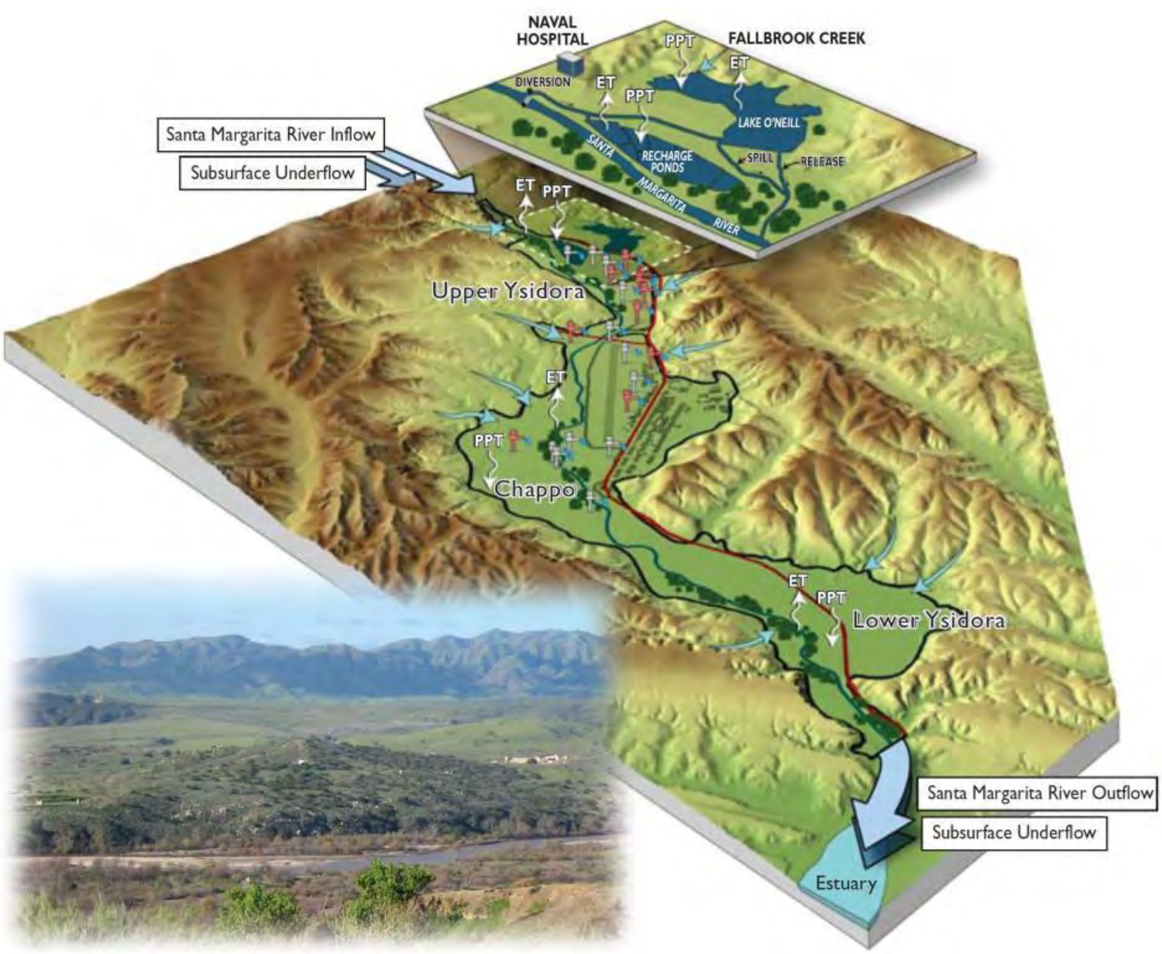
Draft

Environmental Impact Statement/ Environmental Impact Report

Santa Margarita River Conjunctive Use Project



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Acronyms and Abbreviations

°F	degree Fahrenheit
A.D.	Anno Domini
af	acre-feet
af/y	acre-feet per year
AMP	Adaptive Management Plan
APE	Area of Potential Effect
ARTO	arroyo toad
AWTP	Advanced Water Treatment Plant
BA	Biological Assessment
BMP	Best Management Practice
BO	Biological Opinion
B.P.	Before Present
BSSP	Belding's savannah sparrow
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
$CaCO_3$	calcium carbonate
CAGN	coastal California gnatcatcher
Cal EPA	California Environmental Protection Agency
CARB	California Air Resources Board
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGP	Construction General Permit
CGS	California Geological Survey
CH_4	methane
CLTE	California least tern
cm	centimeter(s)
CMP	corrugated metal pipe
CNIC	Commander Navy Installations Command
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CRHR	California Register of Historic Resources
CRPR	California Rare Plant Rank
CSS	coastal sage scrub
CSV	chaparral sand-verbena
CUP	Conjunctive Use Project
CWA	Clean Water Act
CWRMA	Cooperative Water Resources Management Agreement
cy	cubic yard
dB	decibel
DET Fallbrook	Naval Weapons Station Seal Beach, Detachment Fallbrook
DOD	U.S. Department of Defense
DON	U.S. Department of the Navy
DPH	California Department of Public Health
DPS	distinct population segment
DTSC	Cal EPA, Department of Toxic Substances Control
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMWD	Eastern Municipal Water District
EO	Executive Order
EPP	Environmental Protection Plan
EPSO	Environmental Program Services Office
ES	Environmental Security
ESA	Endangered Species Act
ESU	evolutionarily significant unit
ft	foot/feet
ft^2	square feet
FFA	Federal Facilities Agreement
FOP	facility operation plan
FPUD	Fallbrook Public Utility District
FY	fiscal year
GHG	greenhouse gas
GIS	Geographic Information System
GWP	global warming potential
HA	Hydrologic Area
HDPE	high-density polyethylene
HAS	Hydrologic Sub-Area
HU	Hydrologic Unit
I-	Interstate
ICRMP	Integrated Cultural Resources Management Plan
IM-1	Iron and Manganese Plant 1
IM-2	Iron and Manganese Plant 2
IM	iron and manganese
in	inch(es)
INRMP	Integrated Natural Resources Management Plan
IR	Installation Restoration
km	kilometer(s)
km^2	square kilometer(s)
kph	kilometers per hour
kV	kilovolt
kWH	kilowatt hours
LBVI	least Bell's vireo
LFCR	light-footed clapper rail
m	meter(s)
m^2	square meter(s)
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MCL	Maximum Contaminant Level
MCO	Marine Corps Order
MGD	million gallons per day
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
mi	mile(s)
mi^2	square mile(s)
mg/L	milligrams per liter
mL	milliliters
MOU	Memorandum of Understanding
mph	miles per hour

msl	mean sea level
MW	megawatt
MWD	Metropolitan Water District of Southern California
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
$Na_2S_2O_5$	sodium metabisulphate
NaOCl	sodium hypochlorite
NaOH	sodium hydroxide
NAVFAC SW	Naval Facilities Engineering Command Southwest
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NOAA Fisheries	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NOD	Notice of Determination
NOI	Notice of Intent
NOP	Notice of Preparation
NOT	Notice of Termination
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NTU	National Turbidity Unit
O_3	ozone
OB	Orcutt's Brodiaea
OPNAVINST	Naval Operations Instruction
OSMZ	Open Space Management Zone
OSRP	Oil Spill Response Plan
OWR	Office of Water Resources
OU	Operable Unit
P.L.	Public Law
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
PM_{10}	particulate matter less than or equal to 10 microns in diameter
POD	point of diversion
ppb	parts per billion
ppm	parts per million
PRC	public resources code
PWA	Public Works Administration
RAQS	Regional Air Quality Strategy
RCRA	Resource Conservation and Recovery Act
RCWD	Rancho California Water District
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
RFS	Riverside fairy shrimp
RM	Rainbow manzanita
RO	reverse osmosis
ROD	Record of Decision
ROI	region of influence
ROICC	Resident Office in Charge of Construction
RWQCB	Regional Water Quality Control Board
SCADA	Supervisory Control and Data Acquisition
SCM	Special Conservation Measure
SCS	southern California steelhead
SDAB	San Diego Air Basin
SDCAPCD	San Diego County Air Pollution Control District
SDCWA	San Diego County Water Authority
SDFS	San Diego fairy shrimp
SDG&E	San Diego Gas & Electric
SECNAVINST	Secretary of the Navy Instruction
SHPO	State Historic Preservation Office(r)
SIP	State Implementation Plan
SKR	Stephens' kangaroo rat
SMARTS	California Stormwater Multi-Application and Report Tracking System
SMR	Santa Margarita River
SNPL	western snowy plover
SO_2	sulfur dioxide
SO_x	sulfur oxides
SR	State Route
SSC	California Species of Special Concern
SSC Pacific	Space and Naval Warfare Systems Center Pacific
Stetson	Stetson Engineers, Inc.
STP	sewage treatment plant
SWFL	southwestern willow flycatcher
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
TMDL	Total Maximum Daily Load
TWG	tidewater goby
USACE	U.S. Army Corps of Engineers
U.S.	United States
UFC	Unified Facilities Criteria
USC	U.S. Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USMC	U.S. Marine Corps
VOC	volatile organic compound
WDID	Waste Discharge Identification
WTP	Water Treatment Plant
WY	Water Year

ENVIRONMENTAL IMPACT STATEMENT/ENVIRONMENTAL IMPACT REPORT

NEPA Lead Agency: U.S. Department of the Navy, Marine Corps
U.S Department of the Interior, Bureau of Reclamation
CEQA Lead Agency: Fallbrook Public Utility District
Title of Proposed Action: Santa Margarita River Conjunctive Use Project
Affected Jurisdiction: San Diego County
Designation: Environmental Impact Statement/Environmental Impact Report

Abstract

The U.S. Marine Corps (USMC), U.S. Department of the Interior, Bureau of Reclamation (Reclamation), and Fallbrook Public Utility District (FPUD) have prepared this Environmental Impact Statement/Environmental Impact Report (EIS/EIR) for the proposed Santa Margarita River (SMR) Conjunctive Use Project (CUP) in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code § 4321-4370d); as implemented by the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (Title 40 Code of Federal Regulations [CFR] §§ 1500-1508); U.S. Department of the Navy Procedures for Implementing NEPA (32 CFR § 775); Marine Corps Environmental Compliance and Protection Manual (Marine Corps Order P5090.2A, change 3, dated August 2013); California Environmental Quality Act (CEQA) (California Public Resources Code 21000 *et seq.*); California State CEQA Guidelines (14 California Code of Regulations § 15000 *et seq.*), as amended; and resource-specific regulatory guidelines. Implementation of the Proposed Action would include improvements to existing facilities and construction of new facilities to efficiently meet the long-term water demands of Marine Corps Base (MCB) Camp Pendleton and FPUD, reduce FPUD's dependence on imported water, maintain watershed resources, and improve water supply reliability by managing the yield of the Lower SMR Basin. The Proposed Action is needed to upgrade/develop infrastructure and cooperative water management processes that satisfy MCB Camp Pendleton's and FPUD's respective current and future water requirements. The Proposed Action would also resolve the water rights issues between MCB Camp Pendleton and FPUD and satisfy the Court's order to find a "physical solution" to the ongoing dispute in *United States v. Fallbrook Public Utility District, et al.* This EIS/EIR evaluates the potential environmental impacts of two action alternatives and the No-Action Alternative on the following resource areas: geological resources, water resources, biological resources, cultural resources, air quality, hazardous materials and wastes, and utilities.

Point of Contact: United States Marine Corps

Marine Corps Base Camp Pendleton

Attn: Kristin Thomas
Bldg 22165
Camp Pendleton, California 92055-5008
kristin.thomas@usmc.mil
Telephone: (760) 725-9741

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EXECUTIVE SUMMARY

INTRODUCTION

The U.S. Marine Corps (USMC), U.S. Department of the Interior, Bureau of Reclamation (Reclamation), and Fallbrook Public Utility District (FPUD) have prepared this joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR) to evaluate the environmental impacts associated with the proposed Santa Margarita River (SMR) Conjunctive Use Project (CUP). The proposed project would involve the conjunctive use of surface water and groundwater within the Lower SMR Basin. "Conjunctive use" would consist of adaptive management of surface water and groundwater resources and would be achieved through the diversion of SMR surface waters to groundwater percolation ponds and the active use of groundwater aquifers for water storage. The Proposed Action would efficiently meet the long-term water demands of U.S. Marine Corps Base (MCB) Camp Pendleton and the FPUD, reduce dependence on imported water, maintain watershed resources, and improve water supply reliability by managing the yield of the Lower SMR Basin. The USMC and Reclamation are the designated co-lead agencies for review of this project under the National Environmental Policy Act (NEPA) and FPUD is the designated lead agency for review of this project under California Environmental Quality Act (CEQA) in the preparation of this joint EIS/EIR.

