environment) “…a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance.”

Appendix G of the CEQA Guidelines (as revised) indicates that a project would have a significant effect on the environment if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFG or USFWS;

- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFG or USFWS;

- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan.[6]

4.4.4.2 Approach to Impact Analysis

Different approaches were used to evaluate project impacts on terrestrial resources and aquatic resources. These are described below.

Terrestrial Resources

Terrestrial resource impacts are considered from two perspectives: the nature, duration and intensity of the action and the potential presence of special-status resources. The first perspective is similar for most elements that involve facilities constructed on or adjacent to biologically active habitats (i.e., native plant communities and those where previous disturbance has not removed all habitat value) and are the removal of the habitat, possible crushing of burrowing animals during construction, and incidental, indirect impacts such as noise or fugitive dust. The presence of special-status species is determined by direct observation, survey records compiled by others, and in some cases by predicting presence based on habitat associations.

Due to complexity of the Coastal Water Project and to accommodate facility location and pipeline route changes, this Draft EIR recorded known and potential occurrences of special status species in the grid system developed for the Proponent's Environmental Assessment (Table 4.4-2).

Again reflecting the project's complexity, this document combines impacts into the broadest categories consistent with CEQA: those from Appendix G of the CEQA Guidelines listed above. Associated mitigations are frequently drawn from the *California American Water Company Coastal Water Project Terrestrial Biological Resources Phase II Report* (H.T. Harvey, 2005).

Aquatic Resources

As discussed above, a discussion of the existing aquatic resources of the Carmel River is included in this Draft EIR even though none of the project components would be located in or near the river. However, the operations of the project would affect streamflows in the Carmel River, and therefore indirectly affect the river's aquatic biological resources. Implementation of the CWP would result in a reduction in CalAm's pumping of river subflows from the Carmel River by as

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[6] Not applicable to this Project.

much as 8,498 afy compared to existing conditions (1996 – 2006 annual average production) and by as much as 10,730 afy compared to pre-Order 95-10 conditions (1979-1988 annual average production).

The potential impacts of reducing CalAm's pumping from the Carmel River have previously been analyzed for the MPWMD's *Water Supply Project* EIR (Jones & Stokes, 2003b) and *Aquifer Storage and Recovery Project* EIR (Jones & Stokes, 2006). Both documents assessed the potential effects of various water supply alternatives on the aquatic resources of the Carmel River on a daily basis using simulated daily flows from the MPWMD's Carmel Valley Simulation Model (CVSIM). The streamflow analysis is based on simulated monthly values for a 45-year period of analysis, which is based on historical records for Water Years 1958–2002. This period includes a variety of rainfall and runoff conditions. Streamflow was simulated at four sites on the Carmel River below San Clemente Dam: (1) Robles del Rio gauging station (RM 14.4), (2) the Narrows (RM 9.6), (3) the Near Carmel gauging station (RM 3.6), and (4) the Carmel River Lagoon (RM 0.0).

Some of the alternatives analyzed in the previous EIRs were very similar to the baseline conditions and project being considered in this Draft EIR. As such, no new CVSIM simulations were conducted for the purposes of this Draft EIR, but rather the previous simulation results most applicable to the current analysis were used to assess potential impacts to steelhead and other aquatic resources. Specifically, the *Water Supply Project* Draft EIR (Jones & Stokes, 2003b) analyzed a "Regulatory No-Project Alternative" which would limit CalAm's annual water production from the Carmel River to its legal entitlement of 3,376 afy. The currently proposed CWP would limit CalAm's annual Carmel River production to the same amount. Thus, CVSIM results for the "Regulatory No-Project Alternative" (Jones & Stokes, 2003b) were used to analyze the potential operational impacts of the CWP on Carmel River flows[7]. Furthermore, the *Aquifer Storage and Recovery Project* Draft EIR (Jones & Stokes, 2006) analyzed the effects of an ASR system that would allow diversion of a limited amount of excess flow from the Carmel River for storage in, and later recovery from, the Seaside Groundwater Basin. The ASR project would divert up to 2,426 afy from the Carmel River. Diversions would occur between December and May (Jones & Stokes, 2006). The EIR for this project was certified in 2006 and construction commenced in 2007. It is expected that this project will be fully operational by the time the proposed CWP would be implemented. Thus, the CVSIM flow simulation prepared for the ASR project provides the basis for analyzing the baseline conditions in this Draft EIR. Lastly, both the previous projects analyzed estimated historical (i.e., unimpaired) flow conditions in the Carmel River and the results of that simulation are also provided below. The reader is referred to Jones & Stokes (2003b and 2006) for further detail on CVSIM modeling methods, assumptions, and results.

While the previously analyzed scenarios described above most closely resemble Carmel River streamflow conditions being considered in this Draft EIR, it is important to note that the previous CVSIM simulation scenarios are not identical to the baseline and project scenarios. Most importantly, the "Regulatory No-Project Alternative" analyzed in 2003 and presented here as

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[7] Note that both the Moss Landing Project and the North Marina Project would have same operational impacts on Carmel River flows.

future conditions if the CWP were implemented, did not consider the subsequently implemented *Aquifer Storage and Recovery Project*. As such, an average 920 afy (maximum 2,426 afy) of surface water diversion from the Carmel River is not considered in the analysis presented below. Furthermore, the proposed CWP also includes a 320 afy ASR component, which was not considered in the previous CVSIM models. As such the following analysis of the CWP slightly overestimates winter flow conditions in the Carmel River. However, the potential impacts of the *Aquifer Storage and Recovery Project* were analyzed in the DEIR for that project and were found to be beneficial to fisheries resources due to the overall shift away from pumping shallow groundwater from the river in the summer to diverting surface flows in the winter when flows are naturally higher. Therefore, it can be assumed that the proposed average 320 afy ASR diversion would under the project would have similar beneficial effects on fisheries resources.

The impact analysis presented below utilizes the previously prepared CVSIM results to compare expected Carmel River flow conditions under the historic (i.e., unimpaired), existing baseline, and proposed project scenarios and evaluates the flow change impacts to four key phases of the steelhead life cycle: upstream migration of adults, rearing of juveniles, downstream migration of juveniles during late fall and winter, and seaward migration of smolts during spring.

4.4.4.3 Impacts and Mitigation Measures

The potential impacts of the Moss Landing Project and North Marina Project are described in this section. A summary of each impact by project component, and collectively for each project as a whole, is presented in **Table 4.4-4**.

Impact 4.4-1: The project may adversely affect species identified as rare, threatened, endangered, candidate, sensitive, or other special status by the California Department of Fish and Game, ~~or~~ U.S. Fish and Wildlife Service, or National Marine Fisheries Service.

Moss Landing and North Marina Projects

The potential presence of special-status plants and animals at the project sites and facilities is discussed in the setting section and activities at most of them could have some negative (direct and indirect) effect on sensitive biota. The potential impact of the Moss Landing and North Marina projects would be less than significant with implementation of Mitigation Measures 4-4-1a through 4.4-1f. The type of impact depends on the project component and the species present. The types of impacts and mitigation measures that would be applicable to each project component are described below.

Construction of Facilities

Project components with distinct “footprints” sited in developed areas that are surfaced, drained, and maintained free of vegetation would have a low potential to affect special-status species unless construction were extended into areas of natural vegetation. However, some facilities are situated on or near areas of natural, high-quality habitat, and disturbance in these areas could result in impacts to special-status plants and animals. For animals, impacts are sometimes due to movement into the construction area from nearby habitat, and associated risks from vehicles and

TABLE 4.4-4
SUMMARY OF POTENTIAL BIOLOGICAL RESOURCE IMPACTS – COASTAL WATER PROJECT

Facility	Impact 4.4-1 Special status species	Impact 4.4-2 Riparian and Sensitive Communities	Impact 4.4-3 Federally protected wetlands	Impact 4.4-4 Wildlife Movement Corridors	Impact 4.4-5 Conflict with Local Ordinances	Impact 4.4-6 Project Operation
Moss Landing Site:						
Plant: Moss Landing Project	SM	SM	SM	LTS	SM	LTS
Intake: Moss Landing Project	-	-	-	LTS	-	LTS
Outfall: Moss Landing Project	-	-	-	LTS	-	LTS
Transmission Main North	SM	SM	SM	LTS	SM	LTS
North Marina Site:						
Plant: North Marina Project	SM	LTS	LTS	LTS	SM	LTS
Intake: North Marina Project	SM	LTS	LTS	LTS	-	LTS
Outfall: North Marina Project	-	-	-	LTS	-	LTS
Transmission Main South	SM	SM	LTS	LTS	SM	LTS
Terminal Reservoir Site	SM	SM	LTS	LTS	SM	LTS
Valley Green Pump Station	SM	LTS	LTS	LTS	SM	LTS
ASR Facilities	SM	SM	LTS	LTS	SM	LTS
Monterey Pipeline	SM	LTS	LTS	LTS	LTS	LTS
Carmel River	-	-	-	-	-	B
Moss Landing Project	SM	SM	SM	LTS	SM	LTS
North Marina Project	SM	SM	LTS	LTS	SM	LTS

SM – Significant Impact, can be Mitigated
SU – Significant Impact, Unavoidable
LTS – Less-than-significant Impact
B – Beneficial Impact
– – No Impact

equipment traffic, by falling into excavations, or when dewatering aquatic habitat. Construction noise could result in abandonment of nests or other breeding areas used by special-status animals.

Construction of Pipelines

Trenching and other soil disturbance has the potential to cause direct mortality of special-status plants and their seed accumulated in the soil. Special-status animals could be killed by vehicles and equipment, their burrows or other retreats could be crushed, or they could be killed if they fall into trenches or pits and cannot escape. Trenching and other surface-disturbing activity could dry out streams, wetlands or seasonal ponds in which aquatic animals live, or pools in which the larval stages of amphibians are developing. Sediment or other pollutants could cause mortality to aquatic animals in streams at and below the construction areas.

Operation

Operational impacts would be similar to those of other water treatment and conveyance facilities. Biological resources would be subject to increases in noise, traffic, night-lighting and further habitat disturbance during routine or emergency repairs, as well as risks incurred from the disposal of desalination treatment plant waste streams. Impacts are not expected to be significant for terrestrial biological resources due to the extant level of disturbance throughout the Project Region. Since both the Moss Landing Project and the North Marina Project were developed in part to allow CalAm to reduce its water supply dependence on the Carmel River, effects on the Carmel River would be beneficial, as described below.

Mitigation Measures

Mitigation Measure 4.4-1: The Project proponent shall carry out the following measures (either directly or through provisions incorporated into contract specifications for the Project), for those facilities and pipeline reaches identified as potentially supporting special-status species. In the specific measures which follow, the term “qualified biologist” for surveys is defined as an individual who shall possess, at a minimum, a bachelor’s degree in biology, ecology, wildlife biology or closely related field and has demonstrated prior field experience using accepted resource agency techniques for the survey prescribed, and who possesses all appropriate USFWS, NMFS, and CDFG permits. The term “biological monitor” or “qualified biological monitor” is defined as holding similar educational credentials to those of a qualified biologist and who has functioned as an environmental inspector or monitor on at least two construction projects within the preceding two years.

Mitigation Measure 4.4-1a: *Avoid harm or harassment of special-status invertebrates (Smith’s Blue Butterfly).* Smith’s blue butterflies could occur in several portions of the project area where their host plant occurs:

- North Marina Sourcewater Intake Facility
- Transmission Main North

This Federally-listed species lives the majority of its lifecycle within an area of about 100 m in diameter. The majority of the year, this species occurs only as pupae, in the leaf litter below the host plant. Impacts to host plants could potentially destroy pupae, and result in a loss of habitat. Smith’s blue butterfly could occur in the North Marina area (near HHD intake/discharge facilities). The following mitigation measures will reduce impacts to less-than-significant levels:

(1) Conduct Focused Surveys for Host Buckwheat Plants. Floristic surveys of all suitable habitat for coast buckwheat and seacliff buckwheat should be conducted by a qualified biologist prior to the permitting phase of the project. Maps depicting the results of these surveys shall be prepared.

(2) Avoid Impacts to Host Plants and Pupae. Construction of project elements should be planned to avoid mapped habitat for Smith’s blue butterfly.

(3) If impacts to host plants are unavoidable, surveys should be conducted to determine if Smith’s blue butterflies are present, following USFWS guidelines. If no butterflies

are found, no further mitigation is required. If Smith's blue butterflies are found, consultation will be required with the USFWS to determine the necessary level of compensatory mitigation. Compensatory mitigation may include removal and safe relocation of host plants.

All actions pursuant to this measure shall be subject to review and approval by the CPUC.

Mitigation Measure 4.4-1b: ***Avoid harm or harassment of tidewater gobies*** in Moro Cojo Slough and of ***south-central California coast steelhead, Pacific lampreys, and river lampreys*** in the Salinas River. These water bodies occur within the following project areas:

- Transmission Main North

For the Moss Landing Project, harm could occur as a result of pipeline construction activities across these two drainages. Pipeline crossings at these two sites would be accomplished by trenchless construction methods. Underground construction techniques, such as jack-and-bore, horizontal directional drilling (HDD), or tunneling, would be used at Moro Cojo, while the pipeline across the Salinas River will be suspended from the Monte Road bridge. Although underground and suspension pipeline construction avoids most of the potential impacts associated with open trench construction, special-status fish species may nevertheless be adversely affected by potential releases of construction materials (e.g., fuels, lubricants, solvents, etc.) into the water course. Bentonite clay used as a lubricant during underground drilling activities may enter bedrock fissures and subterranean connections to the streambed. Although bentonite is not a toxic substance, it may result in injury or mortality due to short-term sedimentation and turbidity increases, or may cause a temporary reduction in food availability due to smothering of aquatic invertebrates. The following measures will avoid or minimize potential construction-related impacts to special-status fish species:

(1) All construction activities across waterways will be restricted to low-flow periods of July 1 through October 31. If the channel is dry, construction can occur as early as June 1.

(2) Silt fencing will be installed in all areas where construction occurs within 100 feet of the channel.

(3) Spoil sites will be located so they do not drain directly into the waterways. If a spoil site drains into a water body, catch basins will be constructed to intercept sediment before it reaches the channels. Spoil sites will be graded to reduce the potential for erosion.

(4) A spill prevention plan for potentially hazardous materials will be prepared, implemented, and reviewed by the CPUC to ensure quality and enforceability. The plan will include the proper handling and storage of all potentially hazardous materials, as well as the proper procedures for cleaning up and reporting of any spills. If necessary, containment berms will be constructed to prevent spilled materials from reaching the creek channels.

(5) Equipment and materials will be stored at least 50 feet from waterways. No debris such as trash and spoils will be deposited within 100 feet of wetlands. Staging and storage areas for equipment, materials, fuels, lubricants and solvents, will be located outside of the stream channel and banks. Stationary equipment such as motors,

pumps, generators, compressors and welders, located within or adjacent to the stream will be positioned over drip pans. Any equipment or vehicles driven and/or operated within or adjacent to the stream will be checked and maintained daily, to prevent leaks of materials that if introduced to water could be deleterious to aquatic life. Vehicles will be moved away from the stream prior to refueling and lubrication.

(6) Proper and timely maintenance for vehicles and equipment used during construction will be provided to reduce the potential for mechanical breakdowns leading to a spill of materials into or around the creeks. Maintenance and fueling will be conducted in an area that meets the criteria set forth in the spill prevention plan (i.e., away from sensitive drainages).

(7) Water for dust abatement, if necessary, shall be acquired from an off-site source.

(8) A qualified biological monitor will be on site during construction activities. The biological monitor will be authorized to halt construction if impacts to special-status fish species are evident. Depending on the severity of the impact, the biological monitor will assure the source of the impact is remediated (e.g., if sediments are entering the water body) or will coordinate with CDFG/NMFS (e.g., if direct harm to special-status species is evident.

(9) Project sites will be revegetated with an appropriate assemblage of native upland vegetation, and if necessary, riparian and wetland vegetation, suitable for the area. A plan describing pre-project conditions, restoration and monitoring success criteria will be prepared prior to construction. This plan will be reviewed by the CPUC for quality and enforceability, and all actions pursuant to this plan shall be subject to review and approval by the CPUC.

Mitigation Measure 4.4-1c: ***Avoid harm or harassment of California red-legged frogs, California tiger salamanders, and Santa Cruz long-toed salamanders***. These species could occur in aquatic habitats in the Project area. These include:

- Moss Landing Desalination Plant Site
- Transmission Main North
- North Marina Desalination Plant
- North Marina Sourcewater and Return Flow Pipelines

Construction in and around aquatic habitats could result in direct take of individuals (e.g., being crushed by heavy machinery) and loss of habitat by changing vegetation composition.

To determine whether any special-status aquatic species would be affected by any given Project element, surveys shall be conducted at the specific Project site (following standard U.S. Fish and Wildlife Service [USFWS] protocol in the case of red-legged frogs and salamanders). If it is determined that any of these Federally listed species is present, formal consultation with the USFWS would be necessary.

Construction of Project elements shall be planned to avoid habitat for special-status aquatic species such as the California red-legged frog. If construction will occur adjacent to potential habitat, impacts would be avoided or minimized as follows:

(1) Prior to any construction activities, the boundaries of construction areas will be clearly delineated with orange plastic construction fencing to prevent workers or equipment from inadvertently straying from the construction area. All construction personnel, equipment, and vehicle movement shall be confined to designated construction areas and connecting roadways. Movement of construction and personal vehicles shall be prohibited outside designated construction areas or off established roadways.

(2) Prior to the onset of any ground-disturbing activities, exclusion fencing will be established around areas of potentially occupied habitat, as determined by a qualified biologist. Exclusion fencing shall consist of silt-fencing or similar material at least 36 inches in height that is buried at least six inches in the ground to prevent incursion under the fence. This fence shall be surveyed each morning before construction to verify that no frogs or other special status aquatic species have entered the construction site.

(3) Before any construction activities begin, a biologist approved by the U.S. Fish and Wildlife Service (USFWS) shall conduct a training session with construction personnel to describe the California red-legged frog and its habitat, the specific measures being implemented to minimize effects on the species, and the boundaries of the construction area.

(4) All food-related trash items shall be enclosed in sealed containers and removed daily from the Project site to discourage the concentration of potential predators in habitat potentially occupied by California red-legged frogs.

All actions pursuant to this measure shall be subject to review and approval by the CPUC.

Mitigation Measure 4.4-1d: ***Avoid direct Mortality and/or Disturbance of Special-Status Plant Populations.*** Floristic surveys of all suitable habitat for special-status plants shall be conducted prior to the permitting phase of the Project. Maps depicting the results of these surveys shall be prepared for use in final siting design. Sensitive plant species are widespread, and could occur at the following sites: Moss Landing, North Marina, North Marina to Terminal Reservoir Corridor, Terminal Reservoir, Aquifer Storage and Recovery Facilities, and Monterey Pipeline.

Project facilities shall be sited to avoid impacts on special-status plants and their required habitat constituent elements, when reasonably feasible. Unavoidable impacts on listed plants species, including Seaside bird’s-beak, Yadon’s wallflower, sand gilia, Monterey spineflower, and Yadon’s rein orchid, require formal consultation with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG). Impacts on non-listed species would likely involve informal consultation.

Special-status plant occurrences located within temporary construction areas shall be fenced or flagged for avoidance prior to construction, and a biological monitor shall be present to ensure compliance with off-limits areas. Seasonal avoidance measures (i.e., limited operating periods based on timing of annual plant dormancy), combined with topsoil salvage and site restoration, may be acceptable in some cases. Compensation for permanent loss of special-status plant occurrences, in the form of land purchase or restoration, must be provided to the level acceptable to the resource agencies.

Compensatory measures will be determined on a case-by-case basis by the lead agency in consultation with the USFWS and the CDFG. Compensation for loss of special-status plant populations typically involves the purchase and permanent stewardship of known occupied habitat or the restoration and reintroduction of populations in degraded, unoccupied habitat. Restoration or reintroduction may be located on- or off-site. In the latter case, a Site Restoration Plan shall be required, to be prepared by the Applicant and approved by the CPUC, USFWS, and the CDFG as appropriate. It shall include the following:

(1) The location of areas to restore lost plant populations;

(2) A description of propagation and planting techniques to be employed in the restoration effort; plants to be impacted shall have their seeds collected so that the seeds can be planted within the restoration areas;

(3) A time table for implementation of the restoration plan, including pilot-phase studies;

(4) A monitoring plan and performance criteria;[8]

(5) A description of remedial measures to be performed if initial restoration measures are unsuccessful in meeting the performance criteria; and,

(6) A description of the site maintenance activities to follow restoration activities; these may include weed control, irrigation, and control of herbivory by livestock and wildlife. Site maintenance activities shall be altered or intensified when necessary to meet performance criteria.

Mitigation Measure 4.4-1e: *Avoid Construction Impacts on Burrowing Owls*. Burrowing owl habitat may occur at the following project locations:

- Moss Landing Desalination Plant
- Transmission Main North
- North Marina Desalination Plant
- Transmission Main South
- North Marina Sourcewater Pipelines
- ASR Facilities

Preconstruction surveys for burrowing owls shall be completed in potential habitat in conformance with California Department of Fish and Game (CDFG) protocols, and no more than thirty days prior to the start of construction. If no burrowing owls are located during these surveys, no additional action would be warranted. However, if breeding or resident owls are located on or immediately adjacent to the site, the following mitigation measures shall be implemented. A 250-foot buffer, within which no new activity is permissible, shall be maintained between Project activities and nesting burrowing owls. This protected area shall remain in effect until August 31 or, at the discretion of the California Department of Fish and Game (CDFG) and based upon monitoring evidence, until the young owls are foraging independently. If construction will directly impact

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[8] Performance criteria may vary across sites and species, but is intended to provide proof of restoration success. This is normally a majority of the plants surviving a minimum of five years.

occupied burrows, eviction outside the nesting season may be permitted pending evaluation of eviction plans and receipt of formal written approval from the CDFG authorizing the eviction. No burrowing owls shall be evicted from burrows during the nesting season (February 1 through August 31).

Mitigation Measure 4.4-1f: ***Avoid Construction Impacts on Other Special-Status Birds*****.** Special-Status birds (see Table 4.4-2 and *Other Special-Status Bird Species,* above) could occur on or near any of the sites not within developed areas. These bird species typically nest in California between March 1 and September 1. If construction-related work is scheduled outside of this nesting season, nesting birds will not be impacted and no further mitigation is necessary.

If construction must occur during the breeding season (March 1 to September 1), a qualified ornithologist shall conduct preconstruction surveys no more than fifteen days prior to the initiation of disturbance wherever suitable habitat occurs for special-status birds. If active nests are found to be present within or adjacent to work sites during the breeding season, a construction-free buffer around the active nests shall be established. For raptors, this buffer is typically 250 feet; for other birds it may be as narrow as 20 feet. An ornithologist in consultation with the California Department of Fish and Game (CDFG) shall determine the width of this buffer. This buffer shall be maintained until nesting has been completed and the young have fledged.

Significance after Mitigation: Less than Significant.

Impact 4.4-2: The project may adversely affect riparian habitat or other sensitive natural community identified in local or regional plans, policies regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

Moss Landing and North Marina Projects

Sensitive habitats, including maritime chapparal, central dune scrub, coast live oak woodland, riparian woodland and scrub, salt marsh, and northern brackish marsh, are well distributed in the Project area and comprise most of the areas with natural vegetation except for non-native grassland. They would be at risk of temporary and permanent impacts during the construction or long-term operation of the project. The potential impact of the Moss Landing and North Marina projects on riparian habitats or other sensitive natural communities would be less than significant with implementation of Mitigation Measures 4.4-2. The type of impact depends on the project component and the species present. The types of impacts and mitigation measure that would be applicable to each project component are described below.

Mitigation Measures

Mitigation Measure 4.4-2: The project proponent shall carry out the following measures (either directly or through provisions be incorporated into contract specifications for the project), for those facilities identified as potentially supporting sensitive habitats.

Mitigation Measure 4.4-2a: *Avoid Construction Impacts on Riparian Habitat.* Sensitive riparian habitat includes the areas mapped as "Riparian Woodland and Scrub" in Figure 4.4-2 and has been identified at the following Project locations:

- Moss Landing Desalination Plant Site
- Transmission Main North

The project shall be designed in a manner that avoids and/or minimizes impacts on riparian habitats to the maximum extent feasible. Temporary disturbance and/or permanent loss of riparian habitat requires a Streambed Alteration Agreement from the California Department of Fish and Game (CDFG) and ESA Section 7 or 10 consultation with USFWS and NMFS if there is a potential impacts to listed species or critical habitat.

Unavoidable impacts on riparian habitat shall be formally assessed to satisfy the requirements of the California Department of Fish and Game (CDFG) 1601 Streambed Alteration Agreement~~)~~ and federal consultation, which typically include compensatory mitigation. Acceptable riparian mitigation ratios shall be based on habitat quality characteristics, such as vegetation structure and complexity, that correspond to fish and wildlife habitat value. Impact ratios of 3:1, 2:1, and 1:1 shall be applied for impacts on high-, medium-, and low-quality habitats, respectively:

(1) *High-Quality Habitat* – Native overstory with continuous understory or occurring in dense thickets; dense native overstory with sparse, non-native, or no understory; and native willow thicket.

(1) *Medium Quality Habitat* – Sparse native overstory with sparse, non-native, or no understory; non-native overstory with native understory; and dense non-native overstory with sparse, non-native, or no understory.

(1) *Low Quality* – Sparse non-native overstory with sparse, non-native, or no understory; and any areas not included in the medium- or high-quality habitats that will be covered with riprap, gabions, etc. (e.g., ruderal habitat and bare ground).

Furthermore, impacts from encroachment into riparian buffer zones may be considered significant. Appropriate riparian setbacks can be as great as 100 feet and are assessed on a case-by-case basis.

A Riparian Restoration Plan shall be required, to be prepared by the Applicant and approved by the CPUC, USFWS, NMFS, and the CDFG as appropriate. It shall be structured similarly to the Site Restoration Plan described in Mitigation Measure 4.4-1d.

Mitigation Measure 4.4-2b: *Avoid construction Impacts on Sensitive Upland Habitats.* Sensitive Upland Habitat, predominantly Central Maritime Chaparral, has been identified at the following project locations:

- ASR Facilities and Terminal Reservoir
- Transmission Main South

Construction activities, facilities, and conveyance systems shall be sited in a manner that avoids sensitive upland habitats to the maximum extent feasible. Sensitive upland habitats shall be preserved where possible through facility siting within degraded or non-native vegetation. Sensitive areas shall be flagged for avoidance to minimize the possibility of inadvertent encroachment during construction. Construction staff shall be educated on the sensitive habitats located within and adjacent to the Project's footprint, and a biological monitor shall be present to ensure compliance with off-limits areas.

When avoidance is not feasible during construction activities; sensitive upland habitats temporarily disturbed during construction activities shall be quantified and appropriate restoration strategies shall be set forth in a Habitat Restoration Plan which shall be developed in consultation with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG), and submitted to the California Public Utilities Commission (CPUC) and the resource agencies. The Plan shall include the following elements: specific location of restoration site, details on soil preparation, seed collection, planting, maintenance, and monitoring, and quantitative success criteria. At a minimum, temporarily disturbed areas shall be restored by the Applicant to the natural (preconstruction) conditions, which may include the following actions: salvage and stockpiling of topsoil from maritime chaparral, central dune scrub, and oak woodland; regrading of disturbed sites with salvaged topsoil; and revegetation with native, locally collected species.

Where restoration is not feasible (i.e., the impact is permanent), the Applicant shall purchase and/or preserve similar undisturbed habitat off-site, or restore nearby disturbed areas at a ratio to be determined by the USFWS, CDFG, and other responsible resource agencies with jurisdiction over the project area.

Significance after Mitigation: Less than Significant.

Impact 4.4-3: The project may adversely affect federally protected wetlands as defined by Section 404 of the Clean Water Act.

Moss Landing Project

Many of the project elements would affect streams or wetlands that fall under state or federal jurisdiction. Potential Waters of the U.S., and wetlands were identified in the Moss Landing Project area of potential affect. Most impacts would be associated with construction activities and thus would be temporary. Wetland resources could also be affected by siltation or degradation of water quality from spills during construction. The extent of wetlands affected by a project is highly dependent on the final project design.

Mitigation Measure

Mitigation Measure 4.4-3: The Applicant shall implement the following measures for those facilities sited on or adjacent to wetlands.

The project shall avoid areas of potentially jurisdictional wetland habitats to the maximum extent feasible through Project siting and construction avoidance. The project shall implement Best Management Practices[9] during construction to minimize impacts associated with erosion and sediment deposition into wetland and aquatic habitats. Temporary disturbance and/or permanent loss of wetlands or other waters of the U.S. require permits from both the U.S. Army Corps of Engineers (USACE) and (for areas within the Coastal Zone) the California Coastal Commission (CCC) as well as the Regional Water Quality Control Board (RWQCB).

A wetland delineation per the USACE Wetland Delineation Manual, and using the one-parameter approach in areas within the Coastal Zone, shall be conducted prior to construction.

A delineation report shall be prepared and submitted to the USACE and CCC for verification, and to the CPUC for its approval. Through this process, final calculations of wetland area present in the Project area would be obtained for Project permitting. In addition, plans for proposed alteration to any watercourse shall be submitted to the CDFG for review.

The wetland habitat that would be lost under any given project element shall be functionally replaced as part of the Mitigation and Monitoring Plan required for permit issuance. The Mitigation and Monitoring Plan and any relevant permit documents or implementation plans will be submitted to the CPUC to ensure enforceability. In-kind and on-site replacement of lost wetland habitats must be done where possible. If multiple impacts on wetlands occur from the construction of facilities, larger wetland mitigation areas shall be created that provide greater functions and values than numerous small mitigation sites. The determination of wetland impacts and the subsequent location and design of potential mitigation sites be determined by qualified biologists in coordination with resource agency personnel. Mitigation and Monitoring Plans shall require the following of the Project Applicant:

(1) Replacement of lost acreage and functions of wetland habitat;

(2) Identification of the restoration opportunities, complete with an analysis of the technical approach to create high quality wetlands;

(3) Prior to construction of any project element that may impact wetland habitats, obtaining any necessary permits from the USACE, RWQCB or the CCC;

(4) Preparation of detailed plans for wetland mitigation construction that include excavation elevations, location of hydrologic connections, planting plans, and soil amendments, if necessary; preparation of maintenance and monitoring plans in consultation with a qualified habitat restoration specialist; monitoring of any mitigation wetlands for a period of 5 years, during which the site will achieve the target jurisdictional acreage by Year 5; and determination of specific performance criteria and monitoring for site success; provision of annual monitoring reports to the appropriate resource agencies.

Significance after Mitigation: Less than Significant.

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[9] Best Management Practices are subject to CPUC review and approval, and may be expected to include BMPs as described in Caltrans (2003) Caltrans Storm Water Quality Handbooks; *Construction Site Best Management Practices Manual*.

North Marina Project

There are no jurisdictional wetland habitats identified associated with North Marina Project components. The potential impact is less than significant.

Significance: Less than Significant.

Impact 4.4-4: The project may adversely affect the movement of native resident or migratory fish or wildlife species or established native resident or migratory wildlife corridors.

Moss Landing and North Marina Projects

Habitat in the area is fragmented by agricultural fields, residential developments and roads. Project sites represent a small portion of the project area, and conveyance facilities will be underground. There will be no significant obstruction to fish or wildlife movement.

Significance: Less than Significant.

Impact 4.4-5: The project may conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

Moss Landing and North Marina Projects

As noted in the Regulatory Framework section above, Monterey County Zoning Ordinance14 addresses oak and other native tree protection.

Mitigation Measure

Mitigation Measure 4.4-5: The project applicant shall perform a comprehensive survey to identify, measure, and map trees subject to County tree removal ordinances (oak trees greater than 6 inches in diameter) and North County Area Plan and Carmel Valley Master Plan ordinances (all native trees greater than 6 inches in diameter), as well as landmark trees. Prior to the removal of protected trees, ~~T~~ the project sponsor shall obtain tree removal permits or approvals for lost native and landmark trees and arrange mitigation with appropriate public and resource agencies. ~~In most cases such permits will require planting replacement trees in sufficient number to ensure that one or two trees reach maturity.~~ The standards for tree replacement shall be stipulated in the tree permit reviewed and approved by the local agency. For example, Monterey County Zoning Ordinance - Title 21 stipulates submittals including:

- A site plan sufficient to identify and locate the trees to be removed, other trees, buildings, proposed buildings, and other improvements;
- The purpose for the tree removal;

- A description of the species, diameter two feet above ground level, estimated height, and general health of the trees to be removed.
- A description of the method to be used in removing the tree(s);
- A statement showing how trees not proposed for removal are to be protected during removal or construction;
- Proposed visual impact mitigation measures the applicant intends to take (if appropriate). Size, location and species of replacement trees, if any, shall be indicated in the site plan."

Any documentation or permits resulting from these arrangements shall be submitted by the Applicant to the CPUC to ensure enforceability.

Significance after Mitigation: Less than Significant.

Impact 4.4-6: Operation of the project would alter Carmel River flows and may thus indirectly affect federally-listed threatened steelhead and other special-status aquatic species. This would be a beneficial impact.

Moss Landing and North Marina Projects

Both the Moss Landing Project and the North Marina Project were developed in part to allow CalAm to reduce its water supply dependence on the Carmel River in accordance with Order 95-10. Implementation of the CWP (either the Moss Landing or North Marina project) would result in a reduction in CalAm's pumping of river subflows from the Carmel River by as much as 8,498 afy compared to existing conditions (1996 – 2006 annual average production) and by as much as 10,730 afy compared to pre-Order 95-10 conditions (1979-1988 annual average production). As such, the projects would affect streamflows in the Carmel River, and therefore indirectly affect steelhead, Pacific lamprey, and river lamprey in the Carmel River.

Although the project would have no direct impact on the ability to store or release water from Los Padres Dam on the Carmel River, it would influence streamflow indirectly by influencing CalAm's operations in the Carmel Valley. The influence would vary depending on generalized location – upstream or downstream of the Narrows. Below the Narrows, the water production gained from the alternative CWP sources would offset CalAm's production that would otherwise occur, thereby reducing CalAm production from Carmel River subflow pumping in the lower Carmel Valley and potentially increasing the magnitude, extent, and persistence of dry season streamflow below the Narrows. Upstream of the Narrows, streamflow during the dry season is affected directly by the amount of water stored in Los Padres Reservoir, by the relative wetness of the water year, and by the absolute level of base-flow from the upper drainage. A proposed desalination project would have little or no effect on these factors, so dry season streamflow at the Narrows would essentially be equal under project and existing operations. Streamflows during the wet season are generally not affected by CalAm's operations.

The following discussion summarizes the anticipated effects of the proposed project to four key phases of the steelhead life cycle: upstream migration of adults, rearing of juveniles, downstream migration of juveniles during late fall and winter, and seaward migration of smolts during spring.

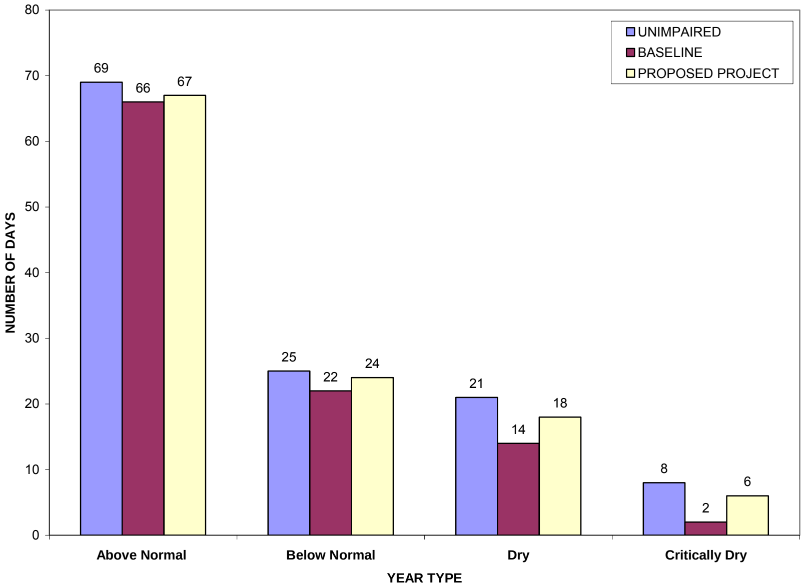
Adult Upstream Migration

Compared to existing conditions, operation of the CWP would improve opportunities for upstream migration by slightly increasing the duration of attraction flows and lengthening the duration of the migration season. The CVSIM model results indicate that, on average, the project would provide 41 days of attraction flows (the minimum flows, ranging from 75 cfs to 200 cfs depending on year type, that induce steelhead to enter the river from the ocean) (Jones & Stokes, 2006) and would provide at least 18 days of attraction flows during the average dry, below-normal, above normal, and wet years (**Figure 4.4-8**). Using CVSIM models to simulate existing flow conditions, river flows provide an average of 38 days of attraction flows across all water year types (Jones & Stokes, 2006) and at least 14 days of attraction flows during the average dry, below-normal, and above normal years (Figure 4.4-8). Although the average number of attraction days and the duration would be increased by only three days under project conditions, in dry years the attraction days would be increased by 4 days (**Figures 4.4-8**) and the duration of the migration season would increase by 9 days (**Figure 4.4-9**). Although small, these differences are considered a significant beneficial impact because steelhead migrate over a short time period of three to six-week long period in dry years, so increases of a few days in years with naturally overwhelming constraints will increase the probability that a larger portion of the potential run will successfully migrate and spawn in the upper river.

Juvenile Rearing

As described above, the project would have little or no effect on dry season aquatic habitat upstream of the Narrows. Below the Narrows, the project would reduce the risk of stranding juvenile steelhead in the lower Carmel River during summer months as compared to existing conditions, reducing stranding from 53 to 49 days in above normal years and from 202 to 201 days during critically-dry years (**Figure 4.4-10**). Overall, this is a significant beneficial impact over existing conditions.

While the duration of risk remains high with the project, the extent of viable juvenile rearing habitat in this reach may be improved during the first 15 to 20 years of project operation, depending on surface storage capacity in Los Padres Reservoir. The persistence and extent of habitat in this reach is a function of streamflow at the Narrows and the rate/distribution of groundwater pumping in Carmel River Basin Aquifer Subunit 3 (AQ 3). During the early years of operation, sufficient flow will pass the Narrows to provide several miles of habitat downstream of the Narrows. However, with time the storage capacity in Los Padres Reservoir will be depleted as it fills with sediment, and in 2 to 3 decades, the flow at the Narrows will decline below the level of river subflow pumping associated with CalAm’s recognized rights (3,376 afy) and other private water systems (~3,000 afy). At that juncture, the persistence and extent of aquatic habitats gained by the project downstream of the Narrows will fade with brief periods of early summer flow over a mile or so of stream.

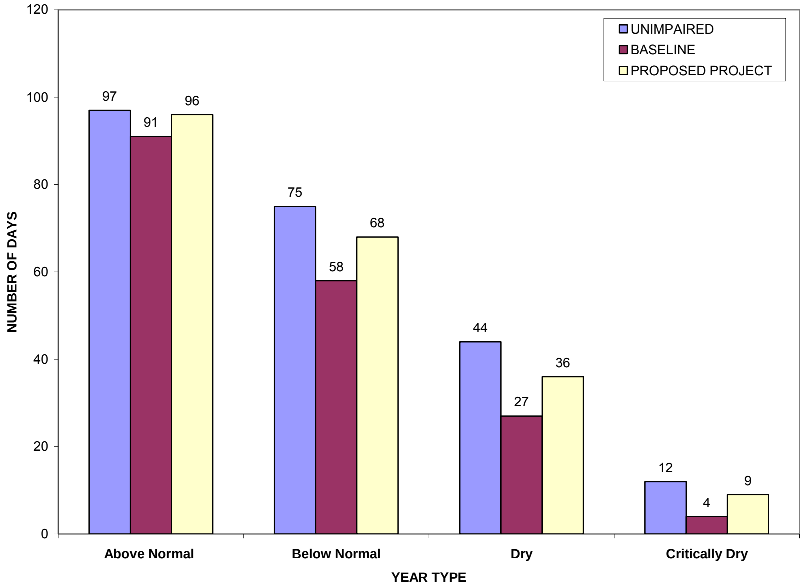


Coastal Water Project ▪ 205335

SOURCE: Jones & Stokes, 2003b and 2006

Figure 4.4-8

Average Number of Days per Year That Recommended Flows for Attraction of Adult Steelhead Would be Equaled or Exceeded, by Water Year Type

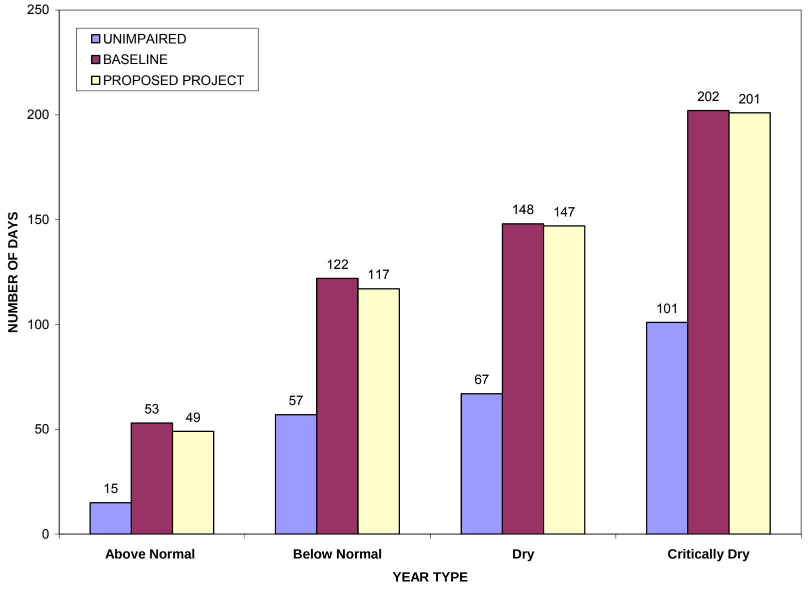


Coastal Water Project ▪ 205335

SOURCE: Jones & Stokes, 2003b and 2006

Figure 4.4-9

Average Number of Days per Year That Recommended Flows for Transportation of Adult Steelhead Would be Equaled or Exceeded, by Water Year Type



Coastal Water Project ▪ 205335

SOURCE: Jones & Stokes, 2003b and 2006

Figure 4.4-10

Average Number of Days in the June-December Period during which Juvenile Steelhead Would be at High Risk of Stranding Below the Narrows, by Water Year Type

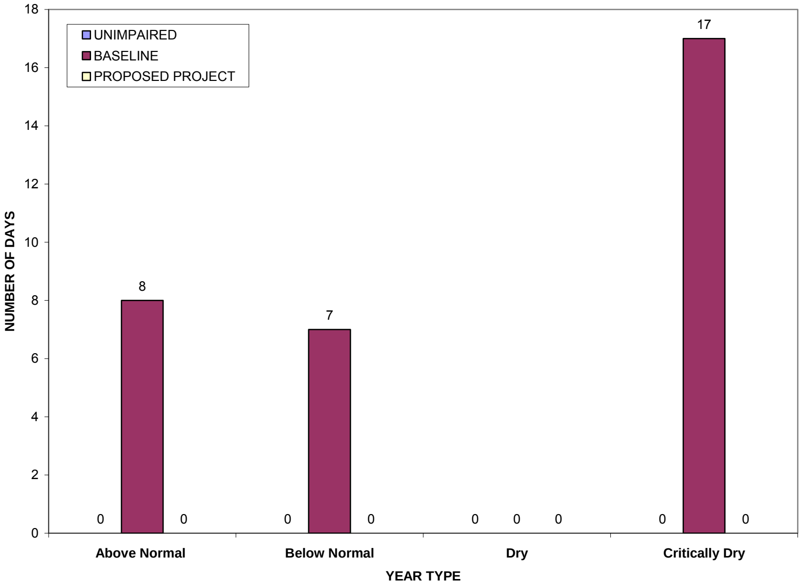
Fall/Winter Downstream Migration

During the October-March period, the project would reduce the risk that juvenile steelhead are stranded, as compared to existing conditions. Under the project, river flows would never result in isolation or standing compared to an average of 17 days on which fish are at a high risk of stranding during critically dry years under existing conditions (**Figure 4.4-11**). The risk of isolation and stranding would be substantially reduced because after implementation of the project, the first rains and runoff of the year would flow over a nearly full aquifer (the result of reduced pumping by CalAm in the lower reach of the river). Modeling indicates that during the single year (2% of years studied) when a risk of stranding occurs, the duration would be only three days. Averaged over the full duration of the hydrologic record, as presented in Figure 4.4-11), the risk of stranding is negligible (i.e., close to zero). Overall, this is a significant beneficial impact over existing conditions.

Spring Smolt Migration

Compared to existing baseline conditions in the Carmel River, implementation of the project would reduce the number of days with a risk of isolating and stranding steelhead smolts during their seaward migration by three days during below normal water years, by four days during dry years, and by 13 days during critically dry years (**Figure 4.4-12**). Overall, this is a significant beneficial impact over existing conditions.

Significance: Beneficial. No mitigation needed.

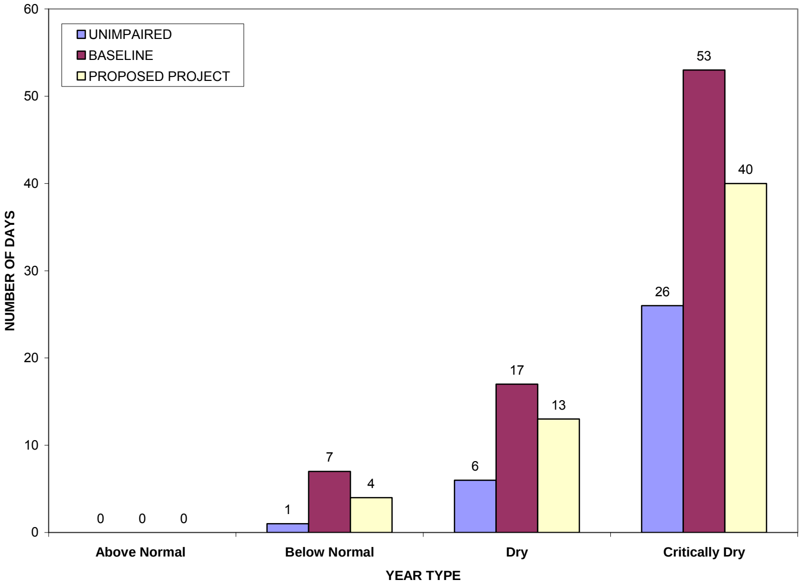


Coastal Water Project ▪ 205335

SOURCE: Jones & Stokes, 2003b and 2006

Figure 4.4-11

Average Number of Days in the October-March Period during which Juvenile Steelhead Would be at High Risk of Stranding Below the Narrows, by Water Year Type



Coastal Water Project ▪ 205335

SOURCE: Jones & Stokes, 2003b and 2006

Figure 4.4-12

Average Number of Days in the April-May Period during which Steelhead Smolts Would be at High Risk of Stranding Below the Narrows, by Water Year Type

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4.5 Geology, Soils, and Seismicity

4.5.1 Introduction

This section evaluates whether construction and operation of the Moss Landing Project or North Marina Project would result in potential adverse impacts related to local geology, existing soil conditions, or seismicity. The analysis is based, in part, on review of various geologic maps and reports. The primary sources of information for this analysis included:

- Proponents Environmental Assessment (PEA) for the Coastal Water Project dated July 14, 2005. The PEA (2005) is based on information supplied by:
    - County of Monterey General Plan (September 30, 1982);
    - California Geologic Survey, 1990 Geology of the Central California Continental Margin, and;
    - Preliminary Geotechnical Evaluation, Monterey County, Coastal Water Project (2005), prepared by Ninyo & Moore Geotechnical and Environmental Sciences Consultants.
- Geologic and geotechnical reports and information from state and local agencies.
- County of Monterey General Plan, 1982.

Due to the multi-component nature of the Moss Landing and North Marina projects, project components are not described individually site by site, but are presented within a geologic context as part of the site setting. Section 4.5.2 describes the overall geologic setting of the project components from north to south and has been divided into northern, central, southern, and coastal dune areas, each with relatively distinct geologic and topographic characteristics, for the purpose of describing the project study area. Section 4.5.3 describes the regulatory framework related to geology, soil and seismic hazards. The Moss Landing and North Marina projects, including an intake system, a desalination plant, a brine discharge system, a product water conveyance system, and an aquifer storage and recovery (ASR) system, are assessed for adverse impacts relating to geology, soils, and seismicity in Section 4.5.4, Impacts and Mitigation Measures. Certain additional components of the Moss Landing and North Marina projects make use of existing infrastructure (e.g. Crest Tank and Segunda Reservoir). Since these components already exist, and no changes will be made to them as part of the project, no impacts relating to geology, soils, and seismicity are anticipated and, as such, these existing components are not included in the analysis presented here.

4.5.2 Setting

The project study area extends from the Moss Landing area near the mouth of the Salinas River valley and Elkhorn Slough south to the Monterey Peninsula. The project study area may be divided into northern, central, southern, and coastal dune sections. Each section displays relatively distinct geologic and topographic characteristics:

- The northern portion includes an existing large power plant and industrial properties at Moss Landing and a large area of low-lying agricultural fields in the floodplain of the Salinas River. The community of Castroville is in the eastern portion of the floodplain. The northern portion of the project study area includes varied land uses such as agricultural fields, undeveloped areas, and residential and commercial developments. Project components located within the northern portion include: Moss Landing desalination plant (including intake and outfall), and a portion of Transmission Main North.

- The central portion includes rolling hills extending inland from the coast composed of wind-blown dune sands. These areas include the urbanized developments of Monterey, Seaside, and Marina, as well as the former Fort Ord military base. The central portion of the project study area includes varied land uses such as agricultural fields, undeveloped areas, and residential, commercial, and military developments. project components located within the central portion include: a portion of Transmission Main North, North Marina source water slant well intake, North Marina Outfall (existing), North Marina Desalination Plant, a portion of Transmission Main South, Terminal Reservoir and Pump Station, ASR Pump Station, ASR Pipeline, ASR Injection/Extraction Wells, and Monterey Pipeline.

- The southern portion includes relatively steep and rugged terrain and extends into the Monterey Peninsula, which varies from densely developed urban areas to undeveloped forested hillside terrain. Valley Greens Pump Station is the project component located within the southern portion.

- Located within the northern and central portions of the project study area is a zone of coastal dunes consisting of extensive gently sloping sand dunes varying in height from approximately 60 to 100 feet above mean sea level (amsl). These coastal dunes are composed entirely of unconsolidated, uncemented, cohesionless, generally well-sorted, highly erodible sand. The coastal dune zone extends along the shoreline of Monterey Bay.

4.5.2.1 Geology

The Project study area lies within the geologically complex region of California referred to as the Coast Ranges geomorphic province.[1] The Coast Ranges province lies between the Pacific Ocean and the Great Valley province (Sacramento and San Joaquin Valleys) and stretches from the Oregon border to the Santa Ynez Mountains near Santa Barbara. Much of the Coast Ranges province is composed of marine sedimentary deposits and volcanic rocks that form northwest-trending mountain ridges and valleys, running roughly parallel to the San Andreas Fault Zone. The Coast Ranges are divided into northern and southern halves which are separated by a structural depression that formed the San Francisco Bay.

The Project study area is located within the southern portion of the Coast Ranges which is located west of the San Andreas fault zone. The tectonics of the San Andreas and other major faults of the western part of California have played a major role in shaping the geologic history of the area. Elongate ranges and narrow valleys that are approximately parallel to the coast mark this province. The drainages south of San Francisco Bay are strongly influenced by tectonic related faults and folds that typically flow parallel to the coast, although some drainages actually run

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[1] A geomorphic province is an area that possesses similar bedrock, structure, history, and age. California has 11 geomorphic provinces (CGS, 2002a).

perpendicular to the coast. The Salinas River, whose course largely lies within a synclinal trough, exemplifies this pattern.[2]

The Santa Lucia Range, the Salinas Valley, and the Santa Cruz Mountains are the prominent geologic features of the region. The rugged Santa Lucia Range generally runs from the Monterey Peninsula through San Luis Obispo. The Salinas Valley is located east of the Santa Lucia Range and roughly parallels these mountains. This valley runs from Monterey Bay south into San Luis Obispo County and largely owes its development to folding, although it does show characteristics of stream erosion and faulting. The Santa Cruz Mountains extend from the San Francisco Peninsula south to the Pajaro River, near Watsonville, where they merge with the Gabilan Range. These mountains help define the northern end of the Monterey Bay.

4.5.2.2 Topography

The topography within the project study area is highly variable, as the various Project elements are located over a large area of Monterey County including the cities of Monterey, Carmel-by-the-Sea, Pacific Grove, Marina, Seaside, Sand City, and Del Rey Oaks, in addition to the Monterey Airport District, the unincorporated areas of Carmel Highlands, Carmel Valley, and Pebble Beach, and other unincorporated county areas. Generally, the majority of the project elements are located either within the coastal dune areas, the low-lying northern portion, or within the central portion. Valley Greens Pump Station is located within the relatively steep and rugged terrain of the southern portion. The Project includes a wide variety of conveyance facilities to transport product water from the ocean, to the Desalination Plant, and to various storage and distribution facilities. As these facilities span the project study area, the topography crossed varies widely.

The northern portion of the project study area is characterized by low-lying, relatively flat, alluvial plains of the Salinas River valley and the relatively narrow floodplains of the Moro Cojo and Tembladero Sloughs. Ground surface elevations in the Salinas River valley area of the project study area generally range from approximately 8 to 15 feet amsl. The Moss Landing area at the extreme northern portion of the project study area includes some slightly elevated, relatively level marine terraces and older dunes with elevations ranging from approximately 10 to 40 feet amsl.

The central portion of the project study area is characterized by gently to moderately rolling dunes with elevations ranging from approximately 10 feet amsl near the Salinas River to approximately 400 feet amsl at the southern extreme of the central portion. Fill embankments up to approximately 30 feet in height were observed (Ninyo and Moore, 2005) at scattered locations within the central project study area. Road cuts within dune sands up to approximately 20 feet high and more were observed.

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[2] A syncline or synclinal trough is a geologic feature where stratified bedrock have been folded into a concave upward form.

The topography of the southern portion of the project study area varies from rolling inland hills to the steep, rugged terrain of the Monterey Peninsula. The topography in this portion of the project study area varies, and includes the relatively flat bottom of Canyon del Rey, gently sloping terraces near Ragsdale Drive, and the steep slopes and narrow canyons in the mountainous areas. Elevations range from approximately 130 feet amsl along Highway 68 to approximately 740 feet amsl at the relatively high area between Crest Reservoir and Segunda Tank.

The topography of the coastal dune project study area ranges from 0 feet amsl at the shore line to approximately 100 feet amsl at the top of the dunes. The coastal dune slopes along the shoreline are steep and have a high potential for erosion (Ninyo and Moore, 2005). The dune deposits east of the coastline are mainly gentle (0–10%) and formed by coastal sand dunes.