SMR CUP may include some or all of the following components, which are configured or combined differently for each action alternative:

- Replacement of the existing diversion structure on the SMR, within MCB Camp Pendleton;
- Improvements to O'Neill Ditch and headgate, within MCB Camp Pendleton ;
- Improvements to existing storage and percolation ponds (also referred to as recharge ponds), within MCB Camp Pendleton;
- Installation of new production wells, gallery wells, and associated collection system infrastructure, within MCB Camp Pendleton;
- Construction or expansion of water treatment facilities, within MCB Camp Pendleton or in the City of Fallbrook;
- Construction of pumping plants and a bi-directional pipeline, between MCB Camp Pendleton and FPUD; and
- An open space management zone (OSMZ), in the City of Fallbrook.

PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the Proposed Action is to efficiently meet the long-term water demands of MCB Camp Pendleton and FPUD, reduce FPUD's dependence on imported water, maintain watershed resources, and improve water supply reliability by managing the yield of the Lower SMR Basin. The Proposed Action is needed to upgrade/develop infrastructure and cooperative water management processes that satisfy MCB Camp Pendleton's and FPUD's respective current and future water requirements.

The Proposed Action would also resolve the water rights issues between MCB Camp Pendleton and FPUD and satisfy the United States District Court for the Southern District of California order to find a "physical solution" to the ongoing dispute in *United States v. Fallbrook Public Utility District, et al.* MCB Camp Pendleton and FPUD entered into a Memorandum of Understanding (MOU) in 2001 agreeing to jointly participate in the project in good faith and with full cooperation. MCB Camp Pendleton, Reclamation, and FPUD signed a Conceptual Points of Agreement in January 2011.

PUBLIC INVOLVEMENT PROCESS

Public involvement in the development of the EIS/EIR is designed to involve the public in the federal and state decision-making process. NEPA and CEQA regulations require an early and open process for determining the scope of issues related to a Proposed Action or project. In accordance with NEPA and CEQA, the USMC, Reclamation, and FPUD initiated a public and agency scoping process to assist in determining the range of issues to be addressed in this EIS/EIR.

The range of issues analyzed in this EIS/EIR was determined from initial USMC, Reclamation, and FPUD evaluation of the action alternatives as well as comments received during the public scoping process and written and verbal comments received during the 2010 public review period for the California State Water Resources water rights permit petitions (refer to Appendix A).

A Notice of Availability/Notice of Completion for the Draft EIS/EIR was published in the *Federal Register* on 9 May 2014 and a Notice of Completion was provided to the State Clearinghouse on 9 May 2014 to initiate a 45-day public review of the Draft EIS/EIR. The public review period for the Draft EIS/EIR will conclude on 23 June 2014. A public meeting will be held on 29 May 2014 at FPUD. The Draft EIS/EIR has been made available to the public via the MCB Camp Pendleton website: http://www.pendleton.usmc.mil/base/environmental/index.asp and the Fallbrook Public Utility District website: http://www.fpud.com, and at the following local libraries: City of San Clemente Public Library, Fallbrook Public Library, and the City of Oceanside Public Library.

REGULATORY ENVIRONMENT

This EIS/EIR has been prepared pursuant to the following:

- NEPA of 1969 (42 United States Code [USC] §§ 4321-4370h), which requires an environmental analysis for major federal actions having the potential to significantly impact the quality of the human environment;
- Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] §§ 1500-1508), which implement the requirements of NEPA;
- U.S. Department of the Navy (DON) regulations for implementing NEPA (32 CFR § 775) and Secretary of the Navy Instruction (SECNAVINST) 5090.6A, which provides the DON policy for implementing the CEQ regulations and NEPA;
- Marine Corps Order (MCO) P5090.2A, change 3, dated August 2013, Environmental Compliance and Protection Manual, which establishes procedures for implementing NEPA;
- CEQA (California Public Resources Code [PRC] §§ 21000-21177); and
- California State CEQA Guidelines (14 California Code of Regulations (CCR) §§ 1500-15387).

This EIS/EIR has also been prepared considering the following federal and state regulations and orders:

Federal Regulations, Statutes, and Orders

- Clean Water Act (CWA) (33 USC §§ 1251-1387);
- Department of Defense (DOD) Ammunition and Explosives Safety Standards (C5.4.1.1.2);
- Federal Endangered Species Act (ESA) (16 USC § 1531 *et seq.*);
- Fish and Wildlife Coordination Act (16 USC § 661 *et seq.*);
- Executive Order (EO) 11990: *Protection of Wetlands*;
- National Historic Preservation Act (NHPA) Section 106 (16 USC § 470 *et seq.*);
- Clean Air Act (CAA) - Authority to Construct and Permit to Operate;
- EO 11988: *Floodplain Management*;

- EO 13547: *Stewardship of the Ocean, Our Coasts, and the Great Lakes*;
- Migratory Bird Treaty Act (16 USC § 703-712);
- Marine Mammal Protection Act (16 USC § 1361 and 50 CFR § 216);
- Marine Protection, Research, and Sanctuaries Act (33 USC § 1401);
- EO 13112: *Invasive Species*;
- EO 12898: *Environmental Justice in Minority Populations and Low-Income Populations*;
- EO 13045: *Environmental Health and Safety Risks to Children*;
- Secretary of the Interior Order 3215, Principles for the Discharge of the Secretary's Trust Responsibility;
- Department of the Interior Manual, Part 303, DM 2, Principles for Managing Indian Trust Assets;
- Coastal Zone Management Act (16 USC § 1451 *et seq.* and 15 CFR § 930), Federal Consistency with Approved Coastal Management Programs;
- Archaeological Resources Protection Act (16 USC 470aa-mm); and
- Native American Graves Protection and Repatriation Act (25 USC §§ 3001-3013).

<u>State Regulations</u>

- State Fish and Wildlife Code § 1601;
- California ESA (California Fish and Wildlife Code § 2081 *et seq.*); and
- California Coastal Act (PRC § 30000 *et seq.*).

PROCESS USED TO FORMULATE ALTERNATIVES

Numerous studies have been conducted and reports written regarding use of water from the SMR and how to best achieve the water supply improvement objectives of MCB Camp Pendleton and FPUD. The common goal of these studies was to develop feasible alternatives that would enhance and optimize the productivity of the Lower Santa Margarita groundwater basin. Various potential alternatives were examined in these previous studies, including local and regional projects located within and outside the SMR Basin. Factors that were considered when identifying potential project alternatives included:

- the quantity of water diverted from the SMR,
- the amount of water available for direct and indirect use,
- potential impacts to the local environment,
- engineering efficiencies, and
- costs.

Forty-four conceptual alternatives, selected during a June 2004 workshop attended by Reclamation, FPUD, MCB Camp Pendleton, and Naval Weapons Station Seal Beach, Detachment Fallbrook (DET Fallbrook), were subsequently evaluated and compared at an appraisal level to determine which alternatives could be constructed to put to beneficial use naturally occurring streamflow, groundwater, and tertiary treated wastewater. The collective project features presented some opportunity for flexibility with alternative locations and design of some features. The resulting report, *Santa Margarita River Conjunctive Use Pre-Feasibility Plan Formulation Study* provided Reclamation, MCB Camp Pendleton, and FPUD with information sufficient to screen and consider alternatives and/or project components to be carried forward for evaluation in a feasibility study and under NEPA and CEQA.

A December 2006 Decision Memo was created by MCB Camp Pendleton, Reclamation, and FPUD describing an inter-agency agreement on a Proposed Action and two alternatives recommended for economic and environmental feasibility analysis. Post approval of the 2006 Decision Memo, the Proposed Action and alternatives were further refined through additional feasibility analysis and design.

Preliminary Draft EIS/EIR, engineering, and economic feasibility documents addressing the three Decision Memo alternatives were prepared in August 2009. Work on the draft documents was placed on hold as coordination meetings were held to address significant design issues between MCB Camp Pendleton's Haybarn Canyon Advanced Water Treatment Plant (AWTP) and the proposed expansion of the Haybarn Canyon AWTP to meet the treatment needs under the 2009 Proposed Action. In addition, in the summer of 2010 the California State Water Resources Control Board (SWRCB) published for public review the project's water rights time extension and change petitions. Comments received during public review provided new information regarding the anadromous form of steelhead trout (*Oncorhynchus mykiss*). The AWTP design coordination meetings and steelhead trout comments resulted in the removal of two alternatives (former Alternatives 1 and 2), and the inclusion of a new alternative. The EIS/EIR now addresses two action alternatives and a No-Action Alternative. The action alternatives provide water supply for both MCB Camp Pendleton and FPUD.

Those alternatives and/or project components that were eliminated from further analysis are discussed in Section 2.4, *Alternatives Considered and Eliminated from Detailed Study*.

DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action would enhance groundwater recharge and recovery capacity within the Lower SMR Basin and develop a conjunctive use program that would increase available water supplies for the benefit of MCB Camp Pendleton and FPUD. SMR CUP would construct facilities within the Lower SMR Basin to capture additional surface runoff during high streamflow events that currently flows out to the Pacific Ocean. This surface water would be used to recharge groundwater through existing groundwater percolation ponds and stored or "banked" in groundwater basins during wet years and used to augment water supplies during dry years, reducing reliance on imported water. Specifically included are improvements to the diversion works and increased capacity of the headgate and the O'Neill Ditch; improvements to seven existing percolation ponds; installation of new groundwater production wells and gallery wells; treatment of water at an existing, expanded, or new water treatment plant (WTP); and a bi-directional pipeline to deliver water to FPUD and provide MCB Camp Pendleton with an off-base water supply during drier than normal conditions or emergency situations. The majority of improvements would occur on MCB Camp Pendleton.

The following sections describe the two action alternatives that are carried forward for analysis in this EIS/EIR. A comparison of the various project components associated with Alternative 1 and Alternative 2 is presented in Table ES-1. In accordance with NEPA and CEQA, Alternatives 1 and 2 represent a range of reasonable alternatives that would meet the purpose of and need for the Proposed Action.

Alternative 1

Improvements to Existing Facilities

Replacement of Existing Sheet Pile Diversion with Inflatable Weir Diversion Structure. The existing sheet pile diversion structure on the SMR (within MCB Camp Pendleton) would be replaced with an inflatable weir diversion structure. The inflatable weir diversion structure would be 1 foot (ft) (0.3 meter [m]) higher than the existing diversion structure to allow for the proposed increase in the amount of water to be diverted into O'Neill Ditch from 60 cubic feet per second (cfs) to 200 cfs. The 250-ft (76-m) inflatable weir diversion structure would consist of a concrete slab foundation and two separate steel gate panels (46 ft and 203 ft long [14 m and 62 m]) that could be separately raised and lowered pneumatically using heavy gauge inflatable air bladders that support the gates on their downstream side. Water diverted from the SMR would flow to the percolation ponds, be stored in Lake O'Neill, or bypassed back to the SMR. A small building would also be constructed to house air compressors and system control equipment for the inflatable weir.

The inflatable weir gates would be operated based on the operation plan outlined in Table ES-2 and the Adaptive Management Plan/Facility Operations plan (AMP/FOP) guidelines and procedures as described below. Both gates on the inflatable weir would be raised to an elevation of 118.7 ft (36.2 m) mean sea level (msl) (i.e., 1 ft [0.3 m] above the elevation of the existing sheet pile weir) from June through November. The shorter 46-ft gate would be lowered to an elevation of 117.7 ft (35.9 m) msl (i.e., the same elevation as the existing sheet pile weir) from December through May and when instantaneous flows at the weir exceed 153 cfs (*Note:* the December through May period coincides with the adult and/or juvenile steelhead migration season). During large streamflow events (i.e., 10-year event and greater), both inflatable gates would be fully lowered to allow floodwaters, sediment, and debris to pass downstream without adversely affecting water diversion facilities.