4.5.2.3 Geologic Units

During a field reconnaissance performed by Ninyo and Moore in June and November, 2004, various geologic units were observed within the project study area. Based on these field observations combined with a geologic literature review, the geologic units anticipated within the project study area include fill, alluvium, dune sands, landslide deposits, and terrace deposits. Summarized below are these geologic units and their anticipated engineering characteristics.

Fill

Fill materials were observed at scattered locations throughout the project study area (Ninyo and Moore, 2005). These fill materials are associated with previous grading for roads, bridges, railroad corridors, agricultural use, and commercial, residential, and military land developments (Ninyo and Moore, 2005). The thicknesses of these fill deposits likely varies. Relatively shallow fills (a few feet thick) were observed in areas associated with roadways and railroad alignments in relatively flat low-lying areas (Ninyo and Moore, 2005). Deeper fills were observed and are anticipated in hillside topography where canyon filling has occurred, where development activities are present, and along bridge approach embankments (Ninyo and Moore, 2005). The fill materials are anticipated to be generally derived from local natural soils and would be similar to the natural soils as described in the following sections (Ninyo and Moore, 2005). Fill materials may also include imported materials, engineered fill, construction debris, or other waste products. In particular, fill materials within the former Fort Ord military base property may include various waste materials associated with historical military operations.

Alluvium

Alluvium is generally composed of unconsolidated sediments deposited along active stream and river channels and floodplains. The northern area of the project study area is underlain predominantly by Holocene age alluvial deposits associated with the Salinas River, the Tembladero Slough, the Moro Cojo Slough, and associated tributaries. The alluvium in northern floodplain areas is anticipated to generally consist of moist to wet, loose/soft, interbedded silts, clays, and sands. The northern floodplain areas are largely agricultural and relatively flat, with relatively poor drainage features. Flowing water was observed in drainage ditches within the agricultural fields and some standing water was in low-lying areas in the northern portion (Ninyo and Moore, 2005). Groundwater is anticipated to be within 10 feet of the ground surface (and shallower) in the lower areas. As a result of the relatively shallow groundwater and loose sands, there is a strong potential for liquefaction and dynamic settlement in the low-lying floodplain areas of the northern project study area, as discussed further below.

Alluvial deposits are also present within the central and southern sections of the project study area, along some of the various smaller drainage courses as well as the more significant drainages such as the Canyon del Rey. Alluvium within drainage courses in the central area of the project study area is anticipated to be composed predominantly of loose sand derived from the dune sand deposits. Alluvium in the southern project study area is anticipated to be more variable because of the complex geologic conditions and terrain associated with the Monterey Peninsula, and may include moist to wet, loose/soft clays, silts, and sands. Flowing water was observed in Canyon del Rey. The alluvium within Canyon del Rey is considered potentially liquefiable and may experience dynamic settlement following a seismic event (discussed below).

Dune Deposits

Wind-blown dune deposits characterize the central portion of the project study area, between the Salinas River and Canyon del Rey. These areas include elevated rolling hills. Some remnant dune deposits are present in the northern area within the slightly elevated terraces near Moss Landing. These deposits are typically composed of dry to damp, moderately consolidated, fine sand and silty sand. The majority of the dune deposits in the central and northern portions of the project study area are composed of older dunes (greater than 11,000 years). Younger dunes, up to 11,000 years, are present along the coastline. The older dune deposits range from uncemented to weakly cemented sands. Recent dune deposits are typically uncemented, sparsely vegetated, and active. During the geologic reconnaissance (Ninyo and Moore, 2005), dune deposits were observed in existing cut slopes and excavations, ranging from loose, friable, “flowing” sands to medium-dense, weakly cemented sands. The cemented dune sands were exposed in a relatively steep road cut and exhibited moderate cohesion, but could be easily broken with a rock hammer. The uncemented dune deposits are generally very friable and have a high potential for erosion. The near surface dune deposits (5 to 10 feet) may be in a loose condition, but should be moderately dense at depth (Ninyo and Moore, 2005). Shallow groundwater is not anticipated within the elevated dune deposits, except for localized low-lying areas along the coastline. The potential for soil liquefaction is generally considered low, except where shallow groundwater may be present in localized low-lying areas. Loose, uncemented dune sands may have a potential for dynamic settlement due to seismic shaking. Liquefaction and dynamic settlement are discussed further below.

Terrace Deposits

Marine and non-marine terrace deposits are present within the northern and southern portions of the project study area. Marine terrace deposits are present in the Moss Landing area and may be recognized by slightly elevated terraces. These deposits generally consist of semi-consolidated, fine silty sands and sandy silts with local thin gravel layers. The potential for soil liquefaction within these deposits may range from low to moderate, depending on the depth to groundwater and the consistency of the terrace materials. Non-marine terrace deposits are present in the southern portion of the project, in the foothills of the mountains along Canyon del Rey. Where exposed along Highway 68, these deposits consist of moderately consolidated, interbedded sands, silts, clays and gravel. In general, the potential for soil liquefaction and dynamic settlement within the non-marine terrace deposits is anticipated to be low as discussed further below.

Landslide Deposits

Landslide deposits are mapped along Canyon del Rey and in the steep terrain south of Canyon del Rey. The relatively large landslides that are mapped in this area are typically deep-seated bedrock landslides formed along bedding planes of the Monterey Formation (Ninyo and Moore, 2005). Steep slope areas also include shallow debris flows and soil slumps. The stability of landslide deposits varies. Landslide material was observed along a road cut within the Canyon del Rey during the field reconnaissance and was composed of gray gravel and cobble-size fragments of diatomaceous siltstone of the Monterey Formation (Ninyo and Moore, 2005).

Monterey Formation

The Tertiary age Monterey Formation is present in the southern portion of the project study area within the mountain areas between Canyon del Rey and Carmel Valley. The Monterey Formation is a marine sedimentary deposit and generally includes interbedded layers of light gray to tan, moderately to strongly cemented siltstone, sandstone, and claystone. Occasional cherty, dolomitic, and diatomaceous beds occur in the Monterey Formation. The lower portions of the mountains near Canyon del Rey are mapped as Miocene diatomite. Bentonite seams, which are prone to landslides, are also present (Ninyo and Moore, 2005).

4.5.2.4 Seismicity

The project study area is located in a region considered to be seismically active, as are most areas of California. The Coast Ranges province is composed of a series of parallel, northwest-trending mountain ranges and valleys generally controlled by faults. Faults juxtapose blocks of geologic units of different origins called belts. The Monterey area is located within the Salinian block, which is a northwest-trending belt bounded to the east by the San Andreas Fault and to the west by the San Gregorio (Sur) fault. Major earthquakes have affected the region in the past and are expected to occur in the near future on one of the principal active faults in the San Andreas Fault System. The USGS Working Group on California Earthquake Probabilities determined there is a 63 percent likelihood of one or more earthquakes of magnitude 6.7 or greater occurring in the greater San Francisco Bay Area region within the next 30-years (USGS, 2003; USGS, 2008).

Richter magnitude (M) is a measure of the size of an earthquake as recorded by a seismograph. The reported Richter magnitude for an earthquake represents the highest amplitude measured by the seismograph at a distance of 100 kilometers from the epicenter. Richter magnitudes vary logarithmically, with each whole-number step representing a tenfold increase in the amplitude of the recorded seismic waves. Earthquake magnitudes are also measured by their moment magnitude (Mw), which is related to the physical characteristics of a fault, including the rigidity of the rock, the size of fault rupture, and the movement or displacement across a fault (CGS, 2002b). Moment magnitude provides a physically meaningful measure of the size of a faulting event (CGS, 2002b).

Several active and potentially active faults have been mapped within or close to the project study area. As defined by the California Geological Survey (CGS), an “active” fault is one that has exhibited seismic activity or has evidence of fault displacement within Holocene time (roughly the past 11,000 years). “Potentially active” faults are those that show evidence of displacement during Quaternary time (roughly the past 1.6 million years), but for which no evidence of Holocene movement has been established. The approximate locations of the major faults in the region and their geographic relationship to the project study area are shown in **Figure 4.5-1** (Project Fault Location Map). **Table 4.5-1** (Principal Active and Potentially Active Faults) lists selected principal active and potentially active faults that may impact the project, the estimated maximum moment magnitude of each fault, and the type of fault. The approximate range of distances to each fault is based on estimated distances from the Moss Landing area and from the Seaside ASR well facilities in order to present representative seismic data for the areas containing both the Moss Landing Project and the North Marina Project elements.

Regional Faults

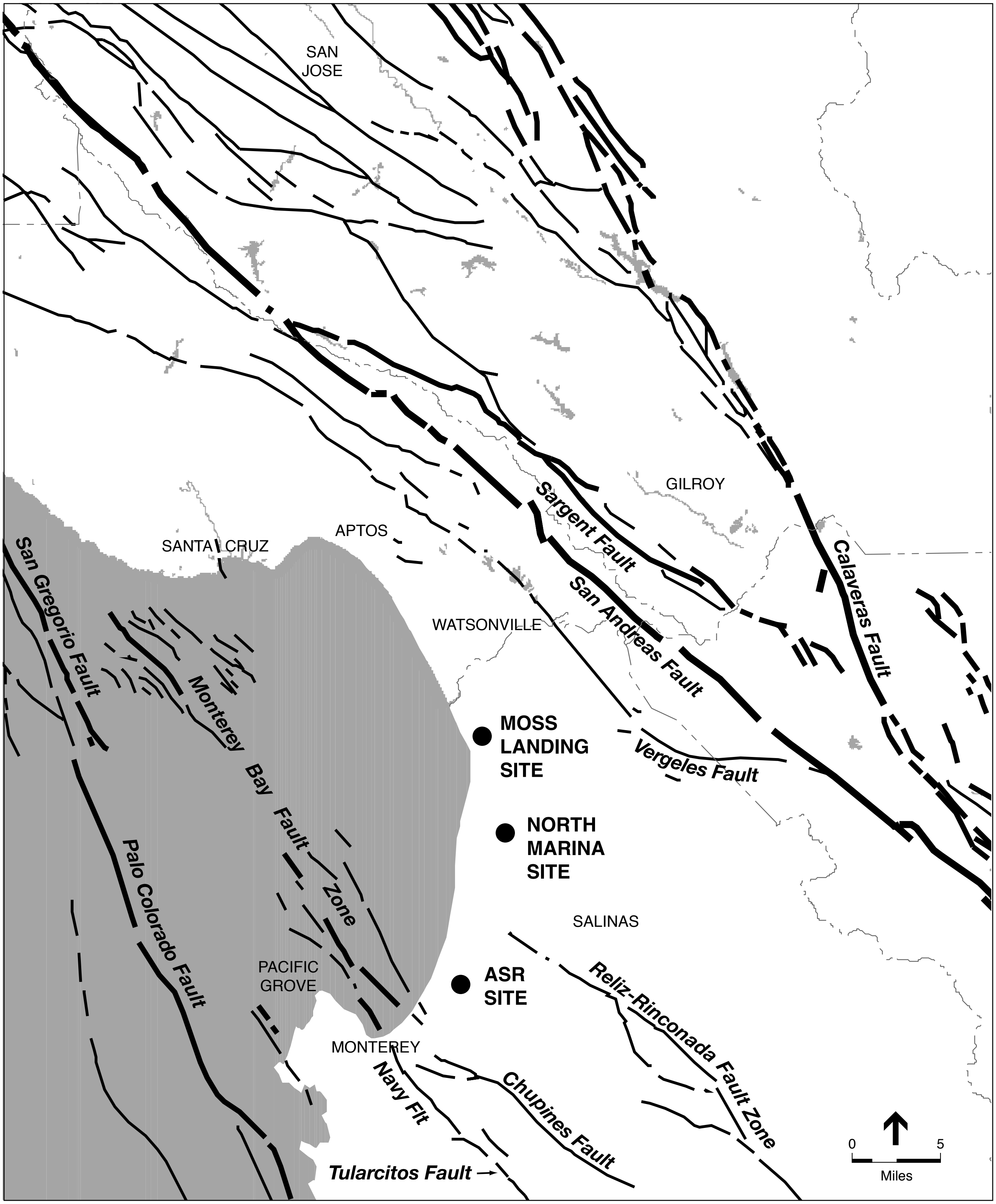
All of the active faults (listed in Table 4.5-1) are located outside the project study area limits. Several potentially active faults (listed in Table 4.5-1) are located within the project study area. Regardless, regional faults located outside the project study area can still cause significant damage in the event of an earthquake. Therefore, a description of the faults that are thought to have the highest risk of causing significant damage is provided below.

San Andreas Fault

The San Andreas Fault Zone is a major structural feature in the region and forms a boundary between the North American and Pacific tectonic plates. The closest portion of the fault is as close as 8 miles from the Moss Landing desalination facility site. In the San Francisco Bay Area, the San Andreas Fault Zone was the source of the two major seismic events in recent history that affected the San Francisco Bay region. The 1906 San Francisco earthquake was estimated at magnitude 7.9 and resulted in approximately 290 miles of surface fault rupture. Horizontal displacement along the fault approached 17 feet near the epicenter. The more recent 1989 Loma Prieta earthquake, with a magnitude of 6.9, resulted in widespread damage throughout the Bay Area. The USGS Working Group on earthquake probabilities assigns a probability of 21 percent for a magnitude 6.7 earthquake during the next 30 years (USGS, 2008).

San Gregorio Fault

The San Gregorio Fault Zone is a complex of faults that skirt the coastline North of Big Sur, run northwestward across Monterey Bay, briefly touching the shoreline of the San Mateo County coastline at Point Ano Nuevo and at Seal Cove, just North of Half Moon Bay. The closest portion of the fault is as close as 12 miles from the ASR well facilities. This fault is an active fault that



SOURCE: Jennings, 1994

Figure 4.5-1
Regional Fault Map

TABLE 4.5-1
PRINCIPAL ACTIVE AND POTENTIALLY ACTIVE FAULTS

Fault	Fault to Project Area Distance (Range in Miles)[a]	Maximum Moment Magnitude (Mmax)[b]	Slip Rate (mm/yr)[b]	Fault Type[c]	Active/ Potentially Active[d]
Monterey Bay – Tularcitos Fault Zone	0 to 13	7.1	0.5	B	Potentially Active
Reliz — Rinconada Fault Zone	0 to 8	7.5	1	B	Potentially Active
San Andreas (1906)	8 to 25	7.9	24	A	Active
Sargent Fault	12 to 30	6.8	3	B	Active
San Gregorio	12 to 20	7.3	5	A	Active
Zayante–Vergeles	14 to 24	7	0.1	B	Active
Calaveras (South)	20 to 31	6.2	15	B	Active
Quien Sabe	25 to 35	6.5	1	B	Active
Hayward	36 to 53	7.1	9	A	Active
Ortigalita	42 to 52	6.9	1	B	Active
Greenville	48 to 66	6.9	2	B	Active

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[a] The approximate range of distances to each fault is based on estimated distances from the Moss Landing area and from the Seaside ASR well facilities. Where fault to project study area distance is 0, proposed pipeline alignments cross potentially active faults.

[b] California Department of Mines and Geology (CDMG, 1996). These earthquake magnitudes represent the maximum credible earthquake that the fault can produce based on known fault geometry.

[c] Type A faults are defined by a Mmax ≥7.0 and a slip rate of ≥5mm/year. Type B faults are defined either by a Mmax ≥6.5 and a slip rate ≤5mm/year or a Mmax <6.5 and a slip rate >2mm/year (CDMG, 1996)

[d] An active fault is defined by the State of California as a fault that has had surface displacement within Holocene time (approximately the last 10,000 years). A potentially active fault is defined as a fault that has shown evidence of surface displacement during the Quaternary (last 1.6 million years), unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer. This definition does not, of course, mean that faults lacking evidence of surface displacement are necessarily inactive. Sufficiently active is also used to describe a fault if there is some evidence that Holocene displacement occurred on one or more of its segments or branches (Hart, 1997).

SOURCES: Revised from Ninyo and Moore, 2005. Bryant, 2001; Jennings, 1994.

has been recently recognized as capable of producing large earthquakes. Recent studies have shown Holocene displacement on the San Gregorio Fault, as recently as 1270 AD to 1400 AD (Bryant and Cluett, 1999). Additionally, a 1929 earthquake with Richter Magnitude above 6.0, thought to have occurred on the Monterey Fault, may have actually ruptured an offshore segment of the San Gregorio Fault Zone (Johnson, 2004). According to the USGS Working Group on earthquake probabilities, the San Gregorio Fault has a 10 percent chance of producing one or more magnitude 6.7 earthquakes in the next 30 years (USGS, 2008).

Hayward Fault

The Hayward–Rodgers Creek fault system extends some 140 km, from Fremont in the south, along the east side of San Francisco Bay beneath San Pablo Bay to near Healdsburg on the north. The closest part of the Hayward is approximately 36 miles from the Moss Landing Desalination facility project site. The Hayward-Rodgers Creek fault system has the highest probability of the characterized faults in the Bay Area of producing one or more magnitude 6.7 earthquakes in the next 30 years. Its characterized ruptures range in mean magnitude from 6.5 to 7.3, and the probability of one or more magnitude 6.7 earthquakes occurring in the next 30 years is 31 percent, when combined with the Rodgers Creek fault (USGS, 2008).

Local Faults

Several potentially active faults intersect some of the proposed project elements. Additionally, several active faults are potentially located in close proximity to project elements in the southern portion of the project study area. While these are not thought of as faults of regional significance, they are described below because they would be particularly damaging in the unlikely event that they produce a significant earthquake.

The Reliz-Rinconada fault zone runs parallel to Highway 101 along the Salinas River Valley at the base of the Santa Lucia Mountains. The Reliz fault has been projected crossing through the central portion of the site in the marina area (Ninyo and Moore, 2005). The fault trace in this area is concealed by fluvial deposits of the Salinas River Valley and coastal dunes, causing uncertainty in the precise location of the fault. Geologic evidence indicates that this fault system has displaced materials that are between 50,000 to 100,000 years old and is considered potentially active (Rosenberg and Bryant, 2003).

Monterey Bay-Tularcitos fault zone extends for about 84 km from about 6 km southwest of Santa Cruz, near the San Gregorio fault, across Monterey Bay southeast to the Monterey Peninsula to near the crest of the Sierra de Salinas. The onshore portion of the fault zone includes the Berwick Canyon, Chupines, Seaside, Tularcitos, Navy, Hatton Canyon, and Ord Terrace faults. These faults create an approximately 6-to-9-mile-wide zone of short in-echelon, northwest-striking faults that are related. The activity and locations of these faults are not well defined. Data presented by Jennings (1994) shows no active portions of the Monterey Bay-Tularcitos fault zone extending on-shore into the southern portion of the project study area. Jennings (1994) classifies the Hatton Canyon, Sylvan Thrust, Navy (on-shore portion) and Tularcitos faults as potentially active. However, Bryant (2001) citing Rosenberg and Clark (1994) mentions evidence of Holocene displacement along the Hatton Canyon, Sylvan Thrust, and Tularcitos faults (Bryant, 2001). For this reason, these faults could be considered active for planning purposes.

The northernmost Ord Terrace fault has been projected beneath dune deposits through the proposed conveyances near the northeastern corner of the proposed Terminal Reservoir project study area. Based on information presented by Jennings (1994) as well as Bryant (2001), no project components cross an active fault zone.

4.5.2.5 Seismic Hazards

Seismic hazards that could potentially affect the project study area include surface fault rupture, ground shaking, soil liquefaction and dynamic settlement, lateral spreading, tsunamis, and landsliding. These seismic hazards are discussed in this section for the proposed project area.

Surface Fault Rupture

Seismically induced ground rupture is defined as the physical displacement of surface deposits in response to an earthquake's seismic waves. The magnitude and nature of fault rupture can vary for different faults, or even along different strands of the same fault. Ground rupture is considered more likely along active faults, which are referenced in **Table 4.5-1**.

Evaluation of fault rupture hazard is based on the concepts of recency and recurrence of faulting along existing faults. Faults of known historic activity during the past 200 years, as a class, have a greater probability for future activity than faults classified as Holocene age (past 11,000 years), and a much greater probability of future activity than faults classified as last experiencing rupture between 11,000 and 1.6 million years. Note that certain faults have recurrent activity measured in tens or hundreds of years, whereas other faults may be inactive for thousands of years before being reactivated. The magnitude, sense, and nature of fault rupture also vary for different faults or along different strands of the same fault. Even so, future faulting generally is expected to recur along pre-existing faults. The development of a new fault or reactivation of a long-inactive fault is relatively uncommon.

The active faults or active segments of faults in the project region are all located beyond project limits and therefore the potential for fault rupture hazard within the project limits is relatively low. **Figure 4.5-1** (Project Fault Location Map) summarizes the approximate location of these faults and their geographic relationship to the proposed improvements.

Groundshaking

Strong ground shaking may occur due to earthquake events along active faults nearby or distant to the project study area. Groundshaking intensity is partly related to the size of an earthquake, the distance to the site, and the response of the geologic materials that underlie a site. As a rule, the greater the earthquake magnitude and the closer the fault rupture to a site, the greater the intensity of groundshaking. Violent groundshaking is generally expected at and near the epicenter of a large earthquake; however, different types of geologic materials respond differently to earthquake waves. For instance, deep unconsolidated materials can amplify earthquake waves and cause longer periods of groundshaking. For example, the 1989 Loma Prieta Earthquake which had an epicenter located near Santa Cruz produced very damaging groundshaking in Santa Cruz but also in the San Francisco Bay Area which is more than 50 miles away. However, disregarding local variations in ground conditions, the intensity of shaking at different locations within the area can generally be expected to decrease with distance away from an earthquake source.

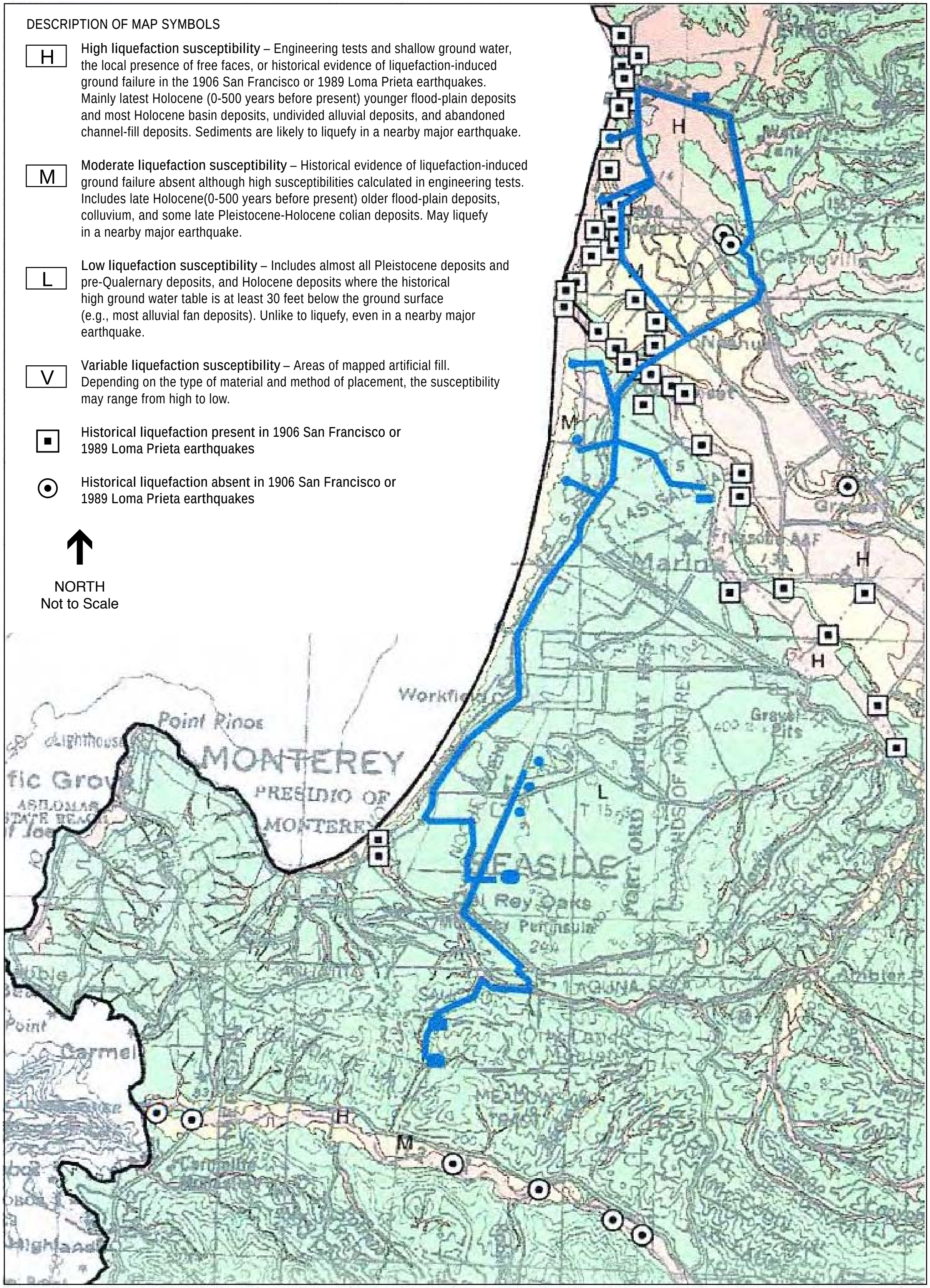
Ground motion during an earthquake can be described using the motion parameters of acceleration, velocity, and duration of shaking. A common measure of ground motion is the peak ground acceleration (PGA). The PGA for a given component of motion is the largest value of horizontal acceleration obtained from a seismograph. PGA is expressed as the percentage of the acceleration due to gravity (g), which is approximately 980 centimeters per second squared. For comparison purposes, the maximum peak acceleration value recorded during the Loma Prieta earthquake was in the vicinity of the epicenter, near Santa Cruz, at 0.64 g. The lowest recorded value was 0.06 g in the bedrock on Yerba Buena Island.

Seismic design of noncritical structures can be based on peak horizontal ground acceleration having a 10 percent probability of exceedance in 50 years. A probabilistic seismic hazard assessment that includes Statewide estimates of peak horizontal ground acceleration has been conducted for California. In 2002, the United States Geological Survey (USGS) and the CGS updated the model by introducing new parameters and updated fault locations (Ninyo and Moore, 2005). A peak horizontal ground acceleration (10% probability of being exceeded in 50 years) of up to 0.47g is anticipated within project limits, based on the updated USGS/CGS model (Ninyo and Moore, 2005). This estimate of peak ground acceleration is based on alluvial conditions. The *Monterey County Draft General Plan* (1982) includes a seismic shaking hazard map showing contours of anticipated peak horizontal ground acceleration based on probabilistic seismic hazard analyses performed by the California Department of Conservation. The project study area fits between contours of 0.55g at the northern end of the project to 0.25g at the southern end of the project on this map. Based on CGS probabilistic seismic hazard mapping (USGS/CGS, 2002) average peak ground accelerations of 0.45g are expected in the northern portion of the Project study area, average peak ground accelerations of 0.40g are expected in the coastal and central portions of the project study area, and average peak ground accelerations of 0.34g are expected in the southern portion of the project study area.

Soil Liquefaction and Dynamic Settlement

Liquefaction is a phenomenon in which soil loses its shear strength for short periods of time during an earthquake. Ground shaking of sufficient duration can result in the loss of grain-to-grain contact, due to a rapid increase in pore water pressure, causing the soil to behave as a fluid for short periods of time. The potential damaging effects of liquefaction include differential settlement, loss of ground support for foundations, ground cracking, heaving and cracking of structure slabs due to sand boiling, and buckling of deep foundations due to liquefaction-induced ground settlement. Dynamic settlement (pronounced consolidation and settlement from seismic shaking) may also occur in loose, dry sands above the water table resulting in settlement of, and possible damage to, overlying structures. In general, a relatively high potential for liquefaction exists in loose, sandy soils that are within 50 feet of the ground surface and are saturated (below the groundwater table). The *Monterey County Draft General Plan* (1982) includes a liquefaction hazard map (County of Monterey, 1982) that categorizes the potential for liquefaction in Monterey County. **Figure 4.5-2** summarizes liquefaction hazard potential in Monterey County in the vicinity of the proposed project.