Table ES-1. Components of Alternative 1 and Alternative 2

Project Components	Alternative 1	Alternative 2
Improvements to Existing Facilities		
Replacement of Existing Sheet Pile Diversion with Inflatable Weir Diversion Structure (within MCB Camp Pendleton)	**X**	**X**
Improvements to O'Neill Ditch and Headgate (within MCB Camp Pendleton)	**X**	**X**
Improvements to Percolation Ponds 1-7 (within MCB Camp Pendleton)	**X**	**X**
Expand Haybarn Canyon AWTP and Add a Surface Water Treatment Facility (within MCB Camp Pendleton)		**X**
Proposed New Facilities		
Four New Groundwater Production Wells and Associated Collection System Infrastructure (within MCB Camp Pendleton)	**X**	**X**
Water Conveyance/Distribution System, including Bi-Directional Pipeline from MCB Camp Pendleton to Red Mountain Reservoir via new FPUD Water Treatment Plant (within MCB Camp Pendleton and the City of Fallbrook)	**X**	
FPUD WTP (City of Fallbrook)	**X**	
Open Space Management Zone (1,392 acres) (City of Fallbrook)	**X**	**X**
Four New Gallery Wells and Associated Collection System Infrastructure (within MCB Camp Pendleton)		**X**
Water Conveyance/Distribution System, including Bi-Directional Pipeline from Reservoir Ridge to the Gheen Zone (within MCB Camp Pendleton and the City of Fallbrook)		**X**

Notes: AWTP = Advanced Water Treatment Plant; MCB = Marine Corps Base; FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant; SCADA = Supervisory Control and Data Acquisition.

Table ES-2. Proposed Operation Plan for the Inflatable Weir Diversion Structure and O'Neill Ditch Headgate, MCB Camp Pendleton

Instantaneous Streamflow at POD (cfs)	Diversion (cfs)	By-Pass (cfs)	Inflatable Weir Gate Elevations		Spill (cfs)[1]	Fish Screen in Use?[2]	Notes
			204 ft	46 ft			
0 to 3	0	0 to 3	118.7	118.7	0	No	
4 to 153	1 to 150	3	118.7	118.7	0	No	
154 to 303	150	3	118.7	117.7	1 - 150[3]	Yes[2]	December through May
304 to 353	151 to 200	3	118.7	117.7	150	Yes[2]	December through May
354 to 15,000	200	3	118.7	117.7	>150	Yes[2]	December through May
>15,000	0	>15,000[4]	114.5	114.5	0	No	O'Neill Ditch headgate would be closed

Notes: [1] Spill would occur over the 46-ft weir when lowered to an elevation of 117.7 ft msl.
[2] Fish screen would be installed seasonally; December through May, when adult and/or juvenile steelhead may occur in the Lower SMR.
[3] Spill primarily to river channel would potentially benefit downstream juvenile steelhead migration.
[4] When instantaneous streamflow at the POD reaches 15,000 cfs (i.e., the 10-year event), both weir gates would be lowered to the bed elevation of 114.5 ft.
POD = point of diversion; cfs = cubic feet per second; ft = foot/feet; SMR = Santa Margarita River.

Improvements to O'Neill Ditch and Headgate. The headgate (i.e., a gate for controlling the flow of water into a ditch) and O'Neill Ditch would be modified to increase the capacity from 60 cfs to 200 cfs to accommodate the amount of water required under the project design. This component includes excavation of approximately 6,000 cubic yards (cy) of depositional material along the length of O'Neill Ditch; replacement of existing undersized road crossing culverts, Parshall flumes, and control gates; and enlarging an approximately 400-ft (122-m) section of the ditch downstream of the road crossing. A fish screen would be incorporated onto the diversion headgate and installed seasonally from December through May to minimize the possibility of trapping adult and juvenile southern California steelhead (SCS) migrating in the SMR. Operation of the headgate and O'Neill Ditch would be based on the operation plan outlined in Table ES-2 and the AMP/FOP guidelines and procedures as described below.

Improvements to Percolation Ponds 1-7. The overall performance of the existing MCB Camp Pendleton Percolation Ponds 1-7 is currently reduced by operational inefficiencies related to lack of water level control and the inability to measure flow between ponds. Proposed improvements to Percolation Ponds 1-7 include redesigning the culverts and weirs that transfer water from one pond to the next. This includes increasing the capacity of the culverts and adding new control structures to better regulate the flow between ponds. Operation of the percolation ponds would be based on the AMP/FOP guidelines and procedures as described below.

Proposed New Facilities

Groundwater Production Wells and Associated Collection System Infrastructure. The existing groundwater production wells operated and maintained by MCB Camp Pendleton would be augmented by the installation of four new groundwater production wells in the Upper Ysidora and Chappo sub-basins, along with appurtenant collection pipelines, power lines, and access roads. Each new well would include a high pressure pump with a pumping rate of 1.8 to 2.2 cfs or a combined maximum capacity to extract up to 8.8 cfs.

The groundwater available for pumping fluctuates seasonally and varies by hydrologic condition. Operation of existing and new production wells would be based on AMP/FOP guidelines and procedures as described below. The pumping schedule would be designed to optimize groundwater levels during the winter to create storage in the aquifer, capture wintertime flow events, and minimize groundwater mounding at the percolation ponds. Pumping would be reduced during dry years, with restricted groundwater pumping continuing until wetter hydrologic conditions occur. The groundwater produced from existing and new groundwater production wells operated and maintained by MCB Camp Pendleton would be collected via new and existing conveyance pipelines connected to the existing raw water collection system and conveyed to the Haybarn Canyon area.

Water Conveyance/Distribution, including Bi-Directional Pipeline from MCB Camp Pendleton to Red Mountain Reservoir via new FPUD Water Treatment Plant. Raw groundwater would be pumped from the aquifer and conveyed to the Haybarn Canyon area on MCB Camp Pendleton. The water delivered to Haybarn Canyon would then be diverted to either MCB Camp Pendleton's existing Haybarn Canyon AWTP (P-113), or to a new FPUD WTP and then Red Mountain Reservoir via a new bi-directional pipeline. The bi-directional pipeline between FPUD and MCB Camp Pendleton would allow imported water to be delivered back to MCB Camp Pendleton during drier than normal periods or emergency conditions when local groundwater is insufficient to meet demands. Red Mountain Reservoir has an existing connection to receive water from the San Diego County Water Authority's (SDCWA) Aqueduct. A new connection between Red Mountain Reservoir and the SDCWA Aqueduct may be added in the future that would allow for delivery of project water to the SDCWA Aqueduct. However, the connection between Red Mountain Reservoir and the SDCWA Aqueduct is not part of SMR CUP and would be subject to a separate analysis under NEPA/CEQA, as appropriate.

MCB Camp Pendleton would continue to process water for its own use at the existing Haybarn Canyon AWTP (P-113) and FPUD would treat its portion of the project water at a new FPUD WTP (see detailed description below). Raw groundwater delivered to FPUD would average 3,100 acre-feet per year (af/y) and would not exceed 800 acre-feet (af) in any given month. However, total volumes of raw water deliveries to FPUD would vary annually dependent upon multiple factors including, but not limited to, precipitation, river surface flows, surface diversions, and environmental considerations.

FPUD WTP. A new FPUD WTP would be constructed on FPUD property adjacent to DET Fallbrook. The new FPUD WTP would be located on the same property as the existing FPUD wastewater treatment plant and would retrofit some of the existing solids drying beds. The FPUD WTP would use a treatment facility designed to provide potable water and would include an iron and manganese removal and demineralization plant. The FPUD WTP would have the capacity to treat a maximum of 800 af per month. The average annual raw water delivery to the FPUD WTP would be 3,100 af/y. The FPUD WTP would be connected to and controlled by the existing FPUD supervisory control and data acquisition (SCADA) system.

Brine from the FPUD WTP would be discharged to the Pacific Ocean via FPUD's Fallbrook Outfall pipeline to the Oceanside Ocean Outfall. FPUD's existing National Pollutant Discharge Elimination System (NPDES) Permit (CA0108031) would be amended to allow for the inclusion of the additional brine from the project. The existing FPUD NPDES Permit currently has a permitted average annual discharge of 2.4 MGD.

SCADA System. Operation of a SCADA system, as included in the project, would be overseen and managed by MCB Camp Pendleton Facilities Maintenance Division. The spillway gates on the inflatable weir diversion structure, turnouts to the percolation ponds and Lake O'Neill, production and monitoring wells; flow measurement, and pumping plants would be designed for remote operation and/or data acquisition.

Open Space Management Zone. A framework would be established by FPUD to permanently preserve 1,392 acres (563 hectares) of riparian open-space land in the City of Fallbrook that was acquired by FPUD in 1958 for water supply development purposes. Under Alternative 1, all or most of the OSMZ is intended to be placed in conservation management to preserve open space and riparian values that currently exist on the site. Conservation approaches currently being considered by FPUD include, but are not limited to: (1) purchase and management of the OSMZ by Reclamation, MCB Camp Pendleton, or another agency or conservation related organization; (2) continued ownership of the property by FPUD subject to a conservation easement purchased by a third party that restricts future development; or (3) management of the property as a mitigation bank by FPUD or its designee.

Whichever conservation approach is ultimately selected by FPUD would comply with Senate Bill 1148, guidelines developed to implement Senate Bill 1148, and any other applicable federal, state, and local regulations and policies. Senate Bill 1148 authorizes private and public conservation and mitigation banks to serve an important function of managing the mitigation provided by private applicants when aquatic or terrestrial mitigation is required as a condition of a permit from a public agency. Should the site be established as a mitigation bank, mitigation credits would be sold to proponents of other projects within San Diego and Riverside counties having mitigation responsibilities that require compensation for impacts to wetlands, threatened or endangered species, and other sensitive resources, but the intended approach is for the open space status of the 1,392 acres (563 hectares) to be maintained.

The OSMZ would continue to serve as a critical parcel for ensuring a healthy watershed in the community of Fallbrook. It would also have the effect of protecting downstream water quality and preventing development of riparian water rights within the OSMZ that, if developed, would decrease in-stream flows reaching MCB Camp Pendleton and the SMR Estuary.

Adaptive Management Plan. As part of the project, an AMP/FOP would be developed by MCB Camp Pendleton to manage project diversion, recharge, production, and delivery facilities. The AMP/FOP would rely on near real-time environmental and hydrologic data from existing and proposed gages to determine project operations and meet delivery requirements. Actual field data gathered during project operations would be processed using a numerical groundwater model to determine future locations and rates of pumping that would protect environmental concerns while meeting project proponents’ water requirements. The pumping schedules and proposed operations would then be published annually in a FOP that would describe how and when the inflatable weir, headgate, turnout gates, and wells are operated on a seasonal and monthly basis. The use of the AMP/FOP and its ability to rely on an alternative water supply (i.e., imported water via a bi-directional pipeline) to meet demands on MCB Camp Pendleton would allow for increased sustained basin yield in the Lower SMR Basin. The AMP/FOP would be developed, updated, and implemented by appropriate MCB Camp Pendleton and FPUD subject matter experts (e.g., hydrologists and biologists).

Alternative 2

Alternative 2 is similar to Alternative 1 in terms of diversion system upgrades, groundwater recharge, and groundwater production (see Table ES-1). Alternative 2 includes the following components described under Alternative 1 (see Alternative 1 description for details on each of the following components):

- Replacement of Existing Sheet Pile Diversion with Inflatable Weir Diversion Structure,
- Improvements to O’Neill Ditch and Headgate,
- Improvements to Percolation Ponds 1-7,
- Groundwater Production Wells and Associated Collection System Infrastructure,
- The OSMZ, and
- SCADA system.

Alternative 2 differs from Alternative 1 in that the existing Haybarn Canyon AWTP would be expanded to treat all groundwater produced under the project. Additionally, a new surface water treatment facility located adjacent to the Haybarn Canyon AWTP would treat surface water diverted from four new gallery wells installed between the percolation ponds and SMR. Treated water would be delivered to FPUD via a bi-directional pipeline located along a different route through MCB Camp Pendleton and DET Fallbrook.

The project components specific to Alternative 2 are discussed below.

Expand Haybarn Canyon AWTP and Add a Surface Water Treatment Facility, at MCB Camp Pendleton. Groundwater from MCB Camp Pendleton's existing wells and SMR CUP's four new production wells would be treated at an expanded Haybarn Canyon AWTP. The expansion of MCB Camp Pendleton's existing Haybarn Canyon AWTP (P-113) would occur to handle the increased Alternative 2 flow volumes. The existing Haybarn Canyon AWTP's groundwater water quality treatment goals would continue to be met under this expansion.

The gallery wells would produce surface water that would be treated at the proposed new surface water treatment facility located adjacent to the existing Haybarn Canyon AWTP. The surface water treatment facility would be designed to treat surface water with organics removal and membrane filtration to comply with the surface water treatment rule. The treated surface water would then be blended with the treated groundwater and distributed to MCB Camp Pendleton and FPUD.

Under SMR CUP, an additional average daily brine discharge of 3.5 cfs would be produced and discharged to the Pacific Ocean via the existing Oceanside Ocean Outfall. The additional brine would be conveyed to the Oceanside Ocean Outfall via the existing brine discharge pipeline constructed for MCB Camp Pendleton's P-113 project, which is connected to the Oceanside Ocean Outfall via P-113's connection to the Oceanside Ocean Outfall Pump Station. Under P-113, this connection provides for secondary emergency brine discharge; however, under Alternative 2 of this project, all additional brine would utilize this connection. The brine discharge would be covered under either an amendment to FPUD's existing NPDES Permit (CA0108031) to the Oceanside Ocean Outfall or an amendment to MCB Camp Pendleton's NPDES Permit (CA0109347). The existing FPUD NPDES Permit currently has a permitted average annual discharge of 2.4 MGD.

Gallery Wells and Associated Collection System Infrastructure. Four gallery wells would be installed adjacent to the SMR along the west side of Percolation Ponds 1, 4, and 5, at MCB Camp Pendleton. Operation of the gallery wells would be based on AMP/FOP guidelines and procedures as described under Alternative 2. Each gallery well would include a caisson connected to a series of lateral pipelines projected under the river channel bottom to collect and filter surface water from the SMR. Gallery wells would capture water in the streambed sediments and induce additional streambed recharge during periods of increased flow in the SMR during the wet season. The four gallery wells would have the capacity to extract a combined maximum of 18 cfs of surface water. Water extracted from the gallery wells would be transported to the proposed new surface water treatment facility located adjacent to the existing Haybarn Canyon AWTP.

Water Conveyance/Distribution System, including Bi-Directional Pipeline to the Gheen Zone/Martin Reservoir. A bi-directional water conveyance pipeline would be installed between the Haybarn Canyon AWTP/Reservoir Ridge storage tanks and FPUD's Gheen pressure zone where it would tie into an existing pipeline to Fallbrook's Red Mountain Reservoir. The new pipeline would have two main turnouts to provide water directly to the MCB Camp Pendleton and FPUD users. A connection would also be installed to deliver water to the SDCWA Aqueduct near the Red Mountain Reservoir. Booster pumping stations would be required near the guard station on the MCB Camp Pendleton side of the boundary between MCB Camp Pendleton and DET Fallbrook and at the site of the Gheen Zone/Martin Reservoirs in the community of Fallbrook. The bi-directional pipeline between FPUD and MCB Camp Pendleton would allow water to be delivered back to MCB Camp Pendleton during drier than normal periods when groundwater is insufficient to meet demands or emergency situations.

NO-ACTION ALTERNATIVE

Under the No-Action Alternative, both MCB Camp Pendleton and FPUD would obtain all of their potable water demands from existing water supplies, with an increased reliance on imported water. MCB Camp Pendleton would continue to use its existing diversion, percolation, storage, and recovery system to meet its water demands. FPUD would rely solely on imported water purchased from the SDCWA. If the No-Action Alternative is chosen and the water rights are not perfected, other water development projects upstream of MCB Camp Pendleton could occur that would result in a reduction of water supply available to meet existing and future water demand.

Existing and future water demands on MCB Camp Pendleton would be met through the use of existing facilities or from the development of more expensive alternative water supplies, such as ocean desalination or construction of a new pipeline to an off-base water purveyor and purchase of imported water. Without access to an alternative water supply through the bi-directional pipeline, groundwater level declines during extended drought periods could not be mitigated nor could MCB Camp Pendleton demands be met during emergency conditions.

Without implementation of a "physical solution," the ongoing *United States v. Fallbrook Public Utility District et al.* litigation likely would not be settled. Although other alternatives may exist, they are neither feasible nor prudent. Failure to reach a physical solution may propel the parties into active litigation prone to lead to a court judgment not likely satisfactory to either party. Although the No-Action Alternative would not meet the purpose of and need for the Proposed Action, it is included to serve as the baseline against which impacts of the alternatives can be compared.

Under the No-Action Alternative, FPUD has no direct water supply benefit from the OSMZ property and no remaining justification for maintaining this property as open space. Without implementation of SMR CUP, the OSMZ could revert to the original condemnees and be developed, in which case there could be adverse impacts on wildlife, water quality, aesthetics, and other environmental values at the site and downstream. Under this alternative, the potential development of water resources by condemnees could result in a reduction of available water supply to downstream users.

SUMMARY OF ENVIRONMENTAL IMPACTS AND POTENTIAL MITIGATION MEASURES

Environmental impacts on the following resources are evaluated in this EIS/EIR: geological resources, water resources, biological resources, cultural resources, air quality, hazardous materials and wastes, and utilities. Table ES-3 provides a summary of potential environmental impacts by resource area. A detailed impact analysis for each of these resources is provided in Chapter 4 and cumulative impact analysis is provided in Chapter 5.

Several additional resources were evaluated: traffic, noise, socioeconomics and environmental justice, land use and recreation, and visual resources. However, because potential impacts under the action alternatives were considered to be negligible or non-existent for these resources, it was determined that detailed evaluation in the EIS/EIR was not required. A list of these resources as well as the rationale for eliminating them from detailed analysis is presented at the beginning of Chapter 3 of this EIS/EIR.

Table ES-3. Summary of Potential Environmental Consequences and Proposed Mitigation Measures by Resource Area

Alternative 1	Alternative 2	No-Action Alternative
GEOLOGICAL RESOURCES		
Through implementation of Special Conservation Measures (SCMs) and the AMP/FOP, significant impacts would not occur; therefore, no additional mitigation measures would be implemented.	Same as Alternative 1.	Without an alternate source of water or reduced demand during sustained dry years, groundwater pumping could exceed safe yield and, therefore, aquifer subsidence is possible. Otherwise, adverse impacts are not anticipated.
WATER RESOURCES		
Through implementation of SCMs and the AMP/FOP, significant impacts would not occur; therefore, no additional mitigation measures would be implemented.	Potential impacts to groundwater resources in the Upper Ysidora Sub-basin would occur with implementation of Alternative 2. The following mitigation measure to monitor and reduce impacts to groundwater resources to below a level of significance would be implemented: • The AMP/FOP under Alternative 2 would be modified to include the maintenance of groundwater levels within historical range constraint (*Note:* this measure is included in the AMP/FOP as described under Alternative 1). Groundwater levels would be monitored by a series of telemetered groundwater monitoring wells and pumping would be reduced or shut off if the groundwater level drops to within historic levels and remain reduced until the average monthly groundwater levels recover to above historic levels.	Impacts to groundwater could occur if an increase in pumping were to occur during sustained dry years. However, completion of the P-1045 pipeline, which would allow for water transfers between MCB Camp Pendleton's North and South water systems, may help to alleviate this concern during periods of extended drought.

Table ES-3. Summary of Potential Environmental Consequences and Proposed Mitigation Measures by Resource Area

Alternative 1	Alternative 2	No-Action Alternative
BIOLOGICAL RESOURCES		
Facilities construction would have direct and indirect impacts due to vegetation removal and disturbance of individuals resulting in the disruption of feeding or reproduction, energetic costs, and predation risks. In most respects, these impacts would be less than significant because they would be temporary and minimized with the implementation of SCMs that are part of the project. Established conservation measures for special status wildlife species would be followed to lessen construction-related disturbance and loss of habitat. Additional mitigation measures (provided below) involving site-specific avoidance, minimization, and/or restoration would be implemented to lessen construction impacts to levels that would be less than significant. The project's use of water in the Lower SMR may reduce streamflow and groundwater levels relative to historic averages. This could indirectly impact riparian habitat through flow-mediated changes in the distribution and duration of seasonal aquatic habitats, as well as reduced productivity of groundwater-dependent riparian vegetation and would have the potential for impacts on riparian and estuarine habitats and associated special status species, including impacts on least Bell's vireo, southwestern willow flycatcher, arroyo toad, light-footed clapper rail, California least tern, southern California steelhead, and Belding's savannah sparrow. However, potential impacts to these species would not be significant with successful implementation of the AMP/FOP and the terms and conditions of the USFWS and NOAA Fisheries Biological Opinion's (BOs). Impacts from discharging the dilute brine to the Pacific Ocean from the existing Oceanside Ocean Outfall would be minor and any secondary effects on organisms in the runoff areas from the pipe would be negligible. Mitigation measures for Alternative 1 include: • Mitigation for any permanent losses of jurisdictional wetlands and other waters of the U.S.	Construction impacts and mitigation measures are similar to Alternative 1. Impacts from discharging the dilute brine to the Pacific Ocean from the existing Oceanside Ocean Outfall would be minor and any secondary effects on organisms in the runoff areas from the pipe would be negligible. Mitigation measures for Alternative 2 include: • Mitigation for any permanent losses of jurisdictional wetlands and other waters of the U.S.	Without an alternate source of water or reduced demand during sustained dry years, groundwater depletion and its indirect effects on riparian habitat and associated species are anticipated.

Table ES-3. Summary of Potential Environmental Consequences and Proposed Mitigation Measures by Resource Area

Alternative 1	Alternative 2	No-Action Alternative
CULTURAL RESOURCES		
Through implementation of SCMs, significant impacts would not occur; therefore, no additional mitigation measures would be implemented.	Same as Alternative 1.	No impacts would occur.
AIR QUALITY		
Through implementation of SCMs, significant impacts would not occur; therefore, no additional mitigation measures would be implemented.	Same as Alternative 1.	No impacts would occur.
HAZARDOUS MATERIALS AND WASTES		
The proposed new wells have been sited so that groundwater pumping would not impact the mapped plumes associated with Installation Restoration Program sites. Through implementation of SCMs and the AMP/FOP, significant impacts would not occur; therefore, no additional mitigation measures would be implemented.	Same as Alternative 1.	No impacts would occur.
UTILITIES		
Through implementation of SCMs and the AMP/FOP, significant impacts would not occur; therefore, no additional mitigation measures would be implemented.	Same as Alternative 1.	No significant impacts would occur; any future projects to develop potable water for MCB Camp Pendleton would be subject to the NEPA and/or CEQA process, as appropriate.

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CHAPTER 1
PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

This Environmental Impact Statement/Environmental Impact Report (EIS/EIR) evaluates the environmental impacts associated with the proposed Santa Margarita River (SMR) Conjunctive Use Project (CUP). The proposed project would involve the conjunctive use of surface water and groundwater within the Lower SMR Basin. "Conjunctive use" would consist of adaptive management of surface water and groundwater resources and would be achieved through the diversion of SMR surface waters to groundwater percolation ponds and the active use of groundwater aquifers for water storage. The Proposed Action would efficiently meet the long-term water demands of U.S. Marine Corps (USMC) Base Camp Pendleton and the Fallbrook Public Utility District (FPUD), reduce dependence on imported water, maintain watershed resources, and improve water supply reliability by managing the yield of the Lower SMR Basin.

SMR CUP may include some or all of the following components, which are configured differently for each action alternative:

- Replacement of the existing diversion structure on the SMR, within MCB Camp Pendleton,
- Improvements to O'Neill Ditch and headgate (i.e., a gate for controlling the flow of water into a ditch) within MCB Camp Pendleton,
- Improvements to existing storage and percolation ponds (also referred to as recharge ponds) within MCB Camp Pendleton,
- Installation of new production wells, gallery wells, and associated collection system infrastructure within MCB Camp Pendleton,
- Construction or expansion of water treatment facilities within, MCB Camp Pendleton and the City of Fallbrook,
- Construction of pumping plants and a bi-directional pipeline within MCB Camp Pendleton and the City of Fallbrook, and
- An open space management zone (OSMZ), within the City of Fallbrook.