Some locations within the project study area, including the floodplain of the Salinas River, Moss Landing, and other low-lying coastal areas, as well as alluvial river-bottom areas such as Canyon del Rey (Highway 68) have a moderate to high liquefaction potential. During the 1989 Loma Prieta earthquake, liquefaction caused settlement and ground cracking in the Moss Landing area, damaging roads and the approach to the bridge linking Moss Landing to the mainland. Over 30 separate locations of historical liquefaction incidents have been documented within the project study area, the majority of which were located within the northern portion of the project study area. There may be a moderate potential for dynamic settlement of dry, loose sands within the elevated dune sand deposits.



DESCRIPTION OF MAP SYMBOLS

H **High liquefaction susceptibility** – Engineering tests and shallow ground water, the local presence of free faces, or historical evidence of liquefaction-induced ground failure in the 1906 San Francisco or 1989 Loma Prieta earthquakes. Mainly latest Holocene (0-500 years before present) younger flood-plain deposits and most Holocene basin deposits, undivided alluvial deposits, and abandoned channel-fill deposits. Sediments are likely to liquefy in a nearby major earthquake.

M **Moderate liquefaction susceptibility** – Historical evidence of liquefaction-induced ground failure absent although high susceptibilities calculated in engineering tests. Includes late Holocene(0-500 years before present) older flood-plain deposits, colluvium, and some late Pleistocene-Holocene colian deposits. May liquefy in a nearby major earthquake.

L **Low liquefaction susceptibility** – Includes almost all Pleistocene deposits and pre-Qualernary deposits, and Holocene deposits where the historical high ground water table is at least 30 feet below the ground surface (e.g., most alluvial fan deposits). Unlike to liquefy, even in a nearby major earthquake.

V **Variable liquefaction susceptibility** – Areas of mapped artificial fill. Depending on the type of material and method of placement, the susceptibility may range from high to low.

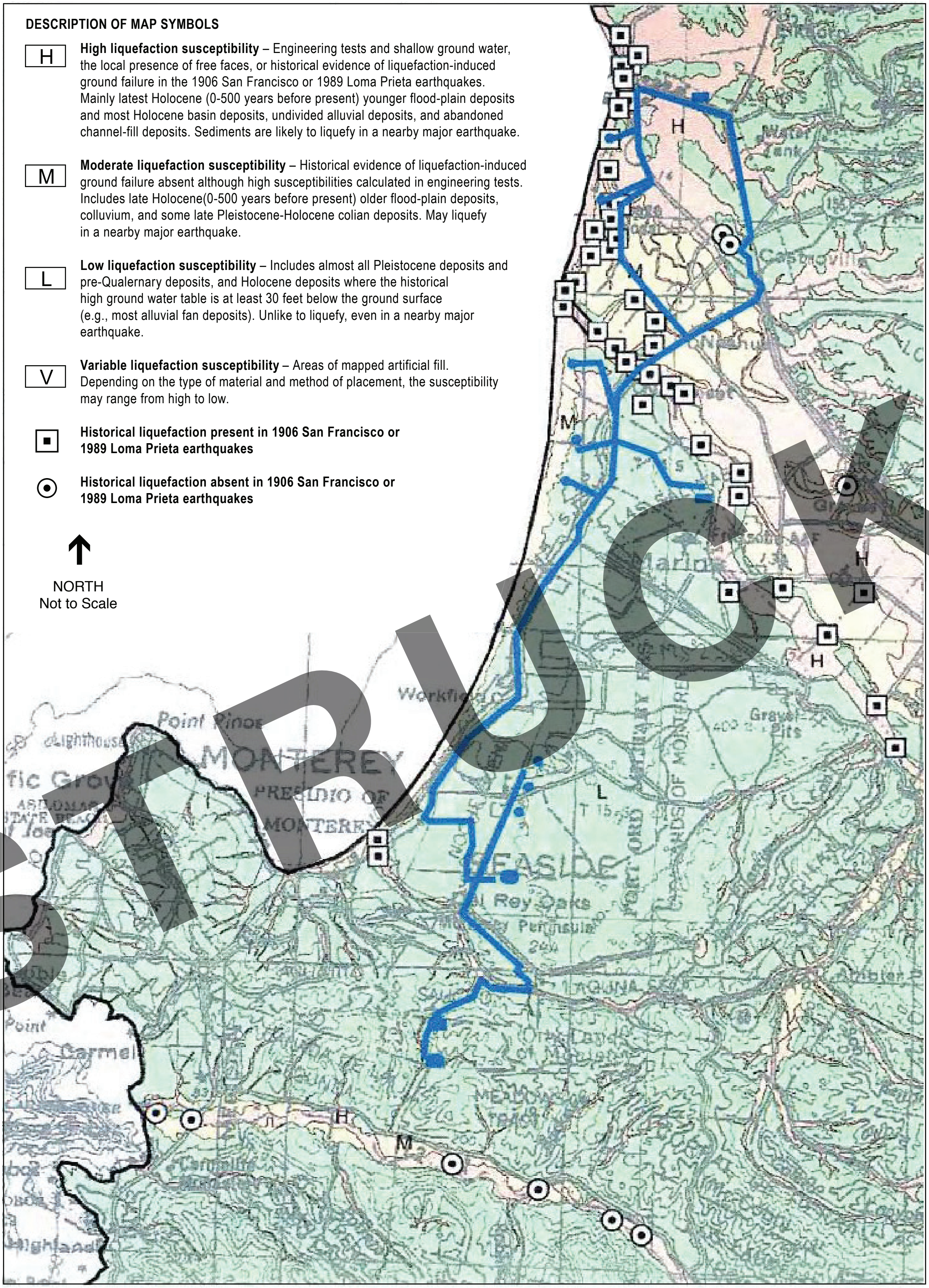
▣ Historical liquefaction present in 1906 San Francisco or 1989 Loma Prieta earthquakes

⊙ Historical liquefaction absent in 1906 San Francisco or 1989 Loma Prieta earthquakes

NORTH
Not to Scale

SOURCE: Ninyo and Moore, 2005

Revised Figure 4.5-2
Liquefaction Seismic Hazard Map



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V	**Variable liquefaction susceptibility** – Areas of mapped artificial fill. Depending on the type of material and method of placement, the susceptibility may range from high to low.
▣	**Historical liquefaction present in 1906 San Francisco or 1989 Loma Prieta earthquakes**
⊙	**Historical liquefaction absent in 1906 San Francisco or 1989 Loma Prieta earthquakes**

↑
NORTH
Not to Scale

STRUCK

SOURCE: Ninyo & Morre

Figure 4.5-2
Liquefaction Seismic Hazard Map

Lateral Spreading

Lateral spreading is horizontal earth movement associated with soil liquefaction. Lateral spreading generally occurs in shallow ground water areas with unsupported embankments including natural creek banks, fill slopes, levees, etc. However, even areas with very little slope gradients can be susceptible to lateral spreading. Areas that have the highest potential for lateral spreading within the project site are low-lying areas in the north that are near river channels, sloughs, or other drainages.

Landslides and Slope Failure

Slope failures, commonly referred to as landslides, include many phenomena that involve the downslope displacement and movement of material, either triggered by static (i.e., gravity) or dynamic (i.e., earthquake) forces. A slope failure is a mass of rock, soil, and debris displaced downslope by sliding, flowing, or falling. Exposed rock slopes undergo rockfalls, rockslides, or rock avalanches, while soil slopes experience shallow soil slides, rapid debris flows, and deep-seated rotational slides. Landslides may occur on slopes of 15 percent or less; however, the probability is greater on steeper slopes that exhibit old landslide features such as scarps, slanted vegetation, and transverse ridges. Landslide-susceptible areas are characterized by steep slopes and downslope creep of surface materials. Debris flows consist of a loose mass of rocks and other granular material that, if saturated and present on a steep slope, can move downslope. The rate of rock and soil movement can vary from a slow creep over many years to a sudden mass movement. Landslides occur throughout the state of California, but the density of incidents increases in zones of active faulting.

Slope stability can depend on a number of complex variables. The geology, structure, and amount of groundwater in the slope affect slope failure potential, as do external processes (i.e., climate, topography, slope geometry, and human activity). The factors that contribute to slope movements include those that decrease the resistance in the slope materials and those that increase the stresses on the slope. Slope failure under static forces occurs when those forces initiating failure overcome the forces resisting slope movement. For example, a soil slope may be considered stable until it becomes saturated with water (e.g., during heavy rains or due to a broken pipe or sewer line). Under saturated conditions, the water pressure in the individual pores within the soil increases, reducing the strength of the soil. Cutting into the slope and removing the lower portion, or slope toe, can reduce or eliminate the slope support, thereby increasing stress on the slope.

Landslides initiated by earthquakes have historically been a major cause of earthquake damage. Earthquake motions can induce significant horizontal and vertical dynamic stresses in slopes that can trigger failure. Earthquake-induced landslides can occur in areas with steep slopes that are susceptible to strong ground motion during an earthquake. Landslides initiated by the 1971 San Fernando, 1989 Lorna Prieta, and 1994 Northridge earthquakes were responsible for destroying or damaging numerous homes and other structures, blocking major transportation corridors, and damaging various types of lifeline infrastructure. Seismically induced landsliding includes surficial sliding and rock falls and deep-seated landsliding. Relatively shallow surficial sliding may occur throughout the project study area where steep slope gradients are present and/or loose soil conditions exist (such as dune sands, loose topsoil, and fill slopes). Deep-seated landsliding potential exists in steep canyon areas within the Monterey Peninsula where existing older landslides are present.

The relative potential for earthquake-induced landslides within the project study area is based on the Earthquake-Induced Landslide Susceptibility Map in the *Monterey County Draft General Plan* (1982). The northern and central portions of the project study area are characterized as having a low susceptibility to earthquake-induced landsliding. Significant portions of the Project study area south of Canyon del Rey (Highway 68) have a moderate to high susceptibility to earthquake-induced landsliding. **Figure 4.5-3** summarizes seismically induced landslide hazards for Monterey County in the vicinity of the proposed project.

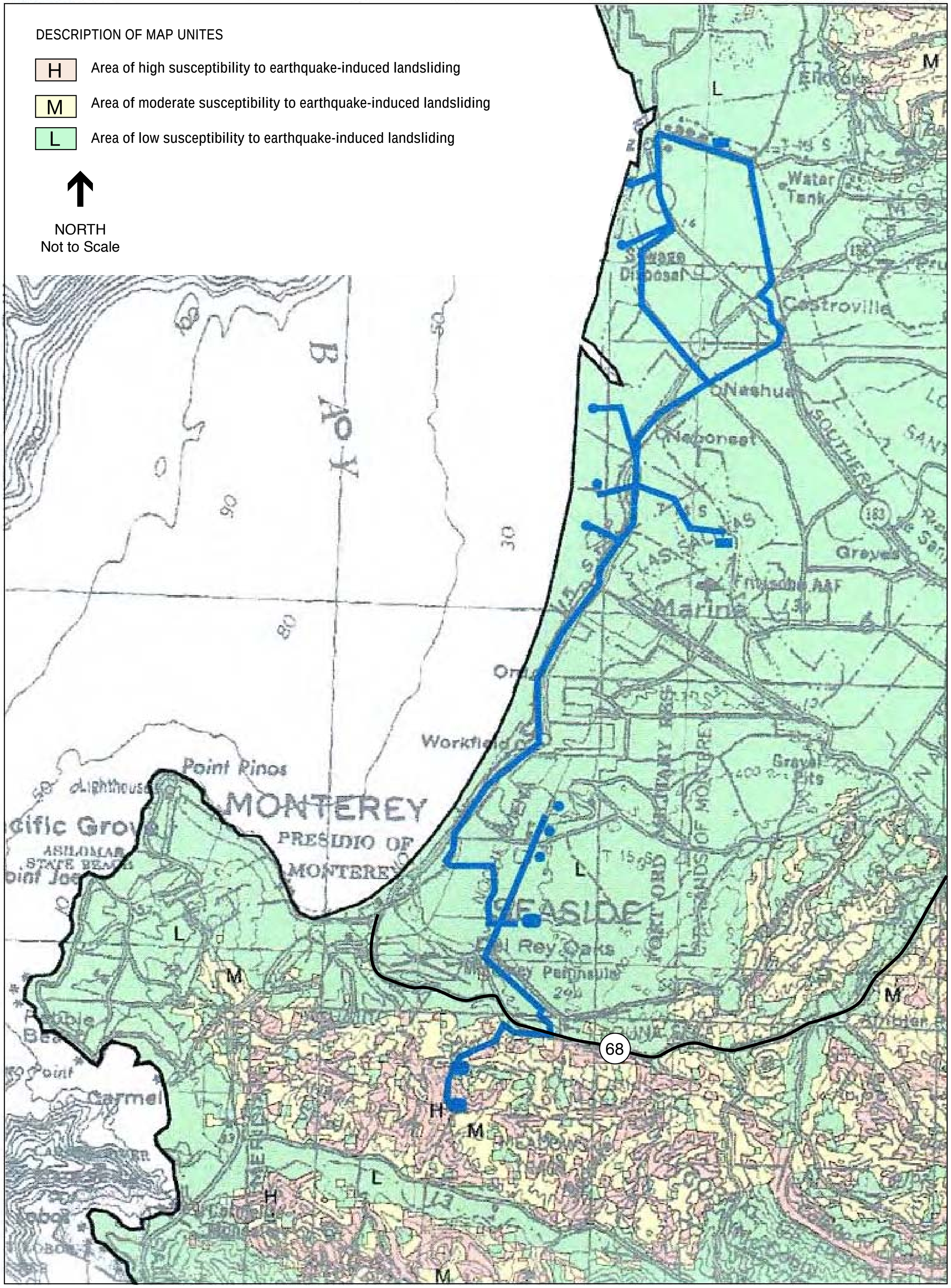
4.5.2.6 Other Geologic Hazards

Erosion

Surface soils tend to erode under the wearing action of flowing water, waves, wind, and gravity. Factors influencing erosion include topography, soil type, precipitation and other environmental conditions. In general, granular soils with relatively low cohesion and soils located on relatively steep topography have relatively high erosion potential. The *Monterey County Draft General Plan* (1982) includes a Soil Erosion Hazard Map showing relative erosion hazards within the County. Soils are classified based on the Monterey County Soil Survey, and the Soil Survey Geographic database for Monterey County prepared by the National Resources Conservation Service. Within the project study area, the mountain areas between Canyon del Rey and Carmel Valley and the steep coastal dune slopes have a high potential for erosion. The dune deposits east of the coastline with less steep topography are considered to have a moderate potential for erosion. The relatively flat areas within the Salinas River valley have a low potential for erosion.

Shoreline Recession

Monterey Bay is a large, lowland coastal embayment, with rocky headlands at the north and south extremes and a sweeping arc of sandy, dominantly dune- and cliff-backed shoreline in between (Stamski, 2005). The shoreline of South Monterey Bay is an 18 km stretch of continuous sandy beach, being wider at the southern end than at the northern end (Stamski, 2005). The morphology of beaches in this region varies from season to season, generally being wider and gently sloping in summer and narrower and steeper in winter (Stamski, 2005). The dunes at the back edge of the beach have an average height of 10.3 m, but can be as high as 46 m (Stamski, 2005). Most of the dune surfaces that are not directly exposed to wave energy are vegetated, indicating that the dunes are stabilized in some areas (Stamski, 2005). The shoreline of Monterey Bay has been receding due to coastal erosion since at least 1916. The Marina area is characterized by extensive sand dunes. These dunes vary in height from about 60 to 100 feet, and are compose entirely of unconsolidated, uncemented, cohesionless, generally well-sorted, highly erodible sand. Differences in erosion of coastal landforms along SMB appear to be dependent upon the amount of wave energy reaching the coast and how that energy is related to tides (Stamski, 2005).

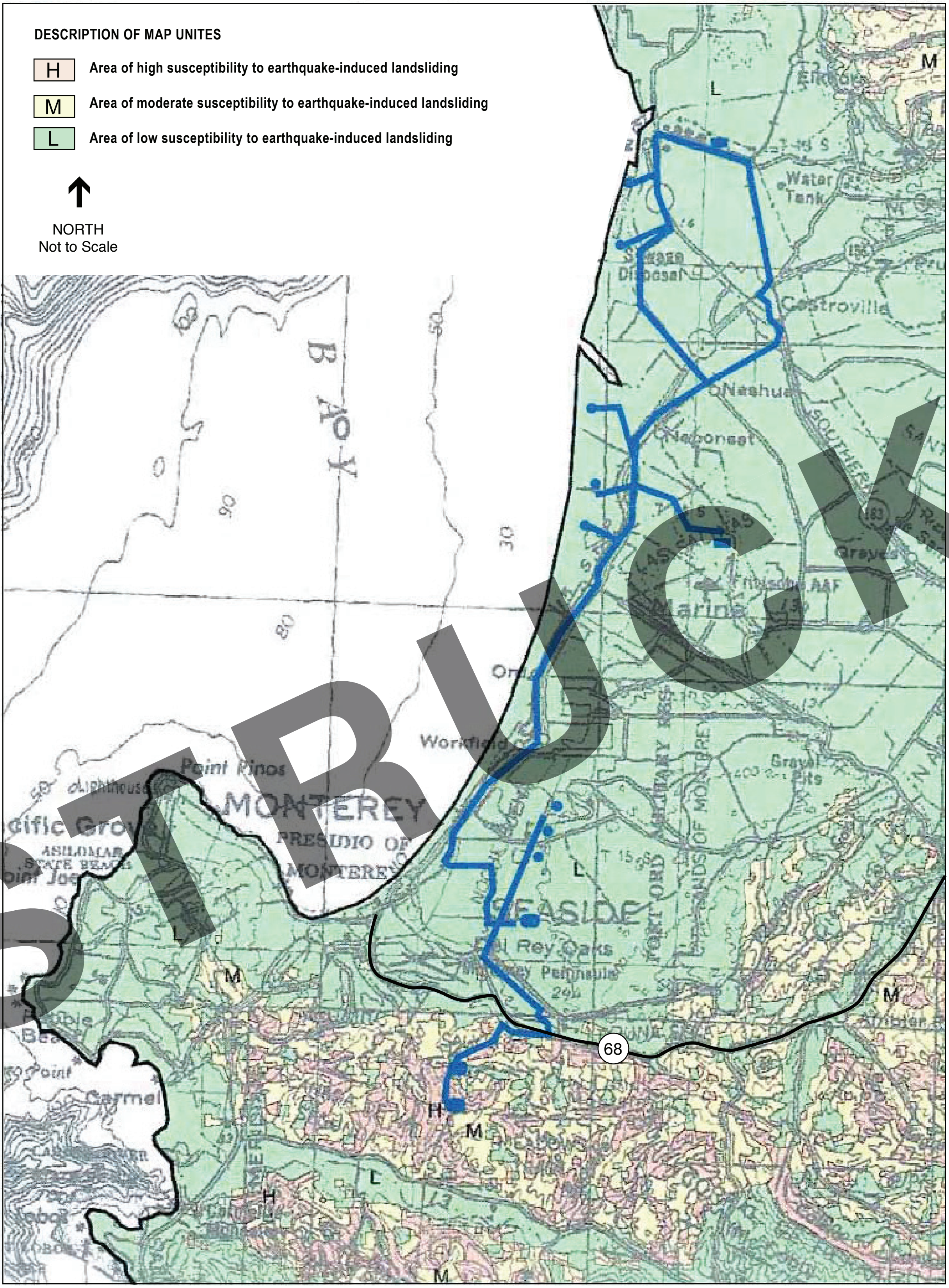


SOURCE: Ninyo and Moore, 2005

CalAm Coastal Water Project . 205335

Revised Figure 4.5-3

Landslide Seismic Hazard Map



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SOURCE: Ninyo & Morre

Figure 4.5-3
Landslide Seismic Hazard Map

The erosion of dunes by waves occurs more often in winter months, when beaches are narrow and storms are stronger and more frequent. Erosion in this region is highly episodic, occurring in steps when high tides coincide with large, storm-generated waves (Stamski, 2005). The steep to near-vertical bluffs that exist in the vicinity of the proposed project site indicate that rapid erosion has taken place in this area.

Evidence indicates that, in the past, the sediment input and output of all of inner Monterey Bay has been in equilibrium. The existence of wide sandy beaches throughout the area, as well as the flanking sand dunes, indicate that, in the past, sand supply was in excess of sand loss. However, the shoreline of southern Monterey Bay has been retreating for a number of years.

The most common method of assessing coastal erosion is to determine an erosion rate, which is generally the amount of linear coastal retreat (perpendicular to shore) that has taken place over a given period of time (Stamski, 2005). These rates are essential for establishing coastal land use planning measures, such as setbacks (Stamski, 2005). Yet, obtaining site-specific erosion rates is not a trivial task. One of the most robust methods for calculating erosion rates is to digitally compare historical aerial photographs (a technique referred to as stereo-photogrammetry). Discrepancies in coastal planning can arise because different, yet valid, erosion rates can be calculated for a single stretch of coast. The key factor in these discrepancies is usually the time interval over which the analysis was made (Stamski, 2005). Therefore, it is critical that a representative time interval is assessed in erosion rate calculations to derive long-term average retreat. A distinction can be made between short-term or event-based erosion versus long-term erosion. Short-term erosion occurs in a single event or series of events (e.g., an El Niño winter), the mechanisms of which include not only direct wave impact, but also flooding, undermining by scour, and removal of overburden (in the case of buried pipelines). Long-term erosion can be defined as the “landward migration of the shoreline over the 50-year planning horizon” (Stamski, 2005). The difference between short and long term rates can be acute (Stamski, 2005). Yet, even with a long-term rate, the episodic and somewhat unpredictable nature of coastal erosion suggests that erosion rates should only be used as guidelines in coastal planning, not as irrefutable facts (Stamski, 2005).

Ten sets of historic stereo aerial photographs were examined to determine the extent of coastal recession for an approximately 6000 foot stretch of coastline off Dunes Drive, in the vicinity of the North Marina desalination plant source water intake slant wells, for the period between 1937 and 2000 (Johnson, 1987; Johnson 2004). Recession rates were calculated by measuring the location of the base of the coastal bluff from a fixed datum along three recession profiles (Johnson, 2004). This study showed an average long-term shoreline erosion rate of 4.2 feet per year for the 63 year study period. The measured short term shoreline erosion rate from 1984 through 2000 was found to be faster at 5.5 feet per year. However, the rate of coastal recession was shown to be episodic rather than uniform during that period. Major erosion occurred when heavy storm wave action reached the base of the bluffs above the level of the beach during 1982-1983 storm events. Thus, a few large storms, each lasting a few days, accounted for most of the erosion during the fifty-year period.

While a large number of major storms affect the central California coast, waves that damage one section of coastline may cause little or no damage elsewhere. Other variables affecting coastal erosion are the orientation of the coastline, the location of wave generation and approach direction, water depth, wave height and length, offshore topography, persistence of wave attack (i.e., the number of storms per season), and the presence or absence of a protective beach or an offshore bar.

The Marina area beach and the bluffs behind it suffered substantial damage during the winter of 1982-83. Much of the beach was removed by a series of storms that left the bluffs unprotected. In addition, heavy rains resulted in copious amounts of groundwater that weakened the earth materials, rendering them more susceptible to erosive forces. Several other factors have contributed to and may continue to contribute to coastal erosion. Dam construction has decreased the historic sediment yield of the Salinas River, thus reducing a major source of sediment added to the beaches in the Marina area. The Nacimiento Dam (constructed in 1957) and the San Antonio Dam (constructed in 1965) have impounded about 15% of the watershed, thereby trapping sand that would have been delivered to the beach, as well as reducing peak flow rates that transport the bulk of the fluvial sediments. Additionally, it is likely that sand mining in the region from the beach and surf zone has also contributed to disequilibrium, thus increasing the rate of coastal recession, although quantification of this effect would be speculative. Future rates of sea level rise could also affect the rate of shoreline recession.

4.5.2.7 Mineral Resources

The CGS has classified lands within the San Francisco Bay region into four Mineral Resource Zones (MRZs). The State Geologist is responsible for classifying urbanizing lands according to the presence or absence of significant sand, gravel, or stone deposits that are suitable as sources of aggregate (Stinson, 1987). The classification of MRZs is based on guidelines adopted by the California State Mining and Geology Board, as mandated by the Surface Mining and Reclamation Act of 1975. This system provides guidance for identifying Mineral Resource Zones (MRZs) based on these four general categories:

- *MRZ-1*. Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.
- *MRZ-2*. Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood exists for their presence.
- *MRZ-3*. Areas containing mineral deposits, the significance of which cannot be evaluated.
- *MRZ-4*. Areas where available information is inadequate for assignment to any other zone.

MRZ-1 zones are located south of Moss Landing in the vicinity of Castroville (County of Monterey, 1982). The coastal region north of Marina continuing to the south of Seaside and Del Rey Oaks is characterized as an MRZ-2 zone. An MRZ-4 zone is located to the southeast of Del Rey Oakes. An MRZ-3 zone characterizes the area southwest of Seaside.

4.5.3 Regulatory Framework

4.5.3.1 Federal and State

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was passed in 1990 following the Loma Prieta earthquake to reduce threats to public health and safety and to minimize property damage caused by earthquakes. This act requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones For structures intended for human occupancy, the act requires site-specific geotechnical investigations to identify potential seismic hazards and formulate mitigation measures prior to permitting most developments designed for human occupancy within the Zones of Required Investigation. The California Geologic Survey is still in the process of producing official maps based on US Geological Survey (USGS) topographic quadrangles. At the time of preparation of this document, the CGS has not completed delineations for any of the USGS quadrangles that intersect the project study area.

California Building Code

The California Building Code (CBC) has been codified in the California Code of Regulations (CCR) as Title 24, Part 2. Title 24 is administered by the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under state law, all building standards must be centralized in Title 24 or they are not enforceable. The purpose of the CBC is to establish minimum standards to safeguard the public health, safety and general welfare through structural strength, means of egress facilities, and general stability by regulating and controlling the design, construction, quality of materials, use and occupancy, location, and maintenance of all building and structures within its jurisdiction. The CBC is based on the International Building Code. The 2007 CBC is based on the 2006 International Building Code (IBC) published by the International Code Conference. In addition, the CBC contains necessary California amendments which are based on the American Society of Civil Engineers (ASCE) Minimum Design Standards 7-05. ASCE 7-05 provides requirements for general structural design and includes means for determining earthquake loads as well as other loads (flood, snow, wind, etc.) for inclusion into building codes. The provisions of the CBC apply to the construction, alteration, movement, replacement, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout California.

The earthquake design requirements take into account the occupancy category of the structure, site class, soil classifications, and various seismic coefficients which are used to determine a Seismic Design Category (SDC) for a project. The SDC is a classification system that combines the occupancy categories with the level of expected ground motions at the site and ranges from SDC A (very small seismic vulnerability) to SDC E/F (very high seismic vulnerability and near a major fault). Design specifications are then determined according to the SDC.