The two action alternatives and the No-Action Alternative are described in further detail in Chapter 2.

The USMC, U.S. Department of the Interior, Bureau of Reclamation (Reclamation), and FPUD have prepared this EIS/EIR for the proposed SMR CUP in compliance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [USC] § 4321-4370d); as implemented by the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (Title 40 Code of Federal Regulations [CFR] §§ 1500-1508); U.S. Department of the Navy (DON) Procedures for Implementing NEPA (32 CFR § 775); Marine Corps Environmental Compliance and Protection Manual (Marine Corps Order [MCO] P5090.2A, change 2, dated May 2009); California Environmental Quality Act (CEQA) (California Public Resources Code [PRC] 21000 *et seq.*); California State CEQA Guidelines (14 California Code of Regulations [CCR] § 15000 *et seq.*), as amended; and resource-specific regulatory guidelines presented in Chapter 4 of this document.

NEPA requires consideration of environmental concerns in the decision-making process for major federal actions. The CEQ regulations implement the "action forcing" provision of NEPA to ensure that federal agencies comply with the letter and spirit of the Act. MCO P5090.2A, change 3 (August 2013) provides specific guidance for the USMC in preparing environmental documentation for USMC actions subject to NEPA. Secretary of the Navy Instruction (SECNAVINST) 5090.6A provides specific policies and responsibilities under NEPA to the DON and USMC. USMC and Reclamation are the designated lead agencies for review of this project under NEPA.

CEQA requires state, local, and other public agencies subject to the jurisdiction of California to evaluate the environmental implications of their actions. It aims to prevent environmental effects by requiring agencies to avoid or reduce, when feasible, the significant environmental impacts of their decisions. CEQA guidelines provide detailed procedures that state and local agencies must follow to implement the law. The Proposed Action qualifies as a "project" under CEQA (Section 21065). FPUD is the designated lead agency for review of this project under CEQA.

NEPA (40 CFR § 1506.2) requires that federal agencies must "cooperate with state and local agencies to the fullest extent possible to reduce duplication between NEPA and state and local requirements." Therefore, this joint EIS/EIR will be utilized by state and local agencies to meet both NEPA and CEQA requirements.

As defined in the CEQ regulations and CEQA guidelines, an EIS/EIR is a public document that identifies environmental impacts of a Proposed Action or project for which both a public and federal agency is responsible. The EIS/EIR provides full and objective discussion of potential environmental impacts and mitigation measures. An EIS/EIR ensures that the programs and actions of both the federal government and California public agency meet the policies and goals set forth in NEPA and CEQA, respectively.

The Draft EIS/EIR will be filed with the U.S. Environmental Protection Agency (USEPA) and the California State Clearinghouse and distributed to appropriate federal, state, local, and private agencies; organizations; and individuals for review and comment.

1.2 CONTENT AND SCOPE OF THE EIS/EIR

The scope of issues analyzed in this EIS/EIR was determined through initial Reclamation, MCB Camp Pendleton, and FPUD evaluation and analysis of the action alternatives; written and verbal comments received during the public scoping process; written and verbal comments received during the 2010 public review period for the California State Water Resources Control Board (SWRCB) water rights permit petitions; and requirements specified in NEPA and CEQA. This EIS/EIR focuses on those environmental resources with a reasonable potential for environmental impacts. The Proposed Action has the potential to impact the following elements of the natural and human environment: geological resources, water resources, biological resources, cultural resources, air quality, hazardous materials and wastes, and utilities.

Conversely, resource areas for which potential impacts are considered to be negligible have been considered but eliminated from a detailed analysis/evaluation in this EIS/EIR (40 CFR 1501.7[a][3]). Those resource areas that have been eliminated from a detailed analysis/evaluation include: traffic, noise, socioeconomics and environmental justice, land use and recreation, and visual resources. A list of these resources as well as the rationale for eliminating them from full analysis is presented at the beginning of Chapter 3 in this EIS/EIR.

This EIS/EIR also evaluates direct, indirect, and cumulative impacts that may result from the action alternatives and the No-Action Alternative.

1.2.1 Similarities and Differences between NEPA and CEQA

NEPA and CEQA sometimes use different terms for similar concepts. For example, NEPA uses the term "Proposed Action" while CEQA uses the term "proposed project." For readability, this EIS/EIR uses the term "Proposed Action" except when the context requires CEQA terminology.

The characterization of individual impacts in an EIR as being either "significant" or "less than significant" is very important under CEQA. CEQA requires that an EIR propose mitigation measures for each significant effect of the project subject to the approval of an agency governed by California law, even where the mitigation measure cannot be adopted by the "lead agency," but can only be imposed by another responsible agency (i.e., California Department of Fish and Wildlife [CDFW], San Diego Regional Water Quality Control Board [RWQCB]).

1.2.2 Role of NEPA and CEQA

As discussed in Section 1.1, this document is a joint EIS/EIR. It has been prepared because the federal lead agencies (USMC and Reclamation) determined that an EIS is required under NEPA. Additionally, FPUD, as the CEQA lead agency, determined that the potential impacts of the project on non-federal lands were sufficient to trigger an EIR under CEQA. This EIS/EIR has been prepared to meet requirements under both NEPA and CEQA. MCB Camp Pendleton and Naval Weapons Station Seal Beach, Detachment Fallbrook (DET Fallbrook) are only required to comply with NEPA, and FPUD is required to comply with CEQA.

1.2.3 Use of the EIS/EIR

The Draft EIS/EIR is submitted to responsible public resource agencies, permitting agencies, trustee agencies, the State Clearinghouse, and interested stakeholders. Written and oral comments received in response to the Draft EIS/EIR will be addressed in the Final EIS/EIR. Once the environmental review process has been completed, the Final EIS/EIR will be utilized by USMC in preparing a Record of Decision (ROD) for the project. The ROD will document which alternative is selected for implementation and the reasons for its selection. If the Proposed Action is implemented, USMC and FPUD will certify the EIS/EIR and approve development of the proposed project facilities. The CEQA lead agency will issue a Notice of Determination (NOD) to document FPUD's parallel decision to USMC's ROD.

The Final EIS/EIR may also be utilized by federal, state, regional, and local agencies in their decision-making process in compliance with NEPA and CEQA.

1.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The purpose of the Proposed Action is to efficiently meet the long-term water demands of MCB Camp Pendleton and FPUD, reduce FPUD's dependence on imported water, maintain watershed resources, and improve water supply reliability by managing the yield of the Lower SMR Basin. The Proposed Action would also provide a physical solution to long-standing litigation. The Proposed Action is needed to upgrade/develop infrastructure and cooperative water management processes that satisfy MCB Camp Pendleton's and FPUD's respective current and future water requirements. Specifically, the Proposed Action would achieve the following needs of each EIS/EIR lead agency:

- Satisfy MCB Camp Pendleton's and FPUD's future water demands while reducing FPUD's dependence on costly imported water.
- Connect MCB Camp Pendleton to an off-Base water supply (i.e., imported water from the San Diego County Water Authority [SDCWA] Aqueduct via existing FPUD facilities) to provide a supplemental water source during drought or emergency situations.

- Upgrade MCB Camp Pendleton's existing groundwater diversion and recovery facilities, and maximize subsurface water storage and water rights to meet future water supply demands.
- Provide FPUD with a local water source, reduce its dependency on imported water supplies, and thereby reduce costs. As a publicly held water district, FPUD has an obligation to provide adequate water quantities of acceptable quality to customers within its service area at the lowest possible cost. In addition to providing additional water supply, development of an adaptive groundwater management program would allow FPUD significant flexibility in meeting water demands and controlling water costs.

The Proposed Action would also resolve the water rights issues between MCB Camp Pendleton and FPUD and satisfy the Court's order to find a "physical solution" to the ongoing dispute in *United States v. Fallbrook Public Utility District, et al.* MCB Camp Pendleton and FPUD entered into a Memorandum of Understanding (MOU) in 2001 agreeing to jointly participate in the project in good faith and with full cooperation. Reclamation, MCB Camp Pendleton, and FPUD signed a Conceptual Points of Agreement in January 2011.

1.4 PROJECT BACKGROUND

1.4.1 Legal History of Santa Margarita River Conjunctive Use Project

In the late 1880s, developers of land in the Fallbrook area of northern San Diego County formed Fallbrook Water and Power Company, seeking to construct a dam on the Lower SMR as the source of both water and power. Rancho Santa Margarita, MCB Camp Pendleton's predecessor and the original owner of MCB Camp Pendleton and DET Fallbrook lands, filed suit to stop the dam construction, giving rise to more than 100 years of water rights litigation on the river.

Due to litigation and lack of finances, the Fallbrook Water and Power Company dissolved and the original dam project was abandoned. In 1891, attempts were made to form an entity known as Fallbrook Irrigation District. However, the Supreme Court ruled that the statute under which the irrigation district had been formed, the Wright Act, was unconstitutional, halting those water development plans. In 1922, FPUD was formed to provide water to the 500-acre (200-hectare) Fallbrook township. Then, in 1925, Fallbrook Irrigation District was reinstituted. After years of studies, FPUD pursued investigations to construct a dam in the lower basin near the confluence of the SMR and Sandia Creek. In the meantime, Rancho Santa Margarita had started a long-running battle with Vail Ranch, the main upstream water user, over rights to the river's waters.

In 1928, Fallbrook Irrigation District filed suit to condemn (take possession of) unused riparian rights on the river, notwithstanding the ongoing dispute between Rancho Santa Margarita and Vail Ranch. In 1930, the year of the initial judgment in the Vail litigation, Fallbrook Irrigation District was issued a permit to construct a dam and appropriate 35,000 acre-feet (af) for SMR storage and 15,000 acre-feet per year (af/y) for annual use. However, because of financial problems, Fallbrook Irrigation District could not build the dam and, in 1937, the irrigation district was taken over by FPUD.

In 1940, Rancho Santa Margarita and Vail Ranch settled their lawsuit by way of a stipulated judgment. Under the 1940 settlement, one-third of the natural flow of the river was allocated to Vail Ranch and two-thirds to Rancho Santa Margarita. FPUD was not a party to the suit. Later in 1942, the DON condemned part of Rancho Santa Margarita as the site for MCB Camp Pendleton.

Following further investigations by the U.S. Army Corps of Engineers (USACE), MCB Camp Pendleton and FPUD applied for water rights permits to divert and store water from the SMR. In 1946 and 1947, FPUD was granted three 10,000-af permits for the diversion and storage of water from the SMR at the

Fallbrook Reservoir site. In 1948, DON filed for a permit to build De Luz Dam at MCB Camp Pendleton. Then in 1949, the two parties agreed on a plan to build a multi-purpose dam at the De Luz site to serve them both.

In 1951, the United States (on behalf of MCB Camp Pendleton) abandoned its state water rights application and brought suit against FPUD and about 3,600 other upstream users to claim MCB Camp Pendleton's right to the flow of the SMR (*United States v. Fallbrook Public Utility District, et al*; Case No 1247-SD-C). In September 1963, following the Final Judgment and Decree in the case, the United States filed Application 21471 for diversion and storage of SMR surface flow. In 1973, the SWRCB separated this application into two parts, 21471A and 21471B. The SWRCB ordered a license be issued for Application 21471A to allow diversion of up to 4,000 af/y into percolation ponds for storage in the MCB Camp Pendleton's Lower Santa Margarita underground basins and later use for military, domestic, municipal, and agricultural purposes. Application 21471B was for aboveground storage of up to 165,000 af/y in De Luz Dam for such uses as well as for incidental flood control and recreational purposes. The SWRCB ultimately issued a license for Application 21471A (percolation pond license) and a permit for Application 21471B for the facility that, 5 years later, was to become part of the MCB Camp Pendleton-FPUD "Two-Dam Project."