4.5.3.2 Local

Monterey County General Plan

The Monterey County General Plan (1982) includes the following relevant goals, objectives, and policies related to seismic and other geologic hazards:

> **Goal 3:** To promote the conservation of soils as a valuable natural resource.
>
> *Objective 3.1:* Establish procedures for the prevention of soil erosion and the repairing of erosion damage in critical areas on both public and private lands.
>
> *Policies*
>
> *3.1.1* Erosion control procedures shall be established and enforced for all private and public construction and grading projects.
>
> *3.1.2* The County shall support and encourage existing special district, state, and federal soil conservation and restoration programs within its borders.
>
> *3.1.3* In the absence of more detailed site specific studies, determinations of soil suitability for particular land uses shall be made according to the Soil Conservation Service's Soil Survey of Monterey County.
>
> **Goal 15:** To minimize loss of life, injury, damages to property, and economic and social dislocations resulting from seismic and other geologic hazards.
>
> *Objective 15.1*: Reduce the risks resulting from earthquakes to an acceptable level by regulating the type, density, location, and/or design and construction of development in seismic hazard areas.
>
> *Policies*
>
> *15.1.1* The following areas described in the General Plan should be defined as high hazard areas:
>
> - Zones 1/8 mile each side of active or potentially active faults (Figure 3, page 30)[3];
> - Areas of tsunami hazard (Figure 3, page 30);
> - Areas on the Potential Seismic and Geologic Hazards Map (Figure 5, page 33) designated as "high hazard"; and
> - Areas designated as Zones IV, V, and VI on the geotechnical evaluation maps of the County's 1975 Seismic Safety Element (page 17).
>
> *15.1.2* Faults classified as "potentially active" shall be treated the same as "active faults" until geotechnical information demonstrating that a fault is not "active" is accepted by the County.

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[3] Figure and page number references are to the Monterey County General Plan.

15.1.3 The lands within 1/8 mile of active or potentially active faults shall be treated as a fault zone until accepted geo-technical investigations indicate otherwise.

15.1.4 All new development and land divisions in designated high hazard zones shall provide a preliminary seismic and geologic hazard report which addresses the potential for surface ruptures, ground shaking, liquefaction, and landsliding before the application is considered complete. This report shall be completed by a registered geologist and conform to the standards of a preliminary report adopted by the County.

15.1.6 Prior to the construction of a new public facility or critical structure within a high hazard zone, the County shall require a full geological investigation by a registered geologist.

15.1.7 Prior to the issuance of a building or grading permit, the County shall require liquefaction investigations for proposed critical use structures and multi-family dwellings over four units when located in areas of moderate or high hazard for liquefaction or subject to the following conditions:

- location in primary floodways; and
- groundwater levels less than 20 feet, as measured in spring and fall.

15.1.8 The County should require a soils report on all building permits and grading permits within areas of known slope instability or where significant potential hazard has been identified.

15.1.9 The County shall require an engineering geology report for all new public reservoirs. This report shall be completed by a registered engineering geologist and shall conform to County standards.

15.1.10 All structures and private utility lines shall be designed and constructed to conform to the standards of the latest adopted Uniform Building Code.

15.1.11 For high hazard areas, the County should condition development permits based on the recommendations of a detailed geological investigation and soils report.

15.1.12 The County shall require grading permits to have an approved site plan which minimizes grading and conforms to the recommendations of a detailed soils or geology investigation where required.

15.1.13 The County shall require septic leachfields and drainage plans to direct runoff and drainage away from unstable slopes.

15.1.14 The County shall require wave action and erosion information to be submitted by a qualified oceanographer before an application is considered in areas identified as having a tsunami hazard; approval of development shall be conditioned on the recommendations of the oceanographic information.

15.1.15 Side castings from the grading of roads and building pads shall be removed from the site unless they can be distributed on the site so as not to change the natural landform. An exception to this policy will be made for those cases where changes in the natural landform are required as a condition of development approval.

City of Marina General Plan

The City of Marina General Plan includes the following policies and conditions to conserve soil and mineral resources within the Marina Planning Area:

- The City shall continue to require erosion-control and landscape plans for all new subdivisions or major projects on sites with potentially high erosion potential. Such plans should be prepared by a licensed civil engineer or other appropriately certified professional and approved by the City Public Works Director prior to issuance of a grading permit. All erosion control plans shall incorporate Best Management Practices to protect water quality and minimize water quality impacts and shall include a schedule for the completion of erosion and sediment-control structures, which ensures that all such erosion-control structures are in place by mid-October of the year that construction begins. Site monitoring by the applicant's erosion-control specialist should be undertaken, and a follow-up report should be prepared that documents the progress and/or completion of required erosion-control measures both during and after construction is completed.

- The City recognizes the existence of designated mineral resources east of Highway One within the Armstrong Ranch portion of the City's Sphere of Influence area. Mineral extraction on a portion of the Ranch may constitute an appropriate interim use, recognizing also that Armstrong Ranch provides one of the last remaining large areas on the Central Coast suitable for housing and other urban development.

- Mineral extraction on a portion of the Armstrong Ranch mineral resource area may be permitted, provided such use is reviewed and processed in accordance with applicable state laws, including environmental review pursuant to CEQA. Approval should also be contingent on completion and approval of a Reclamation Plan, use permit, and a determination that the proposed mining activity will not significantly conflict with other planned or approved uses within close proximity (i.e., a 1,000-foot radius from the perimeter of the mineral extraction site).

City of Carmel General Plan

The City of Carmel has developed the following Goal and corresponding Objective in guiding its General Plan Policies:

> **G8-1:** To reduce loss of life, injuries, damage to property, and economic and social dislocations resulting from earthquakes, fires, geological hazards and/or other disasters; identify potential problems relating to environmental safety; encourage public awareness concerning the consequences of natural disasters and hazards as they affect Carmel.
>
> *<u>O8-1</u>*: Define the type and nature of potential environmental hazards in and near Carmel to guide risk reduction measures for new construction and structural and non-structural hazard abatement where needed in existing development.

City of Monterey General Plan

The following Goals and Policies relate to Geological and Seismic hazards within the City of Monterey as listed in the General Plan:

Goal a: Evaluate seismic safety when reviewing development applications and land uses.

Policy a.1: Potentially active faults should be treated the same as active faults until detailed geotechnical data is submitted demonstrating to the City's satisfaction that a fault is not active.

Policy a.2: Engineering and geologic investigations should be undertaken for proposed projects within high and moderate seismic hazard zones before approval is given by the City. The entire city is currently within seismic hazard zone IV and these studies are required for almost all new construction except very minor additions.

Policy a.3: Lands within 660 feet of identified faults should be treated as having high seismic hazard until an acceptable geotechnical investigation indicates they should be treated otherwise.

Goal b: Minimize landslide hazards by locating development away from steep slopes and by requiring excellent grading practices.

Policy b.2: Minimize grading in hillside areas.

Policy b.3: Minimize cutting and removal of vegetation during grading operations.

City of Seaside General Plan

The following Goals and Policies relate to Geological and Seismic hazards within the City of Seaside as listed in the General Plan:

Goal S.1: Reduce the risks to people and property from hazards related to seismic activity, flooding, geologic conditions, and wildfires.

Policy S-1.1: Reduce the risk of impacts from seismic and geologic hazards.

City of Pacific Grove General Plan

The following Goals and Policies relate to Geological and Seismic hazards within the City of Pacific Grove as listed in the General Plan:

Goal 1: Prevent loss of life, injury, and property damage from geologic and seismic hazards.

Policy 1: Design underground utilities, including water and natural gas mains, to withstand seismic forces.

Policy 2: Continue City requirements for post-earthquake building replacement, reconstruction, and rehabilitation to latest City codes.

4.5.4 Impacts and Mitigation Measures

4.5.4.1 Significance Criteria

According to CEQA Guidelines Appendix G, the proposed project would result in a significant impact to geology, soils and seismicity if it would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
    - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the state geologist for the area or based on other substantial evidence of a known fault,
    - Strong seismic groundshaking,
    - Seismic-related ground failure, including liquefaction, or
    - Landslides.
- Result in substantial soil erosion or the loss of topsoil
- Be located on a geologic or soil unit that is unstable, or that would become unstable as a result of the project, and potentially result in onsite or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse
- Be located on expansive or corrosive soil, creating substantial risks to life or property
- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater

The proposed project would have a significant impact related to mineral resources if it were to:

- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.
- Result in the loss of availability of a locally important mineral resource recovery site delineated in a local general plan, specific plan, or other land use plan.

Based on the proposed construction of the various project elements and the geologic environment in the project study area, the proposed CWP would not result in impacts related to fault rupture, construction or operation related soil erosion (not including coastal recession), mineral resources, wastewater disposal, or subsidence. No impact discussion is provided for these topics for the following reasons:

- *Fault Rupture*. The faults most susceptible to earthquake rupture are active faults, which are faults that have experienced surface displacement within the last 11,000 years. There are no active faults that cross any of the project components and no project element is located within an Alquist-Priolo fault rupture zone. Therefore, the potential for fault rupture to affect the proposed project elements is very low. Because the active faults in the vicinity of the project are located beyond project limits, the Alquist-Priolo Act requirements do not apply to this project. Additionally, the project does not include a surface building for human occupancy within an Alquist-Priolo fault rupture zone.

- *Soil Erosion*. Construction work would incorporate best management practices for erosion control, in accordance with applicable local policies and/or stormwater pollution prevention plan requirements (see Section 4.1, Surface Water Resources). These erosion control measures would reduce the potential for short- or long-term structural damage to fills, foundations, and other engineered structures. For the operational phase, the pipelines would be constructed below grade and once constructed would not subject any soils to erosion. Completed above grade facilities would include stormwater control infrastructure according to local stormwater requirements that would prevent the potential for any soil erosion to occur. Coastal erosion and its potential impact on proposed facilities, however, is discussed below.

- *Mineral Resources*. A large portion of the project vicinity, including the cities of Marina, Sea Side, and Sand City, has been classified as an MRZ-2 zone. The majority of project elements within this mineral resource zone are comprised of conveyance pipelines. The proposed North Marina Project desalination plant site is located within this large MRZ-2 zone also. The proposed conveyance pipelines, based on their overall limited footprint would not significantly reduce the availability of the identified mineral resources (primarily sand dunes) present. Similarly, the proposed desalination plant, relative to the overall size of the MRZ-2 zone, would not significantly reduce the availability of the mineral resources. Therefore, neither the construction or operation of the proposed project elements would alter, destroy, or limit access to any existing significant mineral resources.

- *Wastewater Disposal*. Reverse osmosis brine from the desalination facilities will utilize existing outfall structures (see section 4.1 Surface Water Resources, for detailed discussion). None of the project elements require the use of septic or other alternative disposal wastewater systems, and therefore no impact associated with this hazard would result.

- *Subsidence.* Subsidence can occur as a result of groundwater extraction from a confined aquifer which results in the compaction of the confining clay layers. This type of subsidence is usually associated with severe, long term withdrawal in excess of recharge. Additionally, compaction tends to happen more readily when the wells are open only to the confined part of the aquifer system than when they are open to the shallow water-table aquifer as well. None of the project elements involve conditions typically resulting in subsidence, and therefore no impact associated with this hazard would result. Also, while overdrafting of groundwater in North County has taken place over an extended time, because of saltwater intrusion, no subsidence has occurred (Monterey County GP, 1982). Additionally, according to the Monterey County General Plan (1982), subsidence is not a critical hazard within the County.

These criteria are not evaluated further in this EIR.

4.5.4.2 Impacts and Mitigation Measures

Table 4.5-2 provides a summary of geologic and seismic impacts by the individual components of each project.

TABLE 4.5-2
SUMMARY OF POTENTIAL GEOLOGY, SOILS, AND SEISMIC IMPACTS

Facility	Impact 4.5-1	Impact 4.5-2	Impact 4.5-3	Impact 4.5-4	Impact 4.5-5
Moss Landing Site:					
Plant: Moss Landing Project	SM	SM	-	LTS	SM
Intake: Moss Landing Project	SM	SM	-	LTS	SM
Outfall: Moss Landing Project	SM	SM	-	LTS	SM
Transmission Main North: *Moss Landing Project*	SM	SM	-	LTS	SM
North Marina Site:					
Plant: North Marina Project	SM	SM	-	LTS	LTS
Intake: North Marina Project	SM	SM	LTS	LTS	SM
Outfall: North Marina Project	SM	SM	-	LTS	SM
Transmission Main South	SM	SM	-	SM	LTS
Terminal Reservoir Site	SM	SM	-	SM	LTS
Valley Greens Pump Station	SM	SM	-	LTS	LTS
Aquifer Storage and Recovery Facilities	SM	SM	-	LTS	LTS
Monterey Pipeline	SM	SM	-	LTS	SM
Moss Landing Project	SM	SM	LTS	SM	SM
North Marina Project	SM	SM	LTS	SM	SM

SM – Significant Impact, can be Mitigated
SU – Significant Impact, Unavoidable
LTS – Less-than-significant Impact
– – No Impact

The potential impacts of the individual project components, as well as the Moss Landing Project and the North Marina Project as a whole, are presented below.

Impact 4.5-1: Large earthquakes would be expected to damage the proposed facilities, impairing and/or disrupting their intended operations if not engineered to withstand such ground shaking.

Moss Landing and North Marina Projects (All Project Facilities)

As described in the Setting, the potential exists for large magnitude earthquakes to result in high intensity ground shaking (note that impacts related to ground failures from liquefaction are discussed in Impact 4.5-5 below). The intensity of such an event would depend on the causative fault and the distance to the epicenter, the moment magnitude, and the duration of shaking. Intense ground shaking and high ground accelerations would affect the entire area around the proposed facilities and associated pipelines. The primary and secondary effects of ground shaking could damage structural foundations, distort pipelines and other water conveyance structures, and cause failure of concrete. Damage to these features would cause temporary service disruption and possibly loss of water due to leakage and pipe rupture. Pumps could be rendered inoperable. In comparison to above-ground structures, underground pipelines and buried structures are generally less susceptible to damage from strong ground shaking because they are imbedded in compacted backfill that can tolerate more seismic wave motion. Broken pipelines could result in soil washout and sinkholes.

Locating and repairing damaged pipelines and the pumps could require a temporary cessation of operation of the facilities for a significant period of time. The 1989 Loma Prieta earthquake reportedly caused more than 60 water pipeline breaks in Santa Cruz, the nearest urbanized area to the epicenter (CDMG, 1990). However, modern standard engineering and construction practices include design criteria to mitigate potential damage from an earthquake, and any potential interruption of service would likely be temporary in nature. While these practices would not completely eliminate the potential for damage to the facilities, they would ensure that the resultant improvements will have the structural fortitude to withstand anticipated groundshaking without significant damage. With implementation of Measure 4.5-1, this impact would be reduced to a less-than-significant level.

Mitigation Measure

> **Mitigation Measure 4.5-1:** A California licensed geotechnical engineer or engineering geologist will conduct geotechnical investigations of all Project facilities and pipeline alignments prior to the final design and prepare recommendations applicable to foundation design, earthwork, backfill and site preparation prior to or during the project design phase. The investigations will specify seismic and geologic hazards including potential ground movements and co-seismic effects (including liquefaction). The recommendations of the geotechnical engineer will be incorporated into the design and specifications in accordance with California Geological Survey Special Publication 117 and shall be implemented by the construction contractor. The construction manager will conduct inspections and certify that all design criteria have been met in accordance with the California Building Code as well as applicable City and County ordinances.
>
> **Significance after Mitigation:** Less than Significant.

Impact 4.5-2: Proposed pipelines and facilities could incur damage as a result of underlying soil properties (high shrink-swell potential, and corrosivity).

Moss Landing and North Marina Projects (All Project Facilities)

Proposed project elements could be damaged due to settlement of weak or saturated subsurface soils. Underlying soils at the proposed project sites may also have a high potential for expansion and corrosivity. The “shrink-swell”[4] capacity of expansive soils can cause damage to foundations and pipelines. One or more of these soil properties could impact portions of the proposed project.

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[4] “Shrink-swell” refers to the cyclical expansion and contraction that occurs in fine-grained clay sediments from wetting and drying.

Unless properly mitigated, shrink-swell soils could exert additional pressures on below-grade facilities, producing shrinkage cracks that allow water infiltration and compromise the integrity of backfill material. Depending on the depth of buried pipelines, soil in expansion or contraction could lead to undue lateral pipeline stress and stress of structural joints. Lateral stresses could, over time, lead to pipeline rupture or leaks in the coupling joints. Shrinkage cracks could form in native soils adjacent to the pipeline trench or in backfill material if expansive soils are used. If shrinkage cracks extend to sufficient depths, groundwater can infiltrate into the trench, causing piping (progressive erosion of soil particles along flow paths) or settlement failure of the backfill materials. Settlement failure can also occur if expansive soils are used in backfill and undergo continued expansion and contraction. Over time these soils could settle, resulting in misalignment or damage to buried facilities.

The effects of shrink-swell soils could damage foundations of aboveground structures, paved service roads, and concrete slabs. Surface structures with foundations constructed in expansive soils would experience expansion and contraction depending on the season and the amount of surface water infiltration. The expansion and contraction could exert enough pressure on the structures to result in cracking, settlement, and uplift.

The conductivity of soils may be high enough in the project study area to corrode underground metal pipes and electrical conduits. Over time, pipe corrosion could lead to pipeline failure, resulting in localized surface flooding of water or localized settlement of surface soils in the location of the failure. Failed subsurface electrical conduits could result in electrical short-circuiting. This would reduce power temporarily to the facility and possibly result in temporary shutdown of operations.

Many of the project sites have been previously studied and developed and the underlying soils replaced with engineered fill. However, whether a previous geotechnical evaluation needs minor updating or the site requires initial analysis, implementation of the measures identified below would reduce the potential hazard to a less-than-significant level.

Mitigation Measure

> **Mitigation Measure 4.5-2:** All project elements and pipeline facilities will comply with applicable policies and appropriate engineering investigation practices necessary to reduce the potential detrimental effects of expansive soils, and corrosivity. Appropriate geotechnical studies will be conducted by California licensed geotechnical engineers or engineering geologists using generally accepted and appropriate engineering techniques for determining the susceptibility of the sites to unstable, weak or corrosive soils in accordance with the most recent version of the California Building Code. A licensed geotechnical engineer or engineering geologist will prepare recommendations applicable to foundation design, earthwork, and site preparation prior to or during the project design phase. Recommendations will address mitigation of site-specific, adverse soil and bedrock conditions that could hinder development. Project engineers will implement the recommendations and incorporate them into project specifications. Geotechnical design and design criteria will comply with the most recent version of the California Building Code and applicable local construction and grading ordinances. Once appropriately designed and subsequently constructed, in accordance with local and state building code requirements,

the resultant improvements will have the structural fortitude to withstand the potential hazards of expansive soils or corrosivity without significant damage.

Significance after Mitigation: Less than Significant.

Impact 4.5-3: Continuing coastal erosion could expose sub-surface components of the project which may result in these structures being damaged or destroyed within the project lifetime rendering delivery systems inoperable.

Moss Landing Project

The Moss Landing Project facilities are not located in coastal dune areas, therefore, there would be no impact to sub-surface components from continuing coastal erosion.

Significance: No impact.

North Marina Project

Source water for the NMA desalination plant would be extracted from subsurface slant wells drawing seawater from groundwater formations under the seafloor. The proposed location for slant well construction is near the Marina Coast Water District (MCWD) offices in the City of Marina at the west end of Reservation Road. The proposed source water slant wells for the NMA desalination facility would be located in a coastal dune field undergoing active coastal bluff (dune) retreat (Johnson, 2004). Exposure of subsurface infrastructure from coastal bluff retreat as surrounding sands are eroded may result in these structures being damaged or destroyed within the project lifetime rendering delivery systems inoperable.

Johnson (1987, 2004) evaluated shoreline retreat in the proposed project study area for the NMA source water slant wells utilizing aerial photographic analysis and geological reconnaissance. Johnson (2004) conducted analyses to quantify the rate of coastal bluff (dune) retreat for a 63 year period between 1937 and 2000 to determine an appropriate setback from the current shoreline for MCWD desalination facilities. These analyses concluded that the overall long-term rate of shoreline recession is 4.2 feet per year for the proposed Project area, with an average short-term recession rate of 5.5 feet per year. These recession rates were used to calculate an estimated 50 year base of bluff recession zone based on the low and high recession rates projected over 54 years from the year 2000. An additional 50 feet was added to this estimated 50 year base of bluff recession zone to account for observed peak coastal dune erosion from high intensity storm events during the winter period of 1982-1983. Johnson (2004) concluded that over 50 years the base of the coastal bluff will be located 280 to 350 feet shoreward from position at time of analysis.

Each cluster of 2 to 3 slant wells would be constructed in a fan array and would originate at the ground surface from a constructed access vault located approximately 150 feet inland of the 2050 beach erosion line. Based on the estimates outlined by Johnson (2004), the proposed NMA source water slant wells would remain undisturbed for the project lifetime. However, there is a degree of uncertainty regarding the calculated average rates of recession and the determination of a 50 year base of bluff recession zone. Future shoreline recession will be governed, in part, by major storm events. Uncertainty exists regarding the frequency of large storm events in the future, potentially effecting estimates of the average rate of recession for the period analyzed. While the overall uncertainties are acknowledged, the best available long term estimates indicate that the proposed North Marina Project source water slant wells would not become exposed for a period up to approximately the year 2050 (lifetime of the facility). The potential impact would be less than significant.

Significance: Less than Significant.

Impact 4.5-4: Potential injury and/or damage resulting from landslides including earthquake induced landslides.

Figure 4.5-3 identifies potential slope stability hazards associated with proposed CWP project sites. The designations shown in the figure (High, Medium, and Low susceptibility to earthquake induced landslide) are based on site-specific reports provided in the Proponents Environmental Assessment and reviewed here, and on resources from the Monterey County General Plan (County of Monterey, 1982). Earthquake susceptibility for the project vicinity is summarized in the Monterey County General Plan (1982) citing Rosenberg (2001) for determination of earthquake induced landslide susceptibility classifications. Sites with the “Low” designation are considered to have the lowest potential for slope stability hazards, and sites with the “High” designation are considered to have the highest potential for slope stability hazards. Potential landslide hazards are present in the southern hillside terrain of the Monterey Peninsula, generally from Canyon del Rey to the south. The proposed pipeline alignment in this area is located near mapped landslides and the slopes in the area are considered to be moderately to highly susceptible to earthquake-induced landsliding (Ninyo and Moore, 2005).

Moss Landing Project

The potential impact resulting from landslides for the Moss Landing Project as a whole is less than significant with mitigation. The impact of each project component varies depending upon the type of structure and its location. The types of impacts and mitigation measures that would be applicable to individual project components are described below.

Moss Desalination Plant

The Moss Landing Project desalination plant would encompass approximately 16 acres and would be located approximately 1500 feet east of the MLPP. The intake and return flow pipelines are an existing component of the MLPP. The proposed location for the desalination plant and associated facilities is on a relatively level area with elevations ranging from approximately 20 to 30 feet above mean sea level (msl). This site is a gently northwest-sloping terrace. Previous grading for former abovegrade tanks on this site created several terraced pads with associated cut and fill areas. Four of the five former tanks have been removed, leaving relatively level pads. Because this site has been previously graded for development and is relatively level, there is a low susceptibility to earthquake-induced landsliding. The majority of the associated facilities to the plant would also be located in the previously developed area or in an area that would not present a hazard associated with unstable slopes. The potential impact would be less than significant.

Transmission Main North

The northern section of the conveyance pipeline corridor (Transmission Main North) consists of a 9.5 mile up to 36-inch pipeline and would convey water from the proposed Moss Landing desalination plant to Reservation Road. Construction activities would involve earthmoving activities such as excavation, grading, soil stockpiling, and backfilling. Pipeline construction would occur primarily through trenching along existing roadways (public right-of-ways) and jack and bore tunneling at sensitive areas such as stream crossings. Transmission Main North would be located on the low-lying, relatively flat, alluvial plains of the Salinas River valley and the relatively narrow floodplains of the Moro Cojo and Tembladero Sloughs. Ground surface elevations in the Salinas River valley area of the project generally range from approximately 8 to 15 feet above msl. The Moss Landing area includes some slightly elevated, relatively level marine terraces and older dunes with elevations ranging from approximately 10 to 40 feet above msl and characterized by gradual elevation changes. The Moss Landing to North Marina conveyance pipeline corridor has a low susceptibility to earthquake-induced landsliding. The potential impact would be less than significant.

Transmission Main South

The Southern section of the conveyance pipeline corridor (Transmission Main South) would have the same characteristics as Transmission Main North and would convey water approximately 10 miles from Reservation Road to Terminal Reservoir. Construction activities would involve earthmoving activities such as excavation, grading, soil stockpiling, and backfilling. Pipeline construction would occur primarily through trenching along existing roadways (public right-of-ways) and jack and bore tunneling at sensitive areas such as stream crossings. Transmission Main South would be located on gently to moderately rolling dunes with elevations ranging from approximately 10 feet above msl near the Salinas River to approximately 400 feet above msl along the proposed Aquifer Storage and Recovery (ASR) well pipeline. Fill embankments up to approximately 30 feet in height were observed at scattered locations within the central project study area (Ninyo and Moore, 2005). Road cuts within dune sands up to approximately 20 feet high and more were observed (Ninyo and Moore, 2005). Depending on the presence or absence of cementation and/or groundwater, excavations in the dune deposits may encounter flowing sands and cave continuously. Additionally, flowing sand conditions may warrant special excavation and shoring procedures to protect adjacent improvements and existing utilities, such as trench shields placed during excavation and limited open-trench conditions. Due to the proximity of proposed pipeline alignments along public right-of-ways to road cuts within sand dunes, there is a potential risk relating to slope stability. With implementation of Measure 4.5-4, the potential impact due to earthquake induced landslides would be less than significant.

Terminal Reservoir and Aquifer Storage and Recovery (ASR) Facilities

The Moss Landing Project would involve construction of the Terminal Reservoir in Seaside. Construction of the reservoir would consist of installing two 2-million-gallon (MG), 132-foot-diameter, and 30-foot high circular tanks. The proposed ASR system would include construction of two injection/extraction wells at two different sites along General Jim Moore Boulevard as well as approximately 2 miles of pipeline. The planned reservoir area is currently undeveloped and includes brush and scattered low trees. The reservoir sites are underlain by older dune deposits that are anticipated to consist of dry to damp, moderately consolidated, silty sand and sand. Groundwater is expected to be relatively deep. Construction would involve site clearing and grading prior to installation of the Terminal Reservoir and wells. Pipeline construction would occur primarily through trenching along existing roadways (public right-of-ways) and jack and bore tunneling at sensitive areas such as stream crossings. The topography of this area is characterized as rolling inland hills. Elevations of the proposed ASR well locations range from approximately 340 to 360 feet above msl. Excavations in the dune sands for trenches, foundations, or other improvements may vary from slightly stable to flowing sand conditions. Trenches excavated in landslide deposits may be unstable. Due to the potential presence of flowing sands and grading requirements, there is a potential risk relating to slope stability. With implementation of Measure 4.5-4, the potential impact due to earthquake induced landslides would be less than significant.

Monterey Pipeline

The Monterey Pipeline would consist of a 36-inch-diameter pipeline connecting the Forest Lake Reservoir pressure zone in Monterey to Seaside. The Monterey Pipeline would also connect to the proposed transmission main, conveying desalinated water to the Monterey Peninsula. The propose Monterey Pipeline route would be situated in the low lying coastal zone in the southern portion of the project study area. The proposed Monterey Pipeline would be within an area classified as having low susceptibility to earthquake-induced landsliding. The potential impact from landslides for this element would be less than significant.

Valley Greens Pump Station

The pressure at Valley Greens (in Carmel Valley south of the Segunda Reservoir) would not be sufficient to fill Segunda Reservoir in this scenario. Therefore, a small pump station (Valley Greens Pump Station) would be required at this location. This pump station would also provide additional pressure to lift the water to the higher portions of Carmel Valley. The proposed pump station would be located in an area that has gentle to moderate slopes that are considered to have a low susceptibility to earthquake-induced landsliding. The potential impact from landslides for this element would be less than significant.