Following years of decisions and appeals, the U.S. District Court issued a Modified Final Judgment and Decree in 1966. In 1968, MCB Camp Pendleton and FPUD entered into a MOU for the purpose of settling the SMR water rights claims that had been the subject of litigation between them since 1951. This 1968 MOU called for the construction of two aboveground storage facilities that became known as the "Two-Dam Project." In his 1968 Order Approving Memorandum of Understanding and Agreement and Amending Modified Final Judgment and Decree, Federal District Court Judge Carter emphasized "that the water rights of the stream system cannot be developed fully in the absence of a "physical solution" which makes equitable provisions as between [MCB Camp Pendleton and FPUD] for the manner in which each of them shall make use of the waters of the stream system to which it is entitled under its water rights . . ." In 1974, Fallbrook and MCB Camp Pendleton assigned their water rights permits to Reclamation (Permits 15000, 8511, and 11357) in anticipation of construction of the Two-Dam Project.

Because of environmental and funding concerns as well as other factors associated with the Two Dam Project, in the late 1980s the parties decided to pursue an alternative, environmentally preferable "physical solution." In 1990, FPUD and MCB Camp Pendleton entered into an agreement entitled the "Conjunctive Use Agreement," to cooperatively manage the aquifer and river on MCB Camp Pendleton, giving birth to the currently used name for the long sought "physical solution" to the water supply needs of MCB Camp Pendleton and FPUD. This agreement was contingent upon the use of reclaimed water under the 1990 Four Party Agreement between MCB Camp Pendleton, FPUD, Rancho California Water District (RCWD) and Eastern Municipal Water District (EMWD). Under the Four Party Agreement, MCB Camp Pendleton and FPUD agreed to support a Basin Plan Amendment that relaxed the water quality standards in SMR watershed to facilitate the use and discharge of excess treated wastewater by EMWD and RCWD. In return, EMWD and RCWD agreed to augment the flows of the SMR with the discharge of the highly treated wastewater and make a significant capital investment in a Reverse Osmosis (RO) plant at MCB Camp Pendleton in order to mitigate the degradation of MCB Camp Pendleton's groundwater supply resulting from upstream stormwater pollution and agricultural return flows. For a variety of reasons, the Four Party Agreement never materialized and the failed Four Party Agreement was the subject of the 2008 litigation in the Central District of California *United States v. Eastern, et al.* FPUD joined the United States as a co-plaintiff in this litigation.

Also occurring in the early 1990s, RCWD petitioned the SWRCB to change its Permit 7032 in a manner that would allow it to increase its pumping in the Upper Basin and change the place it could use that water. MCB Camp Pendleton submitted a protest to the SWRCB on RCWD's Permit 7032 change petition. MCB Camp Pendleton's protest of RCWD's change petition led to a negotiated settlement in 2002: Cooperative Water Resources Management Agreement (CWRMA) between RCWD and MCB Camp Pendleton. Under CWRMA, RCWD guarantees certain minimum flows in the SMR by directly discharging water in the river upstream from MCB Camp Pendleton. Additionally, CWRMA requires that RCWD manage its groundwater pumping in an area upstream of the Gorge on a safe yield basis and mandates a cooperative monitoring program to assess the impacts of CWRMA on the water supply, water quality, and riparian habitat within MCB Camp Pendleton. In 2009, the SWRCB approved RCWD's petition to change Permit 7032 and included the CWRMA flow requirements as a condition to RCWD's Permit 7032.

MCB Camp Pendleton and FPUD have continued and focused their efforts to find an alternative "physical solution." MCB Camp Pendleton and FPUD entered into an MOU in 2001 agreeing to jointly pursue a project with full cooperation. In fiscal year (FY) 2004, an appropriation was made to Reclamation to study the feasibility of SMR CUP. On 13 September 2004, Reclamation, MCB Camp Pendleton, and FPUD signed an MOU agreeing to jointly participate in the design and possible construction/operation of a "physical solution" to the *United States v. Fallbrook Public Utility District, et al.* lawsuit. Reclamation is responsible for completing the feasibility study; the USMC is lead agency for completing the EIS; and FPUD is lead agency for completion of the EIR. On 1 November 2004, a Notice of Intent (NOI) to prepare an EIS was published in the *Federal Register*. On 14 December 2004, a Notice of Preparation (NOP) was sent to the California State Clearinghouse. On 30 March 2009, President Obama signed Public Law (P.L.) 111-11 (HR 146), the *Omnibus Public Land Management Act of 2009*. Title IX, Section 9108 of this act contains the construction authority for SMR CUP. This authority expires in April 2019. In January 2011, Reclamation, USMC, and FPUD signed a Conceptual Points of Agreement that outlines the framework for the division and distribution of water resources and the construction and operation of a joint water project between MCB Camp Pendleton and FPUD.

1.4.2 Context and Legal and Institutional Framework

1.4.2.1 Context

This subsection discusses the context within which the Proposed Action has been planned and its alternatives developed.

MCB Camp Pendleton is being progressively pressured between the urbanization occurring all around it and the increasing habitat and species stewardship requirements resulting from such urban growth. There is a direct correlation between urban growth and the increase in endangered species populating the base. This pinch between the related phenomena of urbanization and endangered species is most strongly exemplified in the resultant management pressures attending the Base's substantial native water supply. The pressure from surrounding urbanization is particularly relevant to the SMR, whose tributaries extend far off the base's property into the highly developing communities of Temecula and Murrieta and which, as noted in Section 1.3, above, satisfies more than 70% of the base's military, municipal, agricultural, domestic, and industrial water demand.

Upstream of MCB Camp Pendleton, increased development in the SMR watershed causes more urban runoff, adversely affecting the quality of the Base's water supply. Downstream from these urban centers, on the Base itself, the USMC's commitments under the Endangered Species Act (ESA) may necessitate an allocation of surface water (stream flow) to the conservation of riparian habitats and associated species. Thus, the Base's own military, municipal, and domestic water demand is under dual pressures from upstream urban development and downstream ecosystem needs.

FPUD currently relies on the purchase of imported water from Metropolitan Water District of Southern California (MWD) and SDCWA for 100% of its potable water supply (FPUD 2010). FPUD's *2010 Urban Water Management Plan* identifies two projects to utilize local sources of water and reduce dependence on imported water: the SMR CUP being analyzed in this EIS/EIR and a cooperative agreement with MWD to store rainfall in Lake Skinner in Temecula. The Lake Skinner project is expected to provide an average of 300 af/y (FPUD 2010).

1.4.2.2 Legal and Institutional Framework

The Proposed Action would operate within a legal and institutional framework that has been shaped by legislative, judicial, and federal and state regulatory action.

<u>Congressional Authorization</u>

The *Omnibus Public Land Management Act of 2009* was signed 30 March 2009 (P.L. 111-11). It includes a section that authorizes the Secretary of the Interior, after certain conditions are met, to construct the facilities needed to extract additional water from the SMR through a joint project. SMR CUP legislation is an outgrowth of the "physical solution" recommended by a Federal Judge in 1968 in order to facilitate the settlement of the longstanding water rights dispute outlined above in Section 1.4.1. SMR CUP legislation contains certain conditions that must be satisfied before Reclamation is authorized to construct the Project.

<u>Federal Court</u>

The Proposed Action constitutes the "physical solution" that, if implemented, would conclude more than 60 years of negotiation and litigation between MCB Camp Pendleton and FPUD over the right to use water from the SMR. The litigation commenced in 1951 with a federal lawsuit *United States v. Fallbrook Public Utility District, et al.* (1247-SD-C) filed by the United States on behalf of MCB Camp Pendleton against FPUD and all water users within the SMR to challenge the intended exercise of certain FPUD water rights on the SMR. The 1951 litigation is still open today with regular Court status calls, quarterly Watershed Steering Committee meetings, and an Annual Report filed by the court-appointed SMR Watermaster. The Proposed Action would settle the longstanding water rights dispute between MCB Camp Pendleton and FPUD. A detailed settlement agreement would be filed with the Federal Court for approval. A Court approved settlement agreement is a condition that must be satisfied before Reclamation is authorized to construct the Project.

<u>Secretariat Decisions</u>

P.L. 111-11 identifies Secretariat level decisions impacting the Proposed Action. Namely, the Secretary of Interior must determine that the Proposed Action has completed the economic, environmental, and engineering feasibility studies as a condition that must be satisfied before Reclamation is authorized to construct the Project. Additionally, pursuant to P.L. 111-11, the Secretary of the Navy is authorized to make decisions concerning the DON's share of Project costs, control of Project facilities located aboard MCB Camp Pendleton, and sale of DON's excess water produced by the Project.

<u>Federal and State Regulatory Agencies</u>

Numerous federal and state laws have been enacted to establish requirements for adequate planning, implementation, and management of water resources. Regulations have been developed to augment and clarify the laws and provide details not included in the laws. The Proposed Action must achieve compliance with applicable rules and regulations promulgated by the USEPA, U.S. Fish and Wildlife Service (USFWS), USACE, CDFW, SWRCB, and California Department of Public Health (DPH). Additionally, several of these Agencies have some level of discretionary project approval authority over the Proposed Action, including San Diego RWQCB, SWRCB, and USACE. Lastly, consultations with USFWS, National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries), CDFW, and the State Historic Preservation Office (SHPO) are required and must be completed per Navy and USMC policy before the Final EIS can be approved. Supporting documentation is being prepared and submitted to these agencies separately from this EIS. The federal and state regulatory requirements are briefly outlined in Section 1.7. While the Proposed Action must comply with all applicable state and federal regulatory requirements and approvals, the SWRCB must grant the necessary water right permits to implement the Proposed Action before Reclamation is authorized to construct the Project.

Water Rights Permitting

Water right approvals are needed from the State of California to implement the Proposed Action (i.e., either Alternative 1 or 2) and are being requested concurrent with the NEPA and CEQA requirements covered in this EIS/EIR. The relevant agency is the SWRCB, which has the authority to administer previously issued water rights and to grant new water rights.

Reclamation, the DON, and FPUD hold various water rights to waters of the SMR Basin (Tables 1.4-1 and 1.4-2). The project proponents intend to exercise the majority of the below listed water rights for the benefit of their constituents by means of the Proposed Action. The water yield resulting from SMR CUP would be shared between MCB Camp Pendleton and FPUD. Details on how the project water would be treated and allocated between MCB Camp Pendleton and FPUD are provided for Alternatives 1 and 2 in Sections 2.3.1 and 2.3.2, respectively.

Table 1.4-1. Reclamation, DON, and FPUD SMR Basin Water Rights Permits and Licenses

Permit / License Number	Status	Owner	Priority Date	Storage Site	Annual Amount (af)	Storage Period
8511	Permit	Reclamation	10/11/46	Fallbrook Reservoir	10,000	01/01-12/31
11356	Permit	FPUD	11/28/47	Lake Skinner	10,000	11/01-06/01
11357	Permit	Reclamation	11/28/47	Fallbrook Reservoir	10,000	11/01-06/01
15000	Permit	Reclamation	09/23/63	De Luz Reservoir	165,000	01/01-12/31
10494	License	DON	09/23/63	Underground	4,000	10/01-06/30

Notes: af = acre-feet; FPUD = Fallbrook Public Utility District; DON = U.S. Department of the Navy.

Table 1.4-2. Other MCB Camp Pendleton SMR Basin Water Rights

Water Right	Status	Owner	Annual Amount	Diversion Period
Riparian	Active	MCB Camp Pendleton	Not Applicable	Year-round
Pre-1914 Appropriative Right	Active	MCB Camp Pendleton	1,200 af/y	Year-round

Note: MCB = Marine Corps Base.

In addition to Federal Court Case 1247, there is a 1940 state court stipulated judgment settling a dispute between MCB Camp Pendleton's predecessors and certain upstream water right holders (*Rancho Santa Margarita v Vail*, San Diego Superior Court No. 42850) which addresses MCB Camp Pendleton's riparian water rights. CWRMA is one of the tools used to manage the division of water addressed under the 1940 stipulated judgment. CWMRA has been incorporated into Case 1247, and is subject to the continuing jurisdiction of the Federal Court in that case.