North Marina Project

The potential impact resulting from landslides for the North Marina Project as a whole is less than significant with mitigation. The impact of each project component varies depending upon the type of structure and its location. The types of impacts and mitigation measures that would be applicable to individual project components are described below. Components common to both the Moss

Landing Project and North Marina Project are assessed above for earthquake induced landslide susceptibility and risk and are not discussed in this section. These components include:

- Transmission Main South
- Terminal Reservoir
- Aquifer Storage and Recovery System
- Monterey Pipeline
- Valley Greens Pump Station

The following sections describe potential impacts resulting from landslides for North Marina Project components not discussed above.

Intake Facility and Source Water Pipeline

Construction of the intake facility would consist of drilling six slant wells in a fan array on an approximately 1-acre site in a previously-disturbed area behind existing MCWD facilities at the west end of Reservation Road. The proposed intake facility and source water pipeline would be located in the low lying coastal dune area with a low susceptibility to earthquake-induced landsliding. The potential impact from landslides for this element would be less than significant.

North Marina Desalination Plant

Construction of the desalination facility would occur on a 10-acre site south of the existing MRWPCA WWTP in Marina. The proposed North Marina desalination plant site is located within the central portion of the project study area on Armstrong Ranch, and exhibits the generally flat, low-lying characteristics of the Salinas River floodplain. Armstrong Ranch is situated on gently rolling elevated dunes. Elevations range from approximately 100 to 140 feet above msl. The proposed North Marina desalination plant site has a low susceptibility to earthquake-induced landsliding. The potential impact from landslides for this element would be less than significant.

Mitigation Measure

Mitigation Measure 4.5-4: During the design phase for all CWP project components that require ground-breaking activities, the project applicant will perform site-specific design-level geotechnical evaluations which will include slope stability conditions and provide recommendations to reduce and eliminate any potential slope hazards, if any, in the final design and if necessary, throughout construction. For all pipelines located in landslide hazard areas, appropriate piping material with the ability to deform without rupture (e.g. ductile steel) will be used. For all other facilities a geotechnical evaluation will be conducted and the geotechnical evaluations will include detailed slope stability evaluations, which could include a review of aerial photographs, field reconnaissance, soil testing, and slope stability modeling. Facilities design and construction will incorporate the slope stability recommendations contained in the geotechnical analysis conducted by California licensed geotechnical engineers or engineering geologists. Final slope stabilization measures, determined by the licensed geotechnical engineer or engineering geologist in accordance with California Building Code requirements, may include, without limitation, one or more of the following:

- Appropriate slope inclination (not steeper than 2 horizontal to 1 vertical)
- Slope terracing
- Fill compaction
- Soil reinforcement
- Surface and subsurface drainage facilities
- Engineered retaining walls
- Buttresses
- Erosion control measures

Mitigation measures included in the geotechnical report will be incorporated into the project construction specifications and become part of the project.

Significance after Mitigation: Less than Significant.

Impact 4.5-5: Potential facility damage resulting from a major earthquake in areas susceptible to liquefaction.

The following analysis of liquefaction potential is based on information presented in the Proponents Environmental Assessment (2005) and the County of Monterey General Plan (1982). The Proponents Environmental Assessment based their analysis of liquefaction potential on information supplied by the County of Monterey General Plan (1982); and, the Preliminary Geotechnical Evaluation, Monterey County, Coastal Water Project (2005), prepared by Ninyo & Moore Geotechnical and Environmental Sciences Consultants.

Figure 4.5-2 identifies potential liquefaction hazards associated with project sites evaluated at a project-level of detail. The designations (High, Moderate, Low, and Variable) are based on liquefaction susceptibility analysis presented in the County of Monterey General Plan (1982). Sites with the “Low” designation are considered to have the lowest potential for liquefaction hazards, and sites with the “High” designation are considered to have the highest potential for liquefaction because of soil types and probable groundwater depths. elements that are located in areas assigned the “moderate” or “High” designation were assumed to be within a zone susceptible to risk of liquefaction and include the following:

- Moss Landing Desalination Plant
- Moss Landing to North Marina Corridor (i.e. Transmission Main North)

Moss Landing Project

The potential impact resulting from liquefaction for the Moss Landing Project as a whole is less than significant with mitigation. The impact of each project component varies depending upon the type of structure and its location. The types of impacts and mitigation measures that would be applicable to individual project components are described below.

Moss Landing Desalination Plant

The Moss Landing Project desalination plant would encompass approximately 16 acres and would be located approximately 1,500 feet east of the MLPP. The proposed Moss Landing Desalination site is underlain by quaternary age marine terrace deposits consisting of moderately consolidated silty, fine sand. The depth to groundwater is anticipated to be within 10 to 20 feet of the ground surface based on surface topography and previous geotechnical studies (Ninyo and Moore, 2005). The Moss Landing area is in a moderate to high susceptibility zone for liquefaction risk. The proposed desalination plant site is mapped near the boundary between an area of low and an area of high susceptibility to liquefaction with historic record of liquefaction occurrence (County of Monterey, 1982). Implementation of Measure 4.5-1 would reduce this impact to a less-than-significant level.

Transmission Main North

The northern section of the conveyance pipeline corridor (Transmission Main North) consists of a 9.5 mile up to 36-inch pipeline and would convey water from the proposed Moss Landing desalination plant to Reservation Road. The low-lying floodplain areas are underlain by Holocene alluvial deposits. These deposits include interbedded, unconsolidated, soft/loose to firm/dense, clayey silt, silty clay and sand (Ninyo and Moore, 2005). Groundwater is anticipated to be approximately 10 feet deep or less in low-lying areas (Ninyo and Moore, 2005). Drainage conditions are relatively poor and the subsurface is anticipated to consist of moist to saturated soils (Ninyo and Moore, 2005). The Moss Landing area at the northern extreme of the conveyance pipeline has a moderate to high liquefaction potential. Additionally, the liquefaction susceptibility in low-lying floodplain areas in the vicinity of the Salinas River is moderate to high. Implementation of Measure 4.5-1 would reduce this impact to a less-than-significant level.

Transmission Main South

The Southern section of the conveyance pipeline corridor (Transmission Main South) would have the same characteristics as Transmission Main North and would convey water approximately 10 miles from Reservation Road to Terminal Reservoir. The North Marina to Terminal Reservoir conveyance corridor is underlain by older dune deposits, recent dune deposits, and fill materials. These deposits are anticipated to consist of dry to damp, uncemented to weakly cemented, loose to medium dense, silty sand and sand (Ninyo and Moore, 2005). Fill materials are generally anticipated to consist of compacted silty sand and sand generated locally from the natural dune deposits (Ninyo and Moore, 2005). Fill materials may also include imported soils and miscellaneous debris (particularly in older developed areas and along the former Fort Ord military base). The susceptibility to liquefaction is considered low along this section of the conveyance pipeline corridor. The potential impact would be less than significant.

Terminal Reservoir and Aquifer Storage and Recovery (ASR) Facilities

The Moss Landing Project would involve construction of the Terminal Reservoir in Seaside. The proposed ASR system would include construction of two injection/extraction wells at two different sites along General Jim Moore Boulevard as well as approximately 2 miles of pipeline. The Terminal Reservoir site generally includes older dune deposits, recent dune deposits, and fill materials (Ninyo and Moore, 2005). These deposits are anticipated to consist of dry to damp, uncemented to weakly cemented, loose to medium dense, silty sand and sand (Ninyo and Moore, 2005). Fill materials are generally anticipated to consist of compacted silty sand and sand generated locally from the natural dune deposits (Ninyo and Moore, 2005). Fill materials may also include imported soils and miscellaneous debris (particularly in older developed areas and along the former Fort Ord military base). The area of ASR Facilities has low liquefaction susceptibility.

The locations of the proposed ASR Facilities contain older dune deposits, recent dune deposits, and fill materials. These deposits are anticipated to consist of dry to damp, un-cemented to weakly cemented, loose to medium dense, silty sand and sand (Ninyo and Moore, 2005). Fill materials are generally anticipated to consist of compacted silty sand and sand generated locally from the natural dune deposits (Ninyo and Moore, 2005). Fill materials may also include imported soils and miscellaneous debris. The proposed well sites are underlain by older dune deposits that are anticipated to consist of dry to damp, moderately consolidated, silty sand and sand (Ninyo and Moore, 2005). Groundwater is expected to be relatively deep. The area of ASR Facilities has low liquefaction susceptibility. The potential impact would be less than significant.

Monterey Pipeline

The Monterey Pipeline would consist of a 36-inch-diameter pipeline connecting the Forest Lake Reservoir pressure zone in Monterey to Seaside. The Monterey Pipeline would also connect to the proposed transmission main, conveying desalinated water to the Monterey Peninsula. The propose Monterey Pipeline route would be situated in the low lying coastal zone in the southern portion of the project study area. The proposed Monterey Pipeline corridor would be situated within areas classified as having low to moderate susceptibility to earthquake-induced liquefaction. Implementation of Measure 4.5-1 would reduce this impact to a less-than-significant level.

Valley Greens Pump Station

The pressure at Valley Greens (in Carmel Valley south of the Segunda Reservoir) would not be sufficient to fill Segunda Reservoir in this scenario. Therefore, a small pump station (Valley Greens Pump Station) would be required at this location. This pump station would also provide additional pressure to lift the water to the higher portions of Carmel Valley. The area of this facility has a low liquefaction potential. The potential impact would be less than significant.

North Marina Project

The potential impact resulting from liquefaction for the North Marina Project as a whole is less than significant with mitigation. The impact of each project component varies depending upon the type of structure and its location. The types of impacts and mitigation measures that would be applicable to individual project components are described below. Components common to both Moss Landing Project and North Marina Project are assessed above for liquefaction susceptibility and risk and are not discussed in the following section. These components include:

- North Marina to Terminal Reservoir Corridor (i.e. Transmission Main South)
- Terminal Reservoir
- Aquifer Storage and Recovery System
- Monterey Pipeline
- Valley Greens Pump Station

The following sections describe potential impacts resulting from liquefaction for North Marina Project components not discussed above.

Intake Facility and Source Water Pipeline

Construction of the intake facility would consist of drilling six slant wells in a fan array on an approximately 1-acre site in a previously-disturbed area behind existing MCWD facilities at the west end of Reservation Road. The proposed intake facility and source water pipeline would be located in the low lying coastal dune area with a Moderate susceptibility to earthquake-induced liquefaction. Implementation of Measure 4.5-1 would reduce this impact to a less-than-significant level.

North Marina Desalination Plant

Construction of the desalination facility would occur on a 10-acre site south of the existing MRWPCA WWTP in Marina. The proposed North Marina desalination plant site is located within the central portion of the project study area on Armstrong Ranch within the generally flat, low-lying characteristics of the Salinas River floodplain. Older dune deposits underlie this site. Dune deposits are anticipated to comprise loose to medium dense, sands and silty sands. Fill soils associated with the existing treatment plant, landfill operations, agricultural development, or adjacent roadways may also be present. The area of this facility has a low liquefaction potential. The potential impact would be less than significant.

Mitigation Measure

Implement Mitigation Measure 4.5-1.

Significance after Mitigation: Less than Significant.

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4.6 Hazards and Hazardous Materials

4.6.1 Introduction

This section presents an evaluation of the potential for hazards and hazardous materials impacts related to the Moss Landing and North Marina projects. For each project, the existing conditions of the project area and the regulatory requirements that affect hazardous materials management are discussed, followed by identification of potential hazardous materials impacts and appropriate mitigation measures, when necessary. Potential impacts include impacts arising from project construction, impacts resulting from the potential exposure to hazardous materials and/or hazardous wastes during project operation, and impacts related to wildland fire hazards.

As used in the EIR, the term "hazardous materials" refers to both hazardous substances and hazardous wastes. Under federal and state laws, materials, including wastes, may be considered hazardous if they are specifically listed by statute as such or if they are poisonous (toxicity), can be ignited by open flame (ignitability), corrode other materials (corrosivity), or react violently, explode or generate vapors when mixed with water (reactivity). The term "hazardous material" is defined in law as any material that, because of quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment.[1] In some cases, past industrial or commercial activities on a site could have resulted in spills or leaks of hazardous materials to the ground, resulting in soil and/or groundwater contamination. Hazardous materials may also be present in building materials and released during building demolition activities. If improperly handled, hazardous materials and wastes can cause public health hazards when released to the soil, groundwater, or air. The four basic exposure pathways through which an individual can be exposed to a chemical agent include: inhalation, ingestion, bodily contact, and injection. Exposure can come as a result of an accidental release during transportation, storage, or handling of hazardous materials. Disturbance of subsurface soil during construction can also lead to exposure of workers or the public from stockpiling, handling, or transportation of soils that have been contaminated by hazardous materials from previous spills or leaks.

The assessment of hazards and hazardous materials focuses on the following issues:

- The potential for encountering hazardous substances in soil and groundwater during construction at any of the project sites
- Potential public safety hazards associated with project construction
- Potential hazards associated with the use of chemicals at the desalination plant and other project facilities

The primary sources of information for this analysis included: the Proponent's Environmental Assessment for the Coastal Water Project dated July 14, 2005, regulatory agency database searches, hazardous materials investigation reports available online through regulatory agency

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[1] State of California, Health and Safety Code, Chapter 6.95, Section 25501(o).

databases and the Fort Ord cleanup website, and site reconnaissance. Section 4.6.2 describes the existing project setting, including known cases of soil and groundwater investigation in the project vicinity, and the hazardous materials currently used at the ASR facility and pump stations. Section 4.6.3 outlines the type of hazardous materials proposed to be used in operation of the desalination facility, ASR facilities and pump stations. Section 4.6.4 presents the framework of laws and regulations established to reduce the potential impacts of hazardous materials to human health and the environment. Section 4.6.5 analyzes the potential impacts resulting from construction and operation of the Moss Landing and North Marina projects.

4.6.2 Project Setting

The project area currently has a wide variety of land uses: the Moss Landing Power Plant (MLPP); the former Fort Ord military reservation; residences; commercial buildings; gasoline stations; railroad tracks; agricultural fields, recreational and open spaces. Industrial, rural and urban land uses involving hazardous materials and other substances can become a health hazard to humans or the environment if not properly contained or managed. Industrial land use typically involves storage of large quantities of fuel or hazardous materials in above-ground or underground storage tanks. Rural land use, such as farming and ranching, typically uses petroleum fuels, pesticides, and fertilizers. A wide array of potential hazardous materials sources originate from urban land uses, such as gasoline service stations, dry cleaners, and other facilities that utilize or store solvents, chemicals or other hazardous materials. In addition, the former Fort Ord military reservation is known to contain soil and groundwater contamination from fuel and solvents, as well as unexploded ordnance hazards. These sources of hazardous materials are present in the existing environment within the project area, and if encountered by construction workers or the general public, can cause exposures that may result in adverse environmental and health effects.

This project setting section discusses the potential presence of soil and groundwater contamination within the project area, hazardous materials currently used at project-related facilities, and potential hazards associated with airport zones and wildfires within the project area.

4.6.2.1 Soil and Groundwater

The Preliminary Hazardous Materials Assessment performed in conjunction with the Proponent's Environmental Assessment (RBF Consulting, 2005) included a regulatory database search performed by Environmental Data Resources (EDR) for the Moss Landing Project area that identified sites listed in regulatory agency files for the documented use, storage, or release of hazardous materials or petroleum products. This database search included the Moss Landing desalination plant site, transmission pipelines, ASR facilities and pipelines, and the Segunda pipeline. An additional database search was performed for the Monterey Pipeline (EDR, 2008). Project construction would involve excavation for pipelines and facilities and, therefore, could potentially encounter contaminated soil or groundwater originating from off-site sources. Sites located within ¼-mile of project facilities that may have the potential to affect subsurface conditions along the proposed project alignment and could potentially expose construction workers or the public to impacted soil or groundwater are listed in **Table 4.6-1**. This table

TABLE 4.6-1
HAZARDOUS MATERIALS RELEASE SITES IDENTIFIED WITHIN 1/4-MILE OF THE PROJECT SITE

Site Name/Address	Direction from Project Site	Regulatory List	Site Summary	Potential to Impact Project Site
National Refactories + Minerals (former magnesium metal manufacturing) Moss Landing, CA	0.02 miles west of the project site (Moss Landing Plant Site)	ERNS Notify 65 HAZNET LUST CORTESE CERC-NFRAP	Soil and groundwater impacts of gasoline, diesel, hexavalent chromium, and solvents. Investigation and remediation on-going at this facility.	**High**
Moss Landing Power Plant and Switchyard (fossil fuel electric power station) Highway 1/Dolan Road Moss Landing, CA	Adjoins project site to the west (Moss Landing Plant Site)	UST IST UST FINDS RCRA-LQG RCRA-SQG RCRA-TSDF RAATS CORRACTS CHMIRS HAZNET WMUDS SWAT CA WDS ERNS AST	Environmental cleanup ongoing at this facility to address soil and groundwater impacts from fuel hydrocarbons, volatile organic compounds, solvents, asbestos. Nineteen (19) large fuel oil tanks have been removed, as well as numerous USTs. Fifty-five (55) USTs reported on-site. Assigned medium corrective action priority. Violations (oversight and compliance) have been reported.	**High**
7881 Sandholdt Road Monterey Regional Water Management District/ Moss Landing Harbor District Moss Landing, CA	0.25 miles west of the project site (Moss Landing Plant Site and pipeline)	ERNS CHMIRS HAZNET CA WDS	Several spills associated with harbor. Reports of gasoline/oil sheen noted on water from bilge pumps.	Low
Monterey Bay Aquarium Research 7642 Sandholdt Road	0.10 miles northwest of the project site (pipeline)	RCRA-SQG FINDS LUST	Diesel contamination has impacted groundwater.	**Moderate**
Beacon Oil Station #479 10899 Merritt Street	0.22 miles north of the project site (pipeline)	LUST CORTESE	Gasoline subsurface release has impacted groundwater due to tank failure.	**Moderate**
Beacon Station #3728	Adjoins project site (pipeline)	LUST	Gasoline subsurface release. Contamination limited to soil only. Post remedial action monitoring in process.	**Moderate**
Artichoke Industries 11599 Walsh Street	Adjoins project site (pipeline)	HAZNET LUST CHMIRS CORTESE HIST UST	Gasoline subsurface release has impacted groundwater. Six (6) historical USTs reported.	**Moderate**
TOSCO Family #6024 11400 Merritt Street	Adjoins project site (pipeline)	LUST	Gasoline subsurface release has impacted groundwater.	**Moderate**
Exxon (Former) 11399 Merritt Street	Adjoins project site (pipeline)	HAZNET LUST CORTESE	Gasoline subsurface release has impacted groundwater. Remedial action underway.	**Moderate**
7-Eleven Store #32415 140 Beach Road	0.22 miles east of the project site (pipeline)	LUST	Gasoline subsurface release has impacted groundwater. Pollution characterization underway.	**Moderate**

TABLE 4.6.1 (Continued)
HAZARDOUS MATERIALS RELEASE SITES IDENTIFIED WITHIN 1/4-MILE OF THE PROJECT SITE

Site Name/Address	Direction from Project Site	Regulatory List	Site Summary	Potential to Impact Project Site
US Army Fort Ord ~~Dir Engr. Housing AFZW De PD~~	Within project site (Terminal Reservoir & Pump Station) Adjoins project site (North Marina)	PADS CERCLIS FINDS NPL RCRA-LQG RCRA-TSDF CORRACTS ROD	Site cleanup initiated in 1984. Placed on NPL because of Volatile Organic Compounds (VOCs) in groundwater. Contamination due to on-site landfills, vehicle maintenance, and chemical storage areas. Over 12,000 acres of the base are suspected of containing ordnance and explosives. Remediation activities continue.	**High (NPL site within project site boundaries)**
Monterey City Disposal Service 808 Tioga Road	0.12 miles west of the project site; (pipeline)	HAZNET LUST	Diesel subsurface contamination; leak being confirmed. Low priority site.	**Moderate**
Sam's Mobil Service 1898 Fremont Boulevard, Seaside	Adjoins project site (pipeline)	LUST HIST UST EMI HAZNET	Subsurface gasoline release that has impacted groundwater.	**Moderate**
COUROC Property 1725 Contra Costa, Seaside	0.15 miles east of the project site; (pipeline)	HAZNET LUST CA SLIC	Subsurface release that has impacted soil and groundwater. Site under pollution characterization.	**Moderate**
Victory Toyota 5 Heitzinger Plaza, Seaside	0.10 miles east of project site; (pipeline)	LUST CORTESE	Gasoline subsurface release has impacted groundwater. Case closed.	Low
Cardinale Oldsmobile-GMC 3 Heitzinger Plaza, Seaside	0.10 miles east of project site; (pipeline)	LUST	Gasoline subsurface release. Case closed.	Low
Exxon Service Station 7-02979 1550 Fremont Boulevard, Seaside	0.12 miles east of the project site; (pipeline)	LUST CORTESE	Gasoline subsurface release has impacted groundwater. Action taken unknown. Unspecified waste oil on-site.	**Moderate**
Seven Eleven 1212 Fremont, Seaside	0.22 miles north of the project site; (pipeline)	LUST	Gasoline contamination limited to soil only. Case closed.	Low
Monterey Peninsula Unified School 540 Canyon Del Rey	0.18 miles west of the project site (pipeline)	LUST CA WDS	Reported diesel contamination; preliminary site assessment underway. Work plan has been submitted. Under waste discharge requirements.	**Moderate**
Love Motors #3 Geary Plaza Seaside	0.1 mile east of the project site (pipeline)	LUST RCRA-SQG HAZNET HIST UST	Case closed. Excavate and dispose of soil.	Low
Daniel E. Cort Property 1725 Contra Costa Sand City	0.1 mile west of project site (pipeline)	HAZNET LUST	Spill, pollution characterization, TPH and phenol in soil and groundwater.	**Moderate**
Abandoned Warehouse 425 Elden Street Sand City	0.1 mile west of project site (pipeline)	LUST CORTESE	Case closed. Soil only.	Low
Val Strough Honda 1 Heitzinger Plaza Seaside	0.1 mile east of project site (pipeline)	LUST CORTESE FINDS SQG Sweeps	Case closed. Soil only.	Low

TABLE 4.6.1 (Continued)
HAZARDOUS MATERIALS RELEASE SITES IDENTIFIED WITHIN 1/4-MILE OF THE PROJECT SITE

Site Name/Address	Direction from Project Site	Regulatory List	Site Summary	Potential to Impact Project Site
Former Scandia Volvo 1661 Del Monte Seaside	Adjacent to the project site (pipeline)	LUST CORTESE Sweeps HAZNET	Case closed.	Low
Shell Service Station 1600 Canyon del Rey, Seaside	0.1mile west of project site (pipeline)	LUST SQG FINDS HAZNET	Case closed. MTBE detected in groundwater.	**Moderate**
Unocal 1600 Fremont Boulevard Seaside	1/4-mile east of project site (pipeline)	LUST	Leak being confirmed.	**Moderate**
Exxon 1550 Fremont Boulevard	1/4-mile east of project site (pipeline)	LUST	Case closed. Excavate and treat impacted soil.	Low
All Around Auto 1523 Del Monte Boulevard Seaside	Adjacent to the project site (pipeline)	LUST HAZNET	Case closed.	Low
Embassy Suites Hotel 1441 Canyon del Rey	0.1 mi east of the project site (pipeline)	RESPONSE DEED ENVIROSTOR HIST CAL-SITES	Deed restriction. Soil impacted by lead, zinc, copper and cadmium remain in-place under a cap.	**Moderate**
Days Inn	Adjacent to the project site (pipeline)	SLIC	Cased closed.	Low
USA Gasoline #42 2388 Del Monte Avenue	Adjacent to the project site (pipeline)	LUST	Remedial action underway. Gasoline	**High**
A-1 Rents 2330 Del Monte Avenue	Adjacent to the project site (pipeline)	LUST FINDS CORTESE RCRA-NonGen	Case closed.	Low
Pacific Bell Yard 234 Ramona	0.1 mile east of project site (pipeline)	HAZNET LUST CORTESE	Soil impacted. Case closed.	Low
Quaestar 2010 Del Monte	Adjacent to the project site (pipeline)	LUST CORTESE	Soil impacted.	**Moderate**
Phil’s Exxon 2100 Del Monte	Adjacent to the project site (pipeline)	LUST CORTESE	Case closed.	Low
Tosco Northwest	0.2 miles northeast of project site (pipeline)	LUST FINDS Sweeps UST SQG	Remediation underway. Groundwater affected by gasoline.	**Moderate**
One Hour Martinizing 724 Lighthouse Avenue Monterey	0.2 miles northeast of project site (pipeline)	HAZNET SLIC Dry Cleaners ENVIROSTOR	Remedial investigation underway. VOCs in groundwater.	Low
Beacon Service Station 700 Lighthouse Avenue	0.2 miles northeast of project site (pipeline)	LUST CORTESE	Post-remedial action monitoring.	Low

TABLE 4.6.1 (Continued)
HAZARDOUS MATERIALS RELEASE SITES IDENTIFIED WITHIN 1/4-MILE OF THE PROJECT SITE

Site Name/Address	Direction from Project Site	Regulatory List	Site Summary	Potential to Impact Project Site
Dana Property 501 Lighthouse Avenue	0.2 miles northeast of project site (pipeline)	LUST CORTESE	Case Closed. Soil only.	Low
The Corner Store 398 Lighthouse Avenue	0.2 miles northeast of project site (pipeline)	HAZNET LUST	Remedial investigation underway. Groundwater affected.	**Moderate**
Tor Petroleum 191 Lighthouse Avenue	0.1 mile northeast of the project site (pipeline)	LUST CA FID UST	Case closed. Soil impacts.	Low
O'Neal Property 456 Pine Street	0.1 mile southwest of the project site (pipeline)	HAZNET LUST CORTESE	Soil, possibly groundwater, impacted by solvent.	**Moderate**
Breakwater Cove Marina 32 Cannery Road	0.1 mile northeast of the project site (pipeline)	LUST CA WDS	Groundwater impacted by diesel.	**Moderate**
U.S. Coast Guard 100 Lighthouse Drive	0.06 mile north of the project site (pipeline)	LUST CHMIRS CORTESE	Soil impacted. Investigation.	
BP Oil 312 Del Monte Avenue	0.1 mile north of the project site (pipeline)	LUST CORTESE HAZNET Sweeps UST	Post-remedial action monitoring.	**Moderate**
Russo's Marine Fueling Station Del Monte / Figueroa	0.06 mile south of the project site (pipeline)	SLIC	Remedial action plan underway.	**Moderate**
Exxon 1042 Del Monte	0.06 mile south of the project site (pipeline)	CORTESE	No information.	**Moderate**
Shell Oil 1290 del Monte	Adjacent to the project site (pipeline)	LUST RCRA SOG Sweeps	Case closed. Excavate and dispose. Remove free product from water 8' deep.	**Moderate**
British Motors 735 del Monte	Adjacent to the project site (pipeline)	LUST CORTESE	Case closed.	Low
City of Monterey 851 del Monte	Adjacent to the project site (pipeline)	HAZNET LUST	Case closed. Waste oil.	Low
Honda Kawasaki 915 del Monte Avenue	Adjacent to the project site (pipeline)	LUST	Case closed. Gasoline.	Low
Former Vapor Cleaners 915 del Monte Avenue	Adjacent to the project site (pipeline)	LUST SLIC	Pollution characterization.	**Moderate**
Luce Meats 1009 del Monte	0.06 mi south of the project site (pipeline)	LUST	Case closed.	Low
Former Exxon 1042 del Monte	Adjacent to the project site (pipeline)	LUST HAZNET	Remedial action underway.	**Moderate**

TABLE 4.6.1 (Continued)
HAZARDOUS MATERIALS RELEASE SITES IDENTIFIED WITHIN 1/4-MILE OF THE PROJECT SITE

Site Name/Address	Direction from Project Site	Regulatory List	Site Summary	Potential to Impact Project Site
Marriott Monterey 350 Calle Principal	0.06 mile north of the project site (pipeline)	HAZNET LUST	Case closed. Soil only.	Low
Former Furniture Mart 425 Pacific Street	Adjacent to the project site (pipeline)	LUST	Investigation assessment for fuel oil release.	**Moderate**
Washington Mutual Bank 468 Washington Street	0.1 mile south of the project site (pipeline)	HAZNET LUST SLIC	Post-remedial action monitoring for PCE, TCE.	**Moderate**
Saucito Land Company 474 Alvarado Avenue	0.2 miles south of the project site (pipeline)	LUST	Not reported.	**Moderate**
Sherwin Williams 505 Tyler Street	0.25 miles south of the project site (pipeline)	LUST HAZNET FINDS	Groundwater affected by mineral spirits. Assessment underway.	**Moderate**
Honest Engines 553 Munras Avenue	0.25 miles south of the project site (pipeline)	LUST	Remedial action underway.	**Moderate**
US Navy Post Graduate School 1 University Circle	0.25 miles south of the project site (pipeline)	CERC-NFRAP LUST ENVIROSTOR	Preliminary assessment. No further remedial action planned.	Low

Regulatory Lists: ERNS (Emergency Response Notification System); Notify 65 (Proposition 65 Records); HAZNET (Hazardous Materials Use Database); LUST (Leaking Underground Storage Tank); UST (Active UST Listings); FINDS (Facility Index System); RCRA-LQG (Large Quantity Generator); RCRA-SQG (Small Quantity Generator); RCRA-TSDF (Treatment, Storage, or Disposal Facility); RAATS (RCRA Administrative Action Tracking System); CORRACTS (RCRA Corrective Action Activity); CHMIRS (California Hazardous Material Incident Report System); WMUDS (Waste Management Unit Database System); SWAT (Waste management Unit Database System); CA WDS (California Waste Disposal System); ERNS (Emergency Response Notification System); AST (Aboveground Storage Tank); CERC-NFRAP (CERCLA- No Further Remedial Action Planned); CORTESE (Cal-EPA List); CERCLIS (Comprehensive Environmental Response Compensation Liability Index System); NPL (National Priorities List); ROD (Record of Decision).

POTENTIAL FOR ENVIRONMENTAL CONDITION KEY:

Low Potential = Potential to create environmental condition on project site is considered to be low for one or several factors including, but not limited to, the following:

direction of groundwater flow is away from the project site (down gradient); remedial action is underway or completed at off-site location: distance from project site is considered great enough to not allow the creation of a potential environmental condition; only soil was affected by the occurrence; and/or reporting agency has determined no further action is necessary (case closed).

Moderate Potential = Potential to create environmental condition on project site is considered to be moderate and further investigation may be necessary due to one or several factors including, but not limited to, the following:

occurrence reported but remedial status unknown; unable to confirm remedial action completed; proximity to project site; groundwater flow is towards the project site (up gradient).

High Potential = Potential to create environmental condition on project site is considered to be high and further investigation necessary due to one or several factors including the following:

Occurrence noted on-site and status of remedial action unknown; occurrence affected groundwater and is located up-gradient from project site.

SOURCE: RBF,2005; EDR, 2008

includes an assessment (high, moderate, or low) of the potential impact for the known soil or groundwater contamination at the identified sites to affect soil or groundwater conditions at proposed project locations based on the environmental condition, status of investigation, distance and groundwater flow direction of the identified sites. This preliminary assessment is made based upon the site information provided in the database report. Additional review of environmental investigation reports available through the appropriate regulatory agencies for the listed sites will be performed closer to the time and provide more current and detailed site information to refine this preliminary assessment in preparation for construction.

In addition to sites identified on the regulatory agency database, a site inspection performed as part of the Hazardous Materials Assessment (RBF Consulting, 2005) identified the following recognized environmental conditions within the project area:

- *Agricultural Uses* – may use pesticides, herbicides, petroleum products, and cleaning solvents (for equipment maintenance)
- *Railroad Operations* – may use herbicides for weed control, historic transport of hazardous materials
- *Aboveground Petroleum Pipeline* – along Dolan Road. Surficial staining observed.
- *Electrical transformers and power lines* – may still contain polychlorinated biphenyls (PCBs)

Sites identified on the regulatory agency database search that are considered to have a high potential to impact soil or groundwater in the project area are discussed further below.

Dynegy Moss Landing Power Plant

Information regarding the status of environmental investigations at MLPP was obtained from the California Department of Toxic Substances (DTSC) Envirostor database (2008). According to the facility report, PG&E began power generation at MLPP in 1950. A total of nine power generation units have been employed since its inception. Fuel oil was burned to generate power before switching to natural gas. Prior to the sale of the facility in 1998 to Duke Energy, PG&E completed a Phase II Environmental Site Assessment Report based on extensive soil and groundwater investigations. This investigation identified the following constituents of concern: Total Petroleum Hydrocarbons (TPH); volatile organic compounds (VOCs); polyaromatic hydrocarbons (PAHs); metals; PCBs; and asbestos. Environmental cleanup has been ongoing. Duke Energy demolished all of the 19 large aboveground fuel tanks used for storage of fuel oil. In May 2006, LS Power acquired MLPP and subsequently merged with Dynegy in April 2007. Environmental cleanup efforts, including quarterly groundwater monitoring, are continuing at the site. The areas of environmental concern at the plant are briefly summarized below:

- <u>*Western Tank Farm*</u> – Demolition and remediation was initiated in 2000. A total of 12,900 cubic yards (cy) of soil were removed. In July 2005, DTSC confirmed that no further soil removal or investigation was needed and groundwater in this area was not impacted.

- Eastern Tank Farm – Demolition and remediation removed a total of 33,000 cy of soil, and DTSC confirmed no further action necessary in July 2005.
- Central Tank Farm – During demolition and remediation in 2003 and 2004, Tank 14 caught fire. The initial cleanup of this incident was performed with Department of Fish and Game oversight. PG&E submitted a Draft Final Summary Report for impacted soil in June 2008. The next investigations will be human health and ecological risk assessments.
- Technician Shop Area – In 2005, an interim measure to address VOCs in groundwater was implemented using in-situ chemical oxidation. Approximately 68 groundwater injection wells were injected with Fenton's reagent (contains hydrogen peroxide, an oxidizer, and iron, which acts as a catalyst). This reagent produces a rapid, heat-producing reaction which breaks down VOCs into carbon dioxide, water, and chloride. This interim measure has removed 80% of VOCs from groundwater in the vicinity of the shop.
- West of Western Tank Farm – A human health risk assessment was completed with DTSC approval in 2006 to address contaminants in groundwater in this area.
- Power Block Units 1-5 – PG&E has submitted a Draft Final Interim Measures Work Plan for the Rock Blotter area at Power Block Units 1-5 (which were retired in 1995). The work plan proposes to remove soil contaminated with TPH and PCBs. This work plan needs to be revised to incorporate DTSC and RWQCB comments issued in July 2008 prior to implementation.
- Power Block Units 6&7 – It is anticipated that these units will continue to operate for approximately another 20 years.

The power plant is a permitted RCRA facility for the storage of hazardous liquids in its three surface impoundments. The majority of the hazardous waste stored in these surface impoundments is generated from boiler cleanings within the power buildings. The surface impoundments have triple liner leachate collection and detection systems. Since the construction of the detection systems, there have been no leaks beyond the first liner. The facility permit was renewed in April 2006 and will expire in April 2016.

National Refractories (Moss Landing Commercial Park)

Kaiser Aluminum and Chemical began producing magnesium metal at this facility during World War II. After the war, the facility was converted to a plant that made high-purity magnesium oxide for refractory bricks and specialty products and operated by National Refractories. Plant production was curtailed in 1991 and the plant produced magnesia products for the pollution control market until 1999. Operations involved the intake of up to 60 million gallons of seawater per day from the harbor, the precipitation of salts in large surface impoundments, and the addition of dolomite to the magnesium chloride salts to form magnesium oxide, or burning to form magnesia. Calcium-enriched (and magnesium depleted) seawater was returned to the ocean via a 620 foot outfall/diffuser. The property was sold 5-6 years ago for redevelopment as the Moss Landing Commercial Park.

The facility is listed on the RWQCB Geotracker database as having impacts of chromium, VOCs, gasoline and diesel in groundwater (RWQCB, 2008). According to the RWQCB Project

Manager, a Phase I/Phase II investigation was performed in connection with the property transfer 5-6 years ago, however, a complete site characterization of hazardous materials has not been performed (Schwartzbart, 2008). Former site operations involved landfills, fuel storage tanks, precipitation ponds ("white lakes"), and industrial facilities such as machine shops. In addition, the Defense National Stockpile Center maintained a chromite stockpile on the eastern side of the site until recently. Soil and groundwater investigations in connection with the leaking underground storage tanks (LUSTs) are ongoing near the northern portion of the site. Groundwater remediation of hexavalent chromium, completed one year ago, appears relatively successful in reducing the chromium to a less-active form. Contamination by solvents (VOCs), co-mingled with the chromium and fuel contamination in groundwater, has not yet been addressed. Approximately 19 monitoring wells are located on-site. While the federal agency responsible for the chromite stockpile removed it approximately two years ago, residual chromite remaining in soil requires removal. The precipitated salts from the former surface impoundments, while not a hazardous material in themselves, represent a potential concern to surface water quality.

Former Fort Ord Military Reservation

The former Fort Ord military reservation is designated by the Environmental Protection Agency (EPA) as a National Priorities List (NPL) site. NPL sites are designated as having known contamination that is a priority for cleanup under the federal Superfund program. Known hazards and hazardous materials resulting from former military operations include munitions and explosives of concern (MEC), consisting of unexploded ordnance and discarded military munitions, on an approximately 8,000-acre firing range/impact area. Types of ordnance include artillery projectiles, rockets, hand grenades, landmines, bombs and other demolition materials. Known munitions sites are fenced, posted with warnings signs, and entry is prohibited to unauthorized individuals.

A portion of the project, (the Terminal Reservoir, ASR Pump Station, and the ASR pipeline), are located within the Seaside Munitions Response Sites 1 through 3 (MRS-SEA.1-3) area of Fort Ord, located adjacent and to the east of General Jim Moore Boulevard. Information regarding site investigations of this area is summarized from the *Technical Information Paper MRS-SEA.1-4* (Parsons, 2006). From 1997 to 2001, sampling and removal investigations performed in this area identified numerous MEC on or within 2 feet below the ground surface (bgs). Due to the close proximity to homes, schools and businesses, as well as trespassing incidents, the Army determined that a threat to human health or the environment existed and the following site activities were conducted from January 2002 to March 2004:

- A time-critical removal action for MEC on the *surface* of MRS-SEA.1-4. This action entailed vegetation clearance and visual search for MEC using instruments to help detect items underneath surface debris. This action identified and destroyed 226 MEC items, and removed over seven tons of munitions and range-related debris.

- A non-time-critical removal action for MEC to a depth of 4 feet bgs at five distinct removal areas determined based on the results of previous site investigations, and a digital geophysical survey on all portions of the site. This action identified and destroyed 196 MEC items and removed approximately 25 tons of munitions and range-related debris.

Despite the considerable work that has been completed to date, approximately 35 acres in the Seaside munitions response sites have been designated special case areas that have not been investigated because of physical obstructions (such as fences, asphalt, latrines, and berms) or interference with geophysical instruments. The Findings of Suitability for Early Transfer (FOSET) agreement (June 2007) restricts use of the Seaside MRS parcels for any purposes other than activities associated with the investigation and remediation of MEC and installation of utilities (including water supply) and roadways until the USEPA, in consultation with the California Department of Toxic Substances Control (DTSC), has certified completion of remedial action. The Environmental Services Cooperative Agreement between the Army and FOR A specifies the grant terms for munitions remediation. According to Mr. Stan Cook, Fort Ord Reuse Authority (FORA), site cleanup has recently been completed for a portion of the MRS-SEA.1-4 area for the General Jim Moore Boulevard realignment project. The MPWMD and CalAm currently have a legal Right-of-Entry to the Terminal Reservoir and ASR Pump Station site from the Army, which is the current owner. The parcels are in the process being transferred from the Army to FOR A, and will ultimately belong to the City of Seaside. All ground-disturbing construction in this area requires oversight by an unexploded ordnance specialist and construction worker awareness training. The long-term use and management of the Seaside munitions response parcels, including the project area, will be evaluated under the Munitions Response Remedial Investigation/ Feasibility Study that will be completed in the future.

In addition to hazards related to unexploded ordnance and military munitions, groundwater in the aquifers located beneath the former Fort Ord is contaminated by saltwater intrusion and the presence of organic compounds, mostly trichloroethylene (TCE), in the vicinity of the former Fritzsche Army Airfield Fire Drill Area and the former Fort Ord landfill. These two sites, or operable units, have undergone considerable investigation and remedial action, including continued operation of groundwater treatment systems. Another 41 sites of concern have been investigated and many of these cleanup actions have been completed. Further information regarding environmental cleanup at the former Fort Ord is available online at www.fortordcleanup.com.

4.6.2.2 Structural and Building Components

Hazardous materials, such as asbestos, lead, and polychlorinated biphenyls (PCBs), may be contained in older building materials and released during demolition or renovation of existing facilities. Because the project does not include demolition or renovation of existing facilities, hazardous materials in building materials will not be encountered, and therefore, are not discussed in detail in this section.

4.6.2.3 Existing Hazardous Materials Usage

Hazardous materials are currently used by project facilities at the existing MPWMD ASR Project well site and at existing pump stations. Operation of the ASR wells involves the storage and use of carbon dioxide, lime, sodium hypochlorite (bleach) solution, and other substances as required for water treatment. The existing pump stations are powered by electricity, but may store fuel for backup emergency generators, and minor amounts of solvents and lubricants for maintenance.

4.6.2.4 Airport Zones

The Transmission Main South is located within two miles of the Marina Municipal Airport, however it is not situated within the approach or air traffic pattern protection zones and therefore is not subject to any development limitations (Monterey County Airport Land Use Commission, 1996).

4.6.2.5 Nearby Schools

Schools are considered sensitive receptors for hazardous materials issues because children are more susceptible than adults to the effects of many hazardous materials. Schools that are located within ¼-mile of the project are listed in **Table 4.6-2**. As shown, the project component are typically water transmission pipelines.

TABLE 4.6-2
SCHOOLS IN THE VICINITY OF PROJECT COMPONENTS

Project Component	Schools Within ¼-mile of Project Components
Transmission Main North (Merritt St. segment)	• Little Rainbow Daycare 11284 Merritt St Ste C, Castroville • Castroville Elementary 11161 Merritt St, Castroville
North Marina Source Water Pipeline (Reservation Rd. to DeForest Rd. segment)	• Marina Children's Center 261 Beach Rd, Marina • Olson Elementary 261 Beach Rd, Marina
Transmission Main South (South of Palm Ave. segment)	• Marina Del Mar Elementary School 3066 Lake Dr, Marina
Transmission Main South (La Salle Ave. segment)	• Monterey Adult School/ Cabrillo Family Center 1295 La Salle Ave, Seaside • Monterey Bay Christian Middle School 1395 La Salle Ave, Seaside
Transmission Main South (Yosemite St. segment)	• International School of Monterey 1720 Yosemite St, Seaside • Martin Luther King Jr. Middle School 1713 Broadway Ave, Seaside • Highland Elementary 1650 Sonoma Ave, Seaside
ASR Facilities (General Jim Moore Blvd. segment)	• Roger S. Fitch Middle School 999 Coe Ave, Seaside
Monterey Pipeline Corridor (Laine St. segment)	• Bayview Elementary School 680 Belden St, Monterey • Pacific Grove Middle School 835 Forest Ave, Pacific Grove

4.6.2.6 Wildfire Hazards

California Department of Forestry and Fire Protection (CAL FIRE) maps identify fire hazard severity zones in state and local responsibility areas for fire protection. Portions of the project area are situated within either a very high fire hazard severity zone (some areas of Monterey, Seaside and Sand City) or a high fire hazard severity zone (parts of Moss Landing, Marina, and Del Rey Oaks) (CAL FIRE, 2007a, b).

4.6.3 Proposed Project Operations

The following sections describe the generation, use, storage, and disposal of hazardous materials associated with project operations. Most of these activities are associated with the desalination plant. Some water treatment chemicals would be utilized at the ASR facilities. Small quantities of fuel will be stored for emergency generators at critical pump stations. Hazardous materials will not be used or generated by the water conveyance pipelines.

4.6.3.1 Moss Landing Project Operations

The Moss Landing desalination plant operations would involve the use and storage of chemicals to remove deposits from the pretreatment filtration system and reverse osmosis (RO) membranes that could reduce performance, as well as chemicals to adjust product water quality.

Chemical Use and Storage

Cleaning of the pretreatment filters and RO membranes would occur continuously during operation. Additionally, the filters and membranes would need to be cleaned at various intervals with Clean-In-Place (CIP) chemicals. The actual CIP cleaning solutions to be utilized and frequency will be determined during pilot testing. The types, quantities, and potential hazards associated with each chemical likely to be used are summarized in **Table 4.6-3**. Information regarding hazards was summarized from the Materials Safety Data Sheets (MSDS) and presented in the PEA and subsequent technical memorandums (RBF Consulting, 2005; RBF Consulting, 2008).

The listed chemicals are non-flammable and will be stored in tanks that meet applicable regulatory requirements. It is anticipated that chemical storage tanks for daily use will be located within the pre-treatment, reverse osmosis and post-treatment buildings. Bulk storage will be located in the chemical building. The design of this building will incorporate the regulatory requirements for hazardous materials storage, such as spill containment features that exceed the capacity of the tanks; segregation of individual chemicals to prevent mixing in the case of accidental spillage; and appropriate alarm and fire sprinklers. Chemicals that have specific reactivity risks with one another will be stored at opposite ends of the storage area to reduce the risk of mixing. In addition, two lime saturation tanks, situated adjacent to the chemical building, will contain a bed of calcite for post-treatment after the RO process.

Residuals Management

As described in Section 3.2.7, the pre-treatment filtration process for intake water would generate approximately 1 mgd of a backwash stream containing marine organic material that would be discharged with the brine to the ocean outfall. If pilot testing determines that a chemical coagulant, such as ferric chloride, is needed in the pre-treatment process, the backwash stream would be treated to remove the coagulant chemical prior to discharge. The settled solids from this process

TABLE 4.6-3
WATER TREATMENT CHEMICAL USAGE SUMMARY
MOSS LANDING AND NORTH MARINA DESALINATION PLANTS

Chemical	Project-Usage	Dosage Concentration (mg/L)	Return Flow[1] Concentration (mg/L)	Approximate Chemical Usage (lb/year)	Hazard
Sulfuric Acid	Pretreatment (Moss Landing only) Clean-In-Place	30	54 (Sulfate); <1	2,000,000	Acute overexposure would burn exposed areas such as the eyes, skin and respiratory tract.
Sodium hypochlorite (Chlorine)	Pretreatment ~~(Moss Landing only)~~ Post-treatment	3	5 (Chloride)	250,000	Acute overexposure would strongly irritate the eyes, skin and respiratory tract. Inhalation of fumes may cause pulmonary edema, while ingestion would cause burns to the mouth, digestive tract and abdominal distress.
Ferric Chloride[2]	Pretreatment (Moss Landing only)	15	10 (Chloride)	1,000,000	Acute overexposure would irritate the respiratory system if inhaled; burns, somnolence, diarrhea, tachycardia, shock, acidosis, and hematemesis if ingested; and irritation/corrosion to the eyes.
Sodium Bisulfite	Reverse Osmosis	6	10	400,000	Acute overexposure would severely burn and irritate the skin, eyes and mucous membranes. Inhalation may cause respiratory discomfort. Ingestion would result in burns to the gastrointestinal system and possibly death.
Antiscalant	Reverse Osmosis	TBD	TBD	TBD	TBD
Lime	Post-treatment	35 (CaO) 60 ($CaCO_3$)	NA	2,000,000	This chemical poses an acute threat for skin and respiratory tract irritation and damage to the mucous membranes of the upper respiratory tract.
Carbon Dioxide	Post-treatment	30 (CO_2) 60 ($CaCO_3$)	NA	2,000,000	This chemical initially stimulates, then depresses, respiration. Inhalation of low concentrations (3-5%) that may occur during accidental gas release has no known permanent harmful effects. Contact with the cold gas can freeze exposed tissue. All forms of carbon dioxide are non combustible.
~~Potassium Permanganate~~	~~Greensand Filtration (North Marina only)~~	~~TBD~~	~~TBD~~	~~TBD~~	~~Prolonged skin contact may cause irritation and dermatitis. Chronic manganese poisoning can result from excessive inhalation exposure to manganese dust and involves impairment of the central nervous system.~~
Citric Acid	Membrane Cleaning	TBD	<1	TBD	Chronic or heavy acute ingestion may cause tooth enamel erosion.
Sodium Hydroxide	Clean-In-Place	TBD	0	TBD	Acute exposure may severely burn exposed tissues (including the eyes), injure the entire respiratory tract if inhaled, and severely injure the digestive tract if ingested.
EDTA	Clean-In-Place	TBD	0	TBD	This chemical is a skin, eye, and respiratory tract irritant.

NOTES: TBD= To Be Determined. Dosages and frequency of cleanings to be determined during pilot testing.

[1] Impact on return flow may be greater than dosage due to high rejection of some constituents from membranes.
[2] Coagulant may or may not be required, as determined by pilot testing.

SOURCE: RBF Consulting 2005; RBF Consulting, 2008.

would be dewatered and hauled off-site by truck or rail to an appropriate landfill. The reverse osmosis process would generate approximately 11 to 12 mgd of brine that would be discharged to the ocean outfall. The brine stream would be diluted with MLPP cooling water in the disengaging basin prior to discharge. The specific chemicals to be utilized for the clean-in-place (CIP) process and cleaning frequency will be determined during pilot testing, as such the volume of the waste stream and the contents of the cleaning solution is presently unknown; however, it is anticipated that the frequency of the cleaning would be in the range of once every six weeks to once every twelve months. ~~The specific chemicals to be utilized for the clean-in-place (CIP) process and cleaning frequency have not yet been determined.will be determined during pilot testing.~~ The CIP waste stream would be directed to a separate collection sump and hauled off-site by tanker truck for disposal.

4.6.3.2 North Marina Project Operations

The North Marina desalination plant would also be an RO plant with similar operations, chemical use and storage, and residuals management as the Moss Landing project. The pre-treatment process at the North Marina site may include horizontal multimedia pressure ~~sand~~ filtration to reduce the ~~high~~ iron and manganese concentrations in seawater. Any solids from this process would be appropriately disposed of off-site. The RO process would generate approximately 11 mgd of brine that would be discharged to the ocean via the MRWPCA ocean outfall. As with the Moss Landing project, the type of cleaning solutions and frequency of cleaning for the pretreatment filters and RO membranes have not been determined~~would be determined during pilot testing~~.

Unlike the Moss Landing Project which would receive its power supply from the adjacent MLPP, the North Marina plant includes several power supply options. One of these options involves the construction of an on-site power generation facility utilizing natural gas turbines. Should this option be selected, additional chemicals would be stored at the site for scrubbers necessary for air emissions control.

4.6.3.3 Pump Stations

Pump stations associated with the project water distribution include Terminal Reservoir (ASR Pump Station) and Valley Greens Pump Station. Pumps will be powered by electricity supplied by PG&E. The Valley Greens pump station would have backup emergency generators and, therefore, would have fuel storage tanks. Pump stations may contain transformers and minor amounts of solvents and lubricants for maintenance.

4.6.3.4 Aquifer Storage and Recovery (ASR) Facilities

The two ASR wells will require well pumps for extraction and injection of water. Water recovered from the ASR wells would be chlorinated for disinfection, and may require dechlorination prior to injection to the aquifer. There are two options for chemical storage facilities. Either each ASR well would be equipped with its own chemical storage facilities or a centralized facility would be constructed, possibly at the MPWMD Phase 1 ASR well site, where all water would be treated prior to injection and after extraction. The following chemicals would be used for treatment:

- *Sodium Hypochlorite* (1 mg/L) – Average annual usage is estimated at 4,000 lbs. At a maximum extraction of 4.3 mgd/well, the maximum daily chemical usage per well would be about 35 pounds.

- *Sodium Bisulfite* (3 mg/L) – Average annual chemical usage, based on injection of 1,300 AF, would be approximately 11,000 pounds. At a maximum injection rate of 2.1 mgd/well, the maximum daily usage per well for dechlorination would be about 55 pounds.

Additional chemicals of concern are generated from the injection of chlorinated water into a groundwater aquifer. This process is known to result in the formation of disinfection by-products (DBPs) including trihalomethanes (THMs) and haloacetic acids (HAAs) from reactions with organic matter present in the aquifer. Studies regarding the fate and stability of DBPs injected into the groundwater aquifer at the MPWMD Santa Margarita Test Injection Well (Pueblo Water Resources, 2007) indicate that THMs appear to increase during the first 40 days of storage, then decline slowly over the following six month period. Although THMs do not completely degrade, THM concentrations are generally at or below the acceptable levels established in State Drinking Water Regulations. HAAs declined steadily during aquifer storage, reaching non-detectable levels within four to five months. Groundwater extracted for drinking water supply would be required to meet drinking water requirements. Please refer to Section 4.2, Groundwater Resources, for further discussion of groundwater quality.

4.6.4 Regulatory Setting

Federal, state and local laws and regulations govern the range of hazardous materials issues that may be encountered during construction, development and operation of the project. Various state and local regulatory agencies implement these laws and regulations to minimize risks to human health and the environment from hazardous materials. This section describes the regulatory oversight of hazardous materials storage and handling, emergency response, site investigation and cleanup, and worker safety. In addition, regulations regarding fire hazards and local plans and policies are discussed.

4.6.4.1 Hazardous Materials

Storage and Handling

The Federal Resource Conservation and Recovery Act of 1976 (RCRA) enables the U.S. Environmental Protection Agency (EPA) to administer a “cradle-to-grave” regulatory program that extends from the manufacture of hazardous materials to their disposal, thereby regulating the generation, transportation, treatment, storage and disposal of hazardous waste. Under RCRA, individual states may implement their own hazardous materials programs as long as the state program is at least as stringent as Federal RCRA requirements. California regulations are equal to or more stringent than federal regulations. The California Environmental Protection

Agency (Cal EPA), Department of Toxic Substances Control (DTSC) has primary oversight responsibility to regulate the generation, transportation, treatment, storage, and disposal of hazardous materials and waste. A number of agencies participate in enforcing hazardous materials management requirements. In Monterey County, the Monterey County Health Department, Environmental Health Division (MCEHD) is the local Certified Unified Program Agency (CUPA) that administers the hazardous materials management, underground storage tank, site mitigation and emergency response programs.