As discussed above in Section 1.4.1, the DON was issued a permit through Application 21471 for the Two-Dam Project and the existing groundwater recharge operations with a priority date in 1963. In 1973 the SWRCB separated the two portions of the permit, issued a license to the DON for the groundwater portion (License 10494), and required the DON to assign the surface water portion (Application 21471B) to Reclamation (Permit 15000). Similarly, FPUD's three 10,000-af permits (Permits 8511, 11356, and 11357) were to be assigned to Reclamation for the storage of water in Fallbrook Reservoir (the second dam of the Two-Dam proposal in the Santa Margarita Project). The permit assignments to Reclamation were in anticipation that the water facilities would be constructed by Reclamation for the benefit of the DON and FPUD. These permits (15000, 8511, 11356, and 11357) were assigned to Reclamation by DON and FPUD under SWRCB Order WR 73-50.

Since that time, Reclamation assigned Permit 11356 back to FPUD for its Lake Skinner project. FPUD has worked to perfect Permit 11356 by re-locating the point of diversion to Lake Skinner in Riverside County. Lake Skinner and Permit 11356 are not part of SMR CUP. The three remaining water rights permits held by Reclamation provide the legal basis for appropriating additional water for a joint conjunctive use project. SMR CUP is the environmentally preferable approach to the Two-Dam Project.

Implementation of Alternative 1 or 2 would require SWRCB approval to change three of the existing permits (15000, 8511, and 11357) to conform the water rights to the project, and to extend the time within which water can be put to beneficial use. The required petitions for change and extension rights have been submitted to the SWRCB (Petitions) and approval is pending on CEQA requirements being met through completion of this EIS/EIR. Among other things, the petitions propose to move the points of diversion downstream to the point of diversion on MCB Camp Pendleton, where the existing sheet pile weir would be replaced by an improved inflatable diversion facility under the project. Direct diversion and diversion to storage would be accommodated through proposed SMR CUP facilities. Implementation of this project also requires a petition to redistribute storage from the unconstructed aboveground reservoirs previously contemplated to the underground storage basin on MCB Camp Pendleton. The required underground storage supplement has also been filed with the SWRCB. A water availability analysis (Reclamation *et al.* 2012) has been conducted and is incorporated as part of this EIS/EIR to support changes to and extension of the existing permits, and any new water right permits that may be required. This EIS/EIR includes an evaluation of the impacts of the action alternatives on water, biological, and other resources, and identifies mitigation measures for environmental impacts. Impact analysis specific to these water and biological resources is provided in Sections 4.2 and 4.3, respectively.

Additional Information Regarding the Water Right Filings

Extensions of Time. The petitions for extension of time apply to Permits 8511, 11357, and 15000. They are necessary to allow project development, diversion, and use of water under these permits in the future. These petitions were timely filed in advance of the 2008 expiration date, and request extension for a 50-year period. Recurrence interval analysis of the 85-year hydrologic period of record available for the SMR watershed shows that 50 years is required to represent the extreme variability of the hydrologic conditions that occur in the watershed, and thus provide a reasonable opportunity to divert the full amount of water proposed to be diverted under SMR CUP.

Petitions for Change and Redistribution of Storage. Reclamation has filed Petitions for Change and Petitions for Redistribution of Storage for Permits 8511, 11357, and 15000 to conform these entitlements to the operations proposed under SMR CUP. Fundamentally, these petitions propose to replace the originally permitted construction of two large on-stream storage reservoirs, and replace that approach with the environmentally preferable conjunctive use approach using the existing groundwater aquifers on MCB Camp Pendleton as storage. Accordingly, the petitions propose authorization for direct diversion, diversion to (and extraction from) underground storage, and diversion to off-stream storage. The petitions also propose to unify the places and purposes of use among the three permits to facilitate operation of SMR CUP for the benefit of MCB Camp Pendleton and FPUD, as well as allow for future exchanges of water with the SDCWA.

Change in Points of Diversion, Rediversion, and Storage. The petitions for Permits 8511 and 11357 propose to move the point of diversion from the site of the proposed Fallbrook Dam to the location of the existing SMR diversion structure (i.e., the sheet pile weir), which is presently used by MCB Camp Pendleton to make diversions of water under License 10494 (Application 21471), riparian rights, and the pre-1914 appropriative water right. The petition for Permit 15000 proposes to move the point of diversion from the site of the proposed De Luz Dam to the existing SMR diversion structure. All three petitions propose the following:

- Add the existing Lake O'Neill as a point of rediversion and storage for water diverted at diversion structure;
- Identify the upstream and downstream limits of groundwater sub-basins to be used for underground storage of water diverted and infiltrated from the SMR;
- Add four shallow-aquifer wells (i.e., gallery wells) as points of direct diversion; and
- Add 25 existing and proposed new production wells as points of diversion (PODs), rediversion, and withdrawal from underground storage.

All of the change petitions seek to divert surface flows from the SMR at the diversion structure for diversion to and storage in the SMR groundwater basin (comprised of three sub-basins discussed in detail in Sections 1.5.1 and 3.2.3.2) and diversion to off-stream storage in MCB Camp Pendleton's existing Lake O'Neill. Water diverted from the river would be percolated to the groundwater basin for storage by way of existing percolation ponds located on MCB Camp Pendleton. Such percolation would enhance naturally occurring infiltration from the river channel to the groundwater basin. Diversions from the river to off-stream storage at Lake O'Neill are currently allowed under MCB Camp Pendleton's pre-1914 water right and are used for military training, recreation, and subsequent groundwater recharge and use. These petitions seek to refill Lake O'Neill subsequent to withdrawal of pre-1914 water from Lake O'Neill for groundwater recharge. Water placed into underground storage would be withdrawn by any of 25 existing and proposed new production wells situated within the SMR groundwater basin.

Changes in Water Diversion and Use

The Permittee intends to change the method of diversion from diversion to surface storage in two earlier proposed on-stream reservoirs to direct diversion, diversion to underground storage, and diversion to off-stream storage.

Present Operations. MCB Camp Pendleton presently diverts water at an existing sheet pile weir structure on the SMR to underground and surface storage pursuant to License 10494 and a pre-1914 appropriative water right. License 10494, which is not part of the pending petitions at the SWRCB, authorizes the diversion of up to 4,000 af to underground storage by way of percolation ponds and natural infiltration in the river during the season of 1 October to 30 June for subsequent extraction for military, domestic, municipal, and irrigation purposes. MCB Camp Pendleton also diverts water from the SMR to surface storage in the existing Lake O'Neill pursuant to a pre-1914 appropriative water right. Under the pre-1914 right, MCB Camp Pendleton is entitled to divert up to 1,200 af annually (plus carriage losses) at a diversion rate of 20 cubic feet per second (cfs). The allowed uses are military training, recreation, and groundwater recharge. Accordingly, the two storage rights exercised by MCB Camp Pendleton entitle it to divert up to 5,200 af/y, plus carriage losses under the pre-1914 right, to surface and underground storage. MCB Camp Pendleton also directly diverts water under riparian rights for various beneficial uses within MCB Camp Pendleton, including maintenance of a salt-water intrusion barrier in the Lower Ysidora Sub-basin.

MCB Camp Pendleton releases water stored in Lake O'Neill at controlled rates for percolation to the groundwater basin for later recapture and use. Water is extracted from the underground basin by existing wells. During the period of 1979 to 2011, maximum groundwater well production from the Lower SMR Basin was 7,200 af/y for potable use and 1,500 af/y for irrigation use.

Proposed Operations. For the proposed SMR CUP, MCB Camp Pendleton's existing vested rights would be exercised in conjunction with the diversions and uses described in the petitions.

Rates of Diversion and Extraction – The capacity of the diversion structure for diversions to O'Neill Ditch would be increased from 60 cfs to 200 cfs. Alternative 1 would rely entirely on existing and proposed groundwater production wells. The existing and proposed groundwater production wells would each have a maximum capacity of up to 2.5 cfs each, with the total pumping rate not to exceed 28 cfs. Alternative 2 would combine surface water gallery wells and groundwater production wells. The proposed gallery wells would each have a maximum capacity of 4.5 cfs each, with the total directly diverted from these wells not to exceed 18 cfs. Total groundwater well pumping rates would not exceed 28 cfs. The maximum combined rate of diversion and extraction from the four gallery wells and groundwater production wells would not exceed 44 cfs.

Storage Amounts – This section describes the storage amounts proposed under Alternative 1, because the maximum storage would occur if this alternative is implemented. Based on SMR CUP modeling studies, the maximum annual amounts diverted from the SMR to storage are estimated to be up to 22,100 af/y to underground storage (inclusive of amounts diverted to underground storage under MCB Camp Pendleton's existing rights under License 10494), and 1,800 af/y to Lake O'Neill for subsequent release and percolation to underground storage, for a total of 23,900 af/y of surface water diverted to storage.

Including induced infiltration of 2,000 af/y of natural flow from the river channel into the groundwater basins, the total diversion to underground storage in the maximum year would be up to 25,300 af/y. The maximum diversion to storage assumes no losses from the percolation ponds and approximately 600 af/y losses from Lake O'Neill. Hence, the net maximum diversion to groundwater storage from Lake O'Neill would be 1,200 af/y.

The total amount of water diverted to storage under SMR CUP would vary depending upon the result from the environmental analysis of the two action alternatives. The estimated diversion to storage described in this section encompasses all of the facilities that may be included under the action alternatives.

Production (Direct Diversion, Extractions from Underground Storage, and Beneficial Use) – The maximum annual groundwater production, defined for purposes of the subject petitions as the combined direct diversions (i.e., from gallery wells) and extractions from underground storage for beneficial uses, is estimated to be 23,770 af, of which a maximum of 7,000 af would be from the gallery wells (assuming implementation of Alternative 2). The estimated combined direct diversion and extraction from underground storage for the Proposed Action is based on constructing all facilities identified in both action alternatives. This is a conservative approach. Completion of the environmental review of the action alternatives would likely result in lower volumes, and depend on the facilities ultimately constructed.

Maximum Potential Amount Taken from the Source – The maximum potential combined amount taken from the source in any one year under all of the subject vested rights and permits would not exceed 46,000 af. Water taken from the SMR would occur as both storage (i.e., diversion to surface storage in Lake O'Neill, diversion to underground storage via the percolation ponds, and induced infiltration to underground storage) and production (i.e., direct diversion via the gallery wells and groundwater extraction via the production wells). The total quantities of storage and production would be dependent upon the facilities that are constructed. Facilities based on an alternative that includes gallery wells (i.e., Alternative 2) would reduce the amount of water diverted to underground storage and increase the amount of surface water directly diverted from the source for beneficial use. Facilities based on an alternative that includes groundwater wells only (i.e., Alternative 1) would rely more on diversion to underground storage and subsequent groundwater extraction from underground storage than direct diversion from the source for beneficial use. All project alternatives would rely on directly diverting water from the SMR for surface and underground storage for subsequent rediversion and beneficial use. The estimated maximum potential combined amount taken from the source is based on constructing all facilities identified in both action alternatives. Again, this is a conservative approach; completion of the environmental review of the action alternatives would likely result in lower volumes of water, depending on the facilities ultimately constructed.

Changes in Land Use

The permitted place of use under Permits 8511 and 11357 is described as 8,192 acres (3,315 hectares) within the boundary of FPUD. The place of use under Permit 15000 is described as being within the boundary of the "Camp Pendleton Naval Enclave" within which irrigation of up to 5,600 acres (2,266 hectares) is allowed. Under these petitions, the place of use is more broadly defined as being within the boundaries of the FPUD and Camp Pendleton Naval Enclave. The SMR CUP also proposes to deliver water diverted from the SMR to the SDCWA, which encompasses approximately the western half of San Diego County (including the service area of the FPUD and MCB Camp Pendleton). Accordingly, these petitions also seek to add lands within the boundary of the SDCWA to the permitted places of use.

Changes in Operations and Purposes of Use

Operationally, these petitions seek to change the presently allowed collection of water to surface storage in on-stream reservoirs to the diversion of water, either directly or to underground/off-stream storage, at defined rates. The SMR CUP project proposes to manage the underground basin conjunctively for the benefit of MCB Camp Pendleton and FPUD. The effects on surface water and groundwater hydrology are evaluated in this EIS/EIR.

The various purposes of use presently allowed by the respective permits are being made uniform among all three permits to facilitate commingling of water commensurate with a joint conjunctive use project. Groundwater recharge is being added to the purpose of use under each permit as a necessary element in the conjunctive operation. Recreation and Fish and Wildlife Enhancement are being added to all of the permits to cover activities associated with Lake O'Neill.