State and federal laws require detailed planning and management to provide that hazardous materials are properly handled, used, stored, and disposed of, and in the event that such materials are accidentally released, to reduce risks to human health or the environment. Businesses that handle specified quantities of chemicals are required to submit a Hazardous Materials Business Plan (HMBP) in accordance with community right-to-know laws. This plan allows local agencies to plan appropriately for a chemical release, fire, or other incidents. The HMBP must include the following:

- An inventory of hazardous materials with specific quantity data, storage or containment descriptions, ingredients of mixtures, and physical and health hazard information
- Site and facility layouts that must be coded for chemical storage areas and other facility safety information
- Emergency response procedures for a release or threatened release of hazardous materials
- Procedures for immediate notification of releases to the administering agency
- Evacuation plans and procedures for the facility
- Descriptions of employee training in evacuation and safety procedures in the event of a release or threatened release of hazardous materials consistent with employee responsibilities, and proof of implementing such training on an annual basis
- Identification of local emergency medical assistance appropriate for potential hazardous materials incidents

Hazardous waste regulations establish criteria for identifying, packaging, and labeling hazardous wastes; dictate the management of hazardous waste; establish permit requirements for hazardous waste treatment, storage, disposal, and transportation; and identify hazardous wastes that cannot be disposed of in landfills.

Underground Storage Tanks

Federal and ~~S~~state laws governing USTs specify requirements for permitting, monitoring, closure, and cleanup of USTs (CFR 280-281; CCR Title 23). Regulations set forth construction and monitoring standards for existing tanks, release reporting requirements, and closure requirements. The MCEHD Local Oversight Program also has regulatory authority for permitting, inspection and removal of USTs. A closure plan for each UST to be removed must be submitted to the County prior to tank removal. Upon approval of the UST closure plan, the County would issue a permit, oversee removal of the UST, require additional subsurface sampling if necessary, and issue a site closure letter when the appropriate removal and/or remediation has been completed.

Soil and Groundwater Contamination

In Monterey County, remediation of contaminated sites is generally performed under the oversight of the DTSC, the RWQCB, and/or the MCEHD. At sites where contamination is suspected or known to occur, the project sponsor is required to perform a site investigation and draw up a remediation plan, if necessary. For typical development projects, site remediation is completed either before or during the construction phase of the project. When site cleanup is satisfactorily completed, the lead regulatory agency issues a site closure letter stating that no further action is required and the case is closed.

Site remediation or development may also be subject to regulation by other agencies. For example, if dewatering of a hazardous waste site were required during construction, subsequent discharge to the sewer system could require a permit from the municipal sewer agency and discharge to the storm water collection system could require an NPDES permit from the RWQCB.

Emergency Response

California has developed an emergency response plan to coordinate emergency services provided by federal, state, and local government and private agencies. Responding to hazardous materials incidents is one part of this plan. The plan is administered by the State Office of Emergency Services (OES), which coordinates the responses of other agencies. The MCEHD Emergency Response Team provides the capabilities for hazardous materials emergencies within the project area. ERT members respond and work with local fire and police agencies, California Highway Patrol, California Department of Fish & Game, California Department of Transportation, U.S. Coast Guard and National Marine Sanctuary personnel.

For Coastal Zone areas, the California Coast Act Section 30232 also requires protection against spillage of hazardous substances or petroleum products related to any development or transportation, and effective containment facilities and procedures be provided for accidental spills that do occur.

Worker Safety

Occupational safety standards exist in federal and state laws to minimize worker safety risks from both physical and chemical hazards in the work place. The California Division of Occupational Safety and Health (Cal OSHA) and the federal OSHA are the agencies responsible for ensuring worker safety in the workplace. Cal OSHA assumes primary responsibility for developing and enforcing standards for safe workplaces and work practices. At sites known or suspected to be contaminated by hazardous materials, workers must have training in hazardous materials operations and a Site Health and Safety Plan must be prepared. The Health and Safety Plan establishes policies and procedures to protect workers and the public from exposure to potential hazards at the contaminated site.

Hazardous Materials Transportation

The United States Department of Transportation regulates hazardous materials transportation on all interstate roads. Within California, the state agencies with primary responsibility for enforcing federal and state regulations and for responding to transportation emergencies are the California Highway Patrol (CHP) and the California Department of Transportation (Caltrans). Together, federal and state agencies determine driver-training requirements, load labeling procedures, and container specifications. Although special requirements apply to transporting hazardous materials, requirements for transporting hazardous waste are more stringent, and hazardous waste haulers must be licensed to transport hazardous waste on public roads.

Hazardous Structural and Building Components

Numerous state and federal laws and regulations control exposure to asbestos, lead-based paint and PCBs. These regulations cover the demolition, removal, cleanup, transportation, storage and disposal of asbestos and lead-containing material. Regulations also outline the permissible exposure limit, protective measures, monitoring and compliance to ensure the safety of construction workers exposed to these materials. ~~Because~~ Due to the nature of construction activities and materials required for the proposed project, exposure to hazardous building components is not anticipated ~~with the proposed project~~, therefore, these laws and regulations are not discussed in detail in this section.

Water Wells

The California Department of Water Resources (DWR) has responsibility for developing standards for wells for the protection of water quality under California Water Code Section 231, enacted in 1949. Authority for enforcing the standards for construction, destruction and modification of water wells in Monterey County rests with MCEHD Drinking Water Protection Services. The California Water Code requires that contractors that construct or destruct water wells have a C-57 Water Well Contractor’s License, follow DWR well standards, and file a completion report with DWR (CWC Sections 13750.5, et seq).

4.6.4.2 Desalination Treatment Facility

A permit must be obtained from MCEHD prior to the construction of a desalination treatment facility, and an annual permit must be obtained from Environmental Health in order to operate a desalination treatment facility. The permit application must outline the chemical analysis of seawater or groundwater at intake source, detailed plans for disposal of brine and other by-products of operations, and if the source is groundwater, a study of the potential impacts that would be caused by groundwater extraction (Monterey County Code, Ch. 10.72).

4.6.4.3 Fire Hazards

The California Public Resources Code includes fire safety regulations that: restrict the use of equipment that may produce a spark, flame, or fire; require the use of spark arrestors[2] on construction equipment that has an internal combustion engine; specify requirements for the safe use of gasoline-powered tools in fire hazard areas; and specify fire suppression equipment that must be provided onsite for various types of work in fire prone areas. These regulations include the following:

- Earthmoving and portable equipment with internal combustion engines would be equipped with a spark arrestor to reduce the potential for igniting a wildland fire (PRC Section 4442).
- Appropriate fire suppression equipment would be maintained during the highest fire danger period – from April 1 to December 1 (PRC Section 4428).
- On days when a burning permit is required, flammable materials would be removed to a distance of 10 feet from any equipment that could produce a spark, fire, or flame, and the construction contractor would maintain the appropriate fire suppression equipment (PRC Section 4427).
- On days when a burning permit is required, portable tools powered by gasoline-fueled internal combustion engines would not be used within 25 feet of any flammable materials (PRC Section 4431).

4.6.4.4 Local Plans and Policies

Portions of the project are located within the cities of Moss Landing, Marina, Monterey, Carmel-by-the-Sea, Pacific Grove, Seaside, Sand City, and Del Rey Oaks. Some of these cities have general plan policies that address hazardous materials and hazardous materials management.

The Marina General Plan (Section 4.103) discusses the need to protect the public from threats posed by hazardous materials and sets forth the following policies:

1. The City shall support all local, regional and state efforts directed at preventing injuries and avoiding environmental contamination due to the uncontrolled release of hazardous substances. The City shall follow all applicable regulations and procedures related to the use, storage and transportation of toxic, explosive and other hazardous materials to prevent uncontrolled discharges.
2. The City shall require discretionary review and approval of all commercial and industrial uses which will generate more than 27 gallons of hazardous wastes monthly (the limitation imposed by Monterey Regional Waste Management District for non-household hazardous wastes). City approval of these uses shall be contingent upon preparation and approval by the County Health Department of a hazardous-waste-disposal plan for these uses prepared in accordance with the requirements of the Monterey County Health Department.

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[2] A spark arrestor is a device that prohibits exhaust gases from an internal combustion engine from passing through the impeller blades where they could cause a spark. A carbon trap is commonly used to retain carbon particles from the exhaust.

3. All uses involving the handling of significant amounts of hazardous materials shall be subject to discretionary approval. Hazardous materials management and disposal plans shall be prepared in accordance with the requirements of the Monterey County Health Department for all such projects prior to the granting of any entitlements by the City.

4. The City shall ensure that proposed industrial or commercial projects that will use or generate hazardous materials shall be compatible with surrounding uses as designated by the General Plan. Residential uses and other sensitive uses such as schools shall be adequately buffered from adjoining uses which involve the use or generation of hazardous materials

The City of Marina Municipal Code Chapter 15.56 establishes special standards and procedures for digging and excavation on those properties in the former Fort Ord which are suspected of containing ordnance and explosives. This ordinance requires that a permit be obtained from the City for any excavation, digging, development or ground disturbance of any type involving the displacement of ten cubic yards or more of soil. The permit requirements include providing each site worker a copy of the notice; complying with all requirements placed on the property by the Army and DTSC; obtaining ordnance and explosives construction support; ceasing soil disturbance activities upon discovery of suspected ordnance, and reporting of project findings.

The City of Seaside General Plan (Section S-2.2) establishes implementation plans to minimize the public health and environmental risks to the community associated with hazardous materials. Implementation Plans aim to minimize risks by cooperating with governmental agencies to regulate management of hazardous materials and waste; identifying roadway transportation routes for hazardous materials transport; implementing a multi-hazard emergency plan; obtaining Superfund monies and implementing clean-up activities at the former Fort Ord; and requiring feasible mitigation to be incorporated into new discretionary development and redevelopment proposals to address hazardous materials impacts associated with those proposals.

The City of Seaside Municipal Code Chapter 15.34 contains the “Ordnance Remediation District Regulations of the City” (Ord. 924 (part), 2004) and establishes special standards and procedures for digging and excavation on those properties in the former Fort Ord which are suspected of containing ordnance and explosives. This ordinance requires that a permit be obtained from the City for any excavation, digging, development or ground disturbance of any type involving the displacement of ten cubic yards or more of soil. The permit requirements include providing each site worker a copy of the Ordnance and Explosives Safety Alert; complying with all requirements placed on the property by an agreement between the City, FORA, and DTSC; obtaining ordnance and explosives construction support; ceasing soil disturbance activities upon discovery of suspected ordnance, and reporting of project findings.

The City of Monterey General Plan (Goal g.) provides for review of all applications for discretionary projects to evaluate proposed uses of hazardous materials and require that those projects minimize hazards and conform to MCEHD requirements.

4.6.5 Impacts and Mitigation Measures

Hazardous materials and hazardous wastes, if mishandled, could pose risks to the public. Potential health and safety impacts can stem from interactions of construction workers, the public and/or future site occupants with existing hazardous materials in soil or groundwater or from the use, storage, or discharge of hazardous materials and wastes from project operations.

4.6.5.1 Significance Criteria

Consistent with Appendix G of the CEQA Guidelines, a project is considered to have a significant hazards or hazardous materials impact if it would result in any of the following:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school;
- Be located on a site, which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, create a significant hazard to the public or the environment;
- Be located within an area covered by an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, and would result in a safety hazard for people residing or working in the project area;
- Be located within the vicinity of a private airstrip and would result in a safety hazard for people residing or working in the project area;
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or
- Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

4.6.5.2 Approach to the Analysis

This impact analysis focused on potential effects of hazards and hazardous materials associated with the project. The evaluation was made in light of current conditions at the project site, the environmental database report, the Proponent's Environmental Assessment (RBF, 2005), applicable regulations and guidelines, and proposed project operations.

The following impacts were considered in this section, but were found to be absent from or not applicable to the proposed project; therefore, no further discussion of these impacts is provided.

- Although operation of the project would require truck trips to deliver water treatment chemicals and dispose of waste, and indirectly result in an incremental increase in the potential for accidents during the routine transport of hazardous materials, the transportation of hazardous materials and wastes is regulated by the California Department of Transportation and the California Highway Patrol. These agencies regulate container types and packaging requirements as well as licensing and training for truck operators, chemical handlers, and hazardous waste haulers. Because CalAm and all service providers will be required to comply with existing and future hazardous materials laws and regulations for the transport of hazardous materials, the risk of accidental releases of hazardous materials during normal transport operations does not constitute a significant hazard.

- Project components are situated within two miles of the Marina Municipal Airport. These components mainly consist of water conveyance pipelines that will be situated below the ground surface, and therefore, would not pose a safety hazard with respect to airport operations. The Monterey Peninsula Airport is not located within two miles or project facilities, nor are any private airstrips.

- Although construction activities could impede access for emergency response vehicles and therefore interfere with an emergency response plan or emergency evacuation plan, measures to avoid interference with emergency access are addressed in Section 4.7, Traffic and Circulation.

Table 4.6-4 summarizes the significance determinations of identified hazards and hazardous materials impacts as they apply to each project facility, and collectively to each project as a whole.

4.6.5.3 Construction Impacts

Impact 4.6-1: Excavation and grading for the project could expose construction workers, the public, or the environment to hazardous materials that may be present in excavated soil or groundwater.

Moss Landing and North Marina Projects (All Project Facilities)

The project involves excavation, trenching, tunneling and grading for the construction of water conveyance pipelines, building footings and utilities. A number of properties with soil and/or groundwater contamination are located within ¼-mile of project facilities and may have impacted subsurface conditions at project locations. The typical contaminants anticipated to be encountered during project construction activities are related to releases from gasoline service stations, dry cleaners, and agricultural uses such as petroleum hydrocarbons, VOCs, metals, and pesticides. Of particular concern, construction within the Former Fort Ord Military facility could result in exposure to various organic substances, metals, petroleum products, and unexploded ordnance. Soil disturbance during construction could further disperse existing contamination into the environment and expose construction workers or the public to contaminants. If significant levels of hazardous materials are present in excavated soils, health and safety risks to workers and the public could occur. This disturbance would be limited to the construction phase of the project. Because regulatory agency lists are continually updated as new environmental concerns are identified or existing environmental release sites are cleaned up, the agency list and file review will need to be updated to evaluate these concerns closer to the time of excavation for the project.

TABLE 4.6-4
SUMMARY OF POTENTIAL HAZARDS AND HAZARDOUS MATERIALS IMPACTS

Facility	Impact 4.6-1	Impact 4.6-2	Impact 4.6-3	Impact 4.6-4	Impact 4.6-5	Impact 4.6-6
Moss Landing Site						
Plant: Moss Landing Project	SM	LTS	-	-	LTS	-
Intake: Moss Landing Project	-	-	-	-	-	-
Outfall: Moss Landing Project	-	-	-	-	-	
Transmission Main North: *Moss Landing Project*	SM	LTS	-	LTS	-	-
North Marina Site						-
Plant: North Marina Project	SM	LTS	-	-	LTS	-
Intake: North Marina Project	SM	LTS	-	-	-	-
Outfall: North Marina Project	-	-	-	-	-	-
Transmission Main South	SM	LTS	LTS	LTS	-	LTS
Terminal Reservoir Site	SM	LTS	-	LTS	LTS	-
Valley Greens Pump Station	SM	LTS	-	LTS	LTS	-
Aquifer Storage and Recovery Facilities	SM	LTS	LTS	LTS	LTS	LTS
Monterey Pipeline	SM	LTS	-	-	-	-
Moss Landing Project	SM	LTS	LTS	LTS	LTS	LTS
North Marina Project	SM	LTS	LTS	LTS	LTS	LTS

SM – Significant Impact, can be Mitigated
SU – Significant Impact, Unavoidable
LTS – Less-than-significant Impact
– – No Impact

With respect to construction of the Terminal Reservoir and ASR facilities, numerous regulations apply to any ground-disturbing activities within the Seaside Munitions Response Sites of the Former Fort Ord. These regulations include, but are not limited to, the City of Seaside and City of Marina municipal code and the Environmental Protection provisions of the Finding of Suitability for Early Transfer (FOSET), Former Fort Ord, Environmental Services Cooperative Agreement (ESCA) Parcels and Non-ESCA Parcels, Draft Final, June 2007. These regulations will ensure that all personnel authorized to access the former Fort Ord are provided MEC recognition training, a briefing on the potential explosive hazards present, and coordinate with a qualified Ordnance and Explosive Safety Specialist during all activities on the site. Compliance with existing regulations for construction work at the Former Fort Ord would reduce the potential impact of encountering unexploded ordnance by construction workers to less than significant. Ownership of the Seaside parcels is scheduled to change and all future construction will need to be coordinated with the future property owner and comply with all provisions regarding site access and safety that may be set forth in future access agreements.

Implementation of Mitigation Measures 4.6-1a through 4.6-1e, as well as compliance with hazardous materials laws and regulations, would reduce the potential for exposure to hazardous materials during construction to a less-than-significant level.

Mitigation Measures

Mitigation Measure 4.6-1a: Within one year prior to construction of facilities requiring excavation of more than 50 cubic yards of soil, the contractor shall retain a qualified environmental professional to conduct a Phase I Environmental Site Assessment in conformance with ASTM Standard 1527-05 to evaluate subsurface conditions that could be expected during construction. For all pipeline alignments, including Transmission Main North, Transmission Main South and the Monterey Pipeline, the contractor shall retain a qualified environmental professional to update the environmental database review to identify environmental cases, permitted hazardous materials uses, and spill sites within one-quarter mile of the pipeline alignment. Regulatory agency files will be reviewed for those sites that could potentially affect soil and groundwater quality within the project alignment.

If these preliminary environmental reviews indicate that a release of hazardous materials could have affected soil or groundwater quality at a project site, the contractor shall retain a qualified environmental professional to conduct a Phase II environmental site assessment to evaluate the presence and extent of contamination at the site, in conformance with state and local guidelines and regulations. If the results of the subsurface investigation(s) indicate the presence of hazardous materials, additional site remediation may be required by the applicable state or local regulatory agencies, and the contractors shall be required to comply with all regulatory requirements for facility design or site remediation.

In addition, the environmental professional will perform a site reconnaissance and assess the need for Phase II soil sampling at locations with the potential to have subsurface contamination identified in the RBF Hazardous Materials Assessment (2005). These locations may not be identified through a regulatory agency database search, and include stained soil near the aboveground petroleum pipeline at the Moss Landing plant site, the railroad right-of-way, and near Highway 1. As above, pertinent findings shall be reported to the applicable state or local regulatory agencies and additional remediation may be required based on the findings of these investigations.

Mitigation Measure 4.6-1b: Based on the findings of the environmental review required by Mitigation Measure 4.6-1a, the project applicant shall prepare a project-specific Health and Safety Plan (HSP) in accordance with 29 CFR 1910 to protect construction workers and the public during all excavation, grading and construction services. This plan shall be submitted to the CPUC for review. The HSP shall identify the following, but not be limited to:

- A summary of all potential risks to construction workers and maximum exposure limits for all known and reasonably foreseeable site chemicals;

- Specified personal protective equipment and decontamination procedures, if needed;

- Safety procedures to be followed in the event suspected hazardous materials are encountered;

- Emergency procedures, including route to the nearest hospital;
- The identification of a site health and safety officer and responsibilities of the site health and safety officer

Mitigation Measure 4.6-1c: The contractor shall have a site health and safety supervisor fully trained pursuant to the HAZWOPER standard (29 CFR 1910.120) be present during excavation, grading, trenching, or cut and fill operations to monitor for evidence of potential soil contamination, including soil staining, noxious odors, debris or buried storage containers. The site health and safety supervisor must be capable of evaluating whether hazardous materials encountered constitute an incidental release[3] of a hazardous substance or an emergency spill. The site health and safety supervisor shall direct procedures to be followed in the event that a hazardous materials release with the potential to impact worker health and safety is encountered. These procedures shall be in accordance with hazardous waste operations regulations and specifically include, but are not limited to, the following: immediately stopping work in the vicinity of the unknown hazardous materials release, notifying MCDEH, and retaining a qualified environmental firm to perform sampling and remediation.

Mitigation Measure 4.6-1d: The applicant and its contractor shall coordinate with the future property owner at the time of construction and obtain a legal Right of Entry. The contractor shall comply with all provisions established in that agreement and all regulations regarding excavation, digging, and development within the former Fort Ord.

Mitigation Measure 4.6-1e: The applicant or its contractor shall develop a materials disposal plan specifying how the applicant or its contractor will remove, handle, transport, and dispose of all excavated material in a safe, appropriate, and lawful manner. The plan must identify the disposal method for soil and the approved disposal site, and include written documentation that the disposal site will accept the waste. This plan shall be submitted to the CPUC for review and approval.

The applicant or its contractor shall develop a groundwater dewatering control and disposal plan specifying how the applicant or its contractor will remove, handle, and dispose of groundwater impacted by hazardous substances in a safe, appropriate and lawful manner. The plan must identify the locations at which potential groundwater impacts are likely to be encountered (based on the results of Mitigation Measure 4.6-1a), the method to analyze groundwater for hazardous materials, and the appropriate treatment and/or disposal methods. This plan shall be submitted to the CPUC for review and approval.

Significance after Mitigation: Less than Significant.

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[3] An incidental release is a release of a hazardous substance which does not pose a significant safety or health hazard to employees in the immediate vicinity or to the employee cleaning it up, nor does it have the potential to become an emergency within a short time frame. Incidental releases are limited in quantity, exposure potential, or toxicity and present minor safety and health hazards to employees in the immediate work area or those assigned to clean them up.

Impact 4.6-2: Potential for accidental release of hazardous materials from construction activities.

Moss Landing and North Marina Projects (All Project Facilities)

Petroleum products, such as gasoline, diesel fuel, lubricants and cleaning solvents would be utilized to fuel and maintain construction vehicles and equipment. Inadvertent release of large quantities of these materials into the environment could adversely impact soil, surface waters, or groundwater quality. However, as described in Section 4.1, Surface Water Resources, compliance with NPDES stormwater permits requires the use of best management practices for construction and would reduce the potential for release of construction-related fuels and other hazardous materials to stormwater and receiving water. Furthermore, the contractor would be required to prepare a spill prevention and response plan. The plan would list the hazardous materials (including petroleum products) proposed for use or generated at the job site and describe measures for preventing spills, monitoring hazardous materials, and providing immediate response to spills. With compliance with required stormwater permitting regulations, hazardous materials impacts associated with potential releases of hazardous materials or petroleum products during construction would be less than significant at all project sites.

Significance: Less than Significant.

Impact 4.6-3: Handling and Use of Hazardous Materials within ¼-mile of a school during construction.

The potential impact from the handling and use of hazardous materials within ¼-mile of a school during construction of either the Moss Landing and North Marina projects is less than significant.

Moss Landing Project

Project facilities located within ¼-mile of a school include the following:

- Transmission Main North
- Transmission Main South
- Terminal Reservoir Site
- Aquifer Storage and Recovery Facilities
- Monterey Pipeline

Project facilities located near schools predominantly consist of water conveyance pipelines. Schools in the vicinity include Castroville Elementary, Marina Del Mar Elementary, Fitch Middle, Martin Luther King Middle, International School of Monterey, Bay View Elementary, and Pacific Grove Middle. As discussed above in Impact 4.6-2, construction activities may result in the inadvertent release of small quantities of fuels, solvents, or lubricants. Construction would occur within ¼-mile of schools, however, stormwater permitting requirements would impose performance standards on the construction activities so that the risk of release of hazardous materials during construction would be low. The potential for a hazardous materials release during construction to result in exposures at the nearby schools is remote, therefore, this impact is less than significant.

North Marina Project

Components of the North Marina project located within ¼-mile of a school include:

- North Marina Plant Sourcewater Pipeline
- Transmission Main South
- Terminal Reservoir Site
- Aquifer Storage and Recovery Facilities
- Monterey Pipeline

As discussed above for the Moss Landing Project, construction for project facilities would occur within ¼-mile of schools, however, stormwater permitting requirements would impose performance standards on the construction activities so that the risk of release of hazardous materials during construction would be low. The potential for a hazardous materials release during construction to result in exposures at the nearby schools is remote, therefore, this impact is less than significant.

Significance: Less than Significant.

Impact 4.6-4: Increased risk of wildland fires during construction in high fire hazard areas.

The potential impact from an increased risk of wildland fires during construction of either the Moss Landing and North Marina projects is less than significant.

Moss Landing and North Marina Projects

Some of the project facilities are located in areas classified by CAL FIRE as High or Very High Fire Hazard Severity Zones. These areas include portions of the following:

- Transmission Main North
- Transmission Main South
- Terminal Reservoir Site
- Valley Greens Pump Station
- Aquifer Storage and Recovery Facilities

Regulations governing the use of construction equipment in fire prone areas are designed to minimize the risk of wildland fires during construction activity. These regulations restrict the use of equipment that may produce a spark, flame, or fire; require the use of spark arrestors on construction equipment that has an internal combustion engine; specify requirements for the safe use of gasoline-powered tools in fire hazard areas; and specify fire suppression equipment that must be provided onsite for various types of work in fire prone areas. The construction contractor must comply with the Public Resources Code and any additional requirements imposed by CAL FIRE or the local fire protection departments, therefore, potential impacts related to wildland fires due to construction activities would be less than significant.

North Marina Project

Components of the North Marina project located in High or Very High Fire Hazard Severity Zones include:

- Transmission Main South
- Terminal Reservoir Site
- Valley Greens Pump Station
- Aquifer Storage and Recovery Facilities

As above, with compliance with the requirements of the Public Resources Code and any additional requirements imposed by CAL FIRE or the local fire protection departments, potential impacts related to wildland fires due to construction activities would be less than significant.

Significance: Less than Significant.

4.6.5.4 Operational Impacts

Impact 4.6-5: Potential for accidental release of chemicals or petroleum products.

Moss Landing and North Marina Projects (Desalination Plants, ASR facilities and Pump Stations)

The proposed project would involve the storage and use of hazardous materials. The chemicals utilized in the desalination process are listed in Table 4.6-1. Bulk storage of these chemicals would be located in tanks within the chemical building and the large lime tanks. It is anticipated that smaller tanks would be utilized in the pre-treatment, reverse osmosis, and post-treatment buildings. Chemicals used for the ASR wells, sodium hypochlorite and sodium bisulfite, would be stored either at each well or at a centralized location nearby. In addition, diesel fuel tanks would be associated with emergency generators located at the plant and at the Valley Greens pump stations.

If accidentally released, these chemicals could cause human health effects to plant personnel and surrounding populations and could cause adverse environmental effects if released to the environment. However, the chemical storage and handling systems would be designed and constructed in accordance with specific requirements for the safe storage and handling of hazardous materials set forth in the Uniform Fire Code, Article 80. Some of the requirements specifically applicable to the project include spill control in all storage, handling and dispensing areas, separate secondary containment for each chemical storage system, and separation of incompatible materials with a non-combustible partition. These requirements reduce the potential for a release of hazardous materials and for mixing of incompatible materials that could pose a public health or water quality risk.

The applicant is required to submit a Hazardous Materials Business Plan (HMBP) for the project facilities to the MCEHD prior to the start of project operations. The HMBP is required to include information on hazardous material handling and storage, including containment, site layout, and emergency response and notification procedures in the event of a spill or release. In addition, the plan requires annual employee health and safety training. The plan must be approved and the project sites would be subject to compliance inspections by the local oversight agency.

With compliance with existing state and federal regulations regarding hazardous materials storage and management, the potential for environmental impacts due to the accidental release of hazardous materials associated with project operations is less than significant.

Significance: Less than Significant.

Impact 4.6-6: Handling and use of hazardous materials within ¼-mile of a school.

Moss Landing and North Marina Projects (ASR facilities)

Project facilities located within ¼-mile of existing schools would be predominantly subsurface water pipelines that do not involve any hazardous materials usage. Hazardous materials would be handled at the proposed ASR well sites, which may be located within ¼-mile of Fitch Middle School. Currently, the MPWMD ASR well at this location uses and stores small quantities of similar chemicals in its operation. Because the storage of sodium hypochlorite (bleach) and sodium bisulfite would be subject to hazardous materials storage regulations, as described in Impact 4.6-5, compliance with these regulations would reduce the risk of a release of hazardous materials that could affect people at the nearby school. Therefore, this impact is considered less than significant.

Significance: Less than Significant.

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