1.5 PROJECT LOCATION

The project study area is located in the northwest corner of San Diego County, on the southwest coast of California (Figure 1-1). The study area includes the geographic boundaries of MCB Camp Pendleton, DET Fallbrook, and the FPUD service area. Action alternatives address the construction and use of facilities primarily within the boundaries of the SMR watershed (small portions of the bi-directional pipeline are located in the neighboring San Luis Rey River watershed). The following sections generally describe the SMR watershed, MCB Camp Pendleton, DET Fallbrook, and FPUD. Proposed project facilities and their locations are described in detail in Chapter 2.

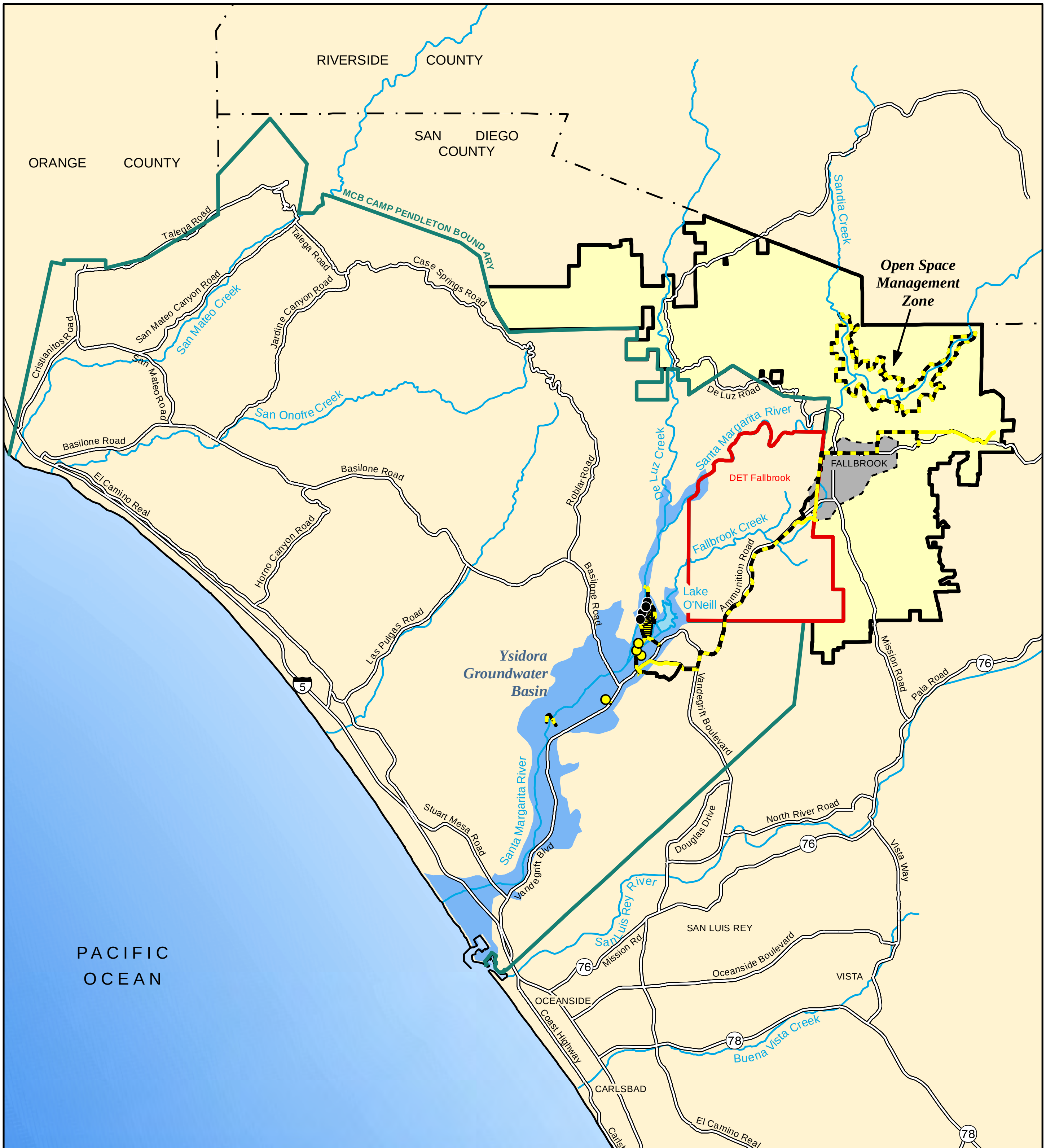
1.5.1 Santa Margarita River Watershed

The SMR flows southwesterly to the Pacific Ocean, draining a portion of the Peninsular Range in southern California. The entire watershed encompasses 744 square miles (mi^2) (1,927 square kilometers [km^2]) within San Diego and Riverside counties, and is divided by a coastal range of mountains. The upper portion of the watershed, located in Riverside County, is drained by Temecula and Murrieta creeks. Located below the confluence of Temecula and Murrieta creeks, the SMR flows 29 miles (mi) (47 kilometers [km]) southwesterly to the Pacific Ocean and drains the lower portion of the watershed. Major tributaries to the lower portion of the SMR are De Luz, Sandia, Rainbow, and Fallbrook creeks. The SMR supports sensitive riparian and wetland habitats that depend on both surface waters and groundwater. Approximately 10% of the SMR watershed includes lands owned by MCB Camp Pendleton and DET Fallbrook and approximately 4% of the watershed includes lands within the FPUD service area.

Groundwater is found in the alluvial basin located downstream from the confluence of the SMR and De Luz Creek and, to a lesser extent, in the shallow alluvium upstream of that confluence. The alluvial basin located downstream from the confluence of the SMR and De Luz Creek is further divided into three separate sub-basins: the Upper Ysidora, Chappo, and Lower Ysidora sub-basins. The Upper Ysidora Sub-basin is the farthest upstream of the three sub-basins. The Chappo Sub-basin, located down-gradient from the Upper Ysidora Sub-basin and the Lower Ysidora is the farthest downstream sub-basin. The three sub-basins range from less than 0.5 mi (0.8 km) wide (Upper and Lower Ysidora sub-basins) to more than 2 mi (3 km) wide (Chappo Sub-basin). Section 3.2, *Water Resources*, provides additional information about the SMR watershed and its hydrology.

1.5.2 Marine Corps Base Camp Pendleton

MCB Camp Pendleton comprises approximately 125,000 acres (50,000 hectares). Los Angeles lies 75 mi (121 km) to the north and San Diego lies 38 mi (61 km) to the south (Figure 1-1). MCB Camp Pendleton is located within San Diego County and is bordered by the City of San Clemente and Orange County to the northwest, the city of Oceanside to the south, and the community of Fallbrook to the east. MCB Camp Pendleton's westernmost boundary fronts approximately 17 mi (27 km) of beaches and coastal bluffs. Principal access to MCB Camp Pendleton is via Interstate (I-) 5. I-15 and State Route (SR-) 76, respectively, located east and south of MCB Camp Pendleton, provide regional access. SR-76/Mission Road provides local access from Oceanside and Fallbrook.



LEGEND

- Alternative 1
- Alternative 2
- Alternatives 1 & 2
- MCB Camp Pendleton Boundary
- DET Fallbrook Boundary
- Community of Fallbrook
- FPUD Boundary

0 2 4 Miles
0 4 8 Kilometers

Figure 1-1
Regional Location Map of Santa Margarita River Conjunctive Use Project

The mission of MCB Camp Pendleton is to operate an amphibious training base that promotes the combat readiness of operating forces by providing facilities, services, and support response to the needs of Marines, sailors, and their families (MCB Camp Pendleton 2002). MCB Camp Pendleton has served as a training base since its establishment in 1942. MCB Camp Pendleton provides a broad range of training facilities that allows live-fire aviation training, artillery and infantry training, tracked vehicle operations and maintenance, reconnaissance training, and field medical treatment. In addition, the varied landscape (consisting of the Pacific Ocean, mountains, and flat ranges) provides excellent terrain for amphibious landing exercises, armor unit training, anti-tank maneuvers, aerial weapons delivery, airlifting of troops and supplies, and loading and unloading of ships and aircraft. The approximately 17 mi (27 km) of coastal land, the diverse inland range and maneuver areas provide the only west coast setting available to the military where the full spectrum of Marine combat doctrine can be exercised: amphibious landings and all elements of the Marine Air Ground Task Force, including aviation and combat arms support. MCB Camp Pendleton supports over 80,000 military and civilian personnel daily. The mild coastal California climate allows for year-round training, making MCB Camp Pendleton a valuable military installation.

1.5.3 Naval Weapons Station Seal Beach, Detachment Fallbrook

Commissioned in February 1942, then Naval Ammunition Depot Fallbrook was constructed next to the community of Fallbrook, just east of MCB Camp Pendleton, in the northwest corner of San Diego County. Unique among naval weapons facilities, DET Fallbrook is located 20 mi (32 km) inland. DET Fallbrook provides weapons storage, loading, maintenance, and support to ships and submarines of the U.S. Pacific Fleet. DET Fallbrook is also home to the West Coast Air-Launched Missile Production and Storage Facility. Here, air-launched missiles are inspected, maintained, and recertified.

1.5.4 Fallbrook Public Utility District

FPUD operates as a public agency under the Public Utility District Act of the State of California, and was established to provide potable water service to customers within its jurisdictional boundaries. Its services also include sewage treatment and production and distribution of recycled water. FPUD was originally formed to provide water to the community of Fallbrook and the delivered water was drawn from wells in the San Luis Rey Valley. FPUD was incorporated on 5 June 1922 and originally consisted of about 500 acres (200 hectares) within its service area. In 1937, the Fallbrook Irrigation District voted to dissolve and a portion of the former Irrigation District became a part of FPUD, increasing the size of FPUD’s service area to 5,000 acres (2,000 hectares). Significant expansions of the FPUD service area took place in 1950 when it annexed the last remaining portion of the Fallbrook Irrigation District and in 1958 when the areas lying north of Fallbrook on both sides of the SMR were annexed to FPUD. In 1990, the De Luz Heights Municipal Water District was annexed to FPUD, adding 11,789 acres (4,771 hectares) to FPUD’s service area. FPUD’s current service area is approximately 28,000 acres (11,300 hectares).

1.6 Existing Water Supply and Associated Facilities

The following sections describe MCB Camp Pendleton’s existing water use, surface water diversion, recharge facilities, groundwater pumping, and water treatment; and FPUD water use, facilities, and operations.

1.6.1 MCB Camp Pendleton Facilities

MCB Camp Pendleton satisfies more than 99% of its total water demand from four stream systems that run through the Base: San Mateo Creek, San Onofre Creek, Las Flores Creek, and the SMR. The remaining 1% (or 70 af/y) is supplied to the San Mateo Point Housing area, on the north side of MCB Camp Pendleton, by the South Coast Water District of Orange County (i.e., imported water). SMR CUP would focus on the Lower SMR Basin. The Lower Santa Margarita groundwater basin supports the service areas at the south end of MCB Camp Pendleton and supplies more than 70% of MCB Camp Pendleton's water. MCB Camp Pendleton does not receive imported water from the MWD or SDCWA to satisfy its demand in the southern part of the Base. Following floods in 1993, MCB Camp Pendleton received emergency access through Oceanside for a potable water supply line. A connection was built between the city and MCB Camp Pendleton in the vicinity of Morro Hill. This connection has not been used and is intended for emergency use only.

1.6.1.1 MCB Camp Pendleton South Water System

The majority of development within MCB Camp Pendleton is located in the southern portion of the Base and is served by the MCB Camp Pendleton South Water System (South System). The SMR and Las Flores Creek groundwater basins make up the South System while water pumped from San Onofre Creek and San Mateo Creek groundwater basins make up the MCB Camp Pendleton North Water System. An EIS was prepared for the construction of a pipeline that would connect the North and South Water Systems (P-1045) (MCB Camp Pendleton 2012a). Completion of the P-1045 pipeline will support SMR CUP by increasing water reliance and base-wide water independence by allowing for increased flexibility in managing the SMR Basin during periods of extended drought.

The South System includes 2 iron and manganese (IM) plants, 1 chlorination station, 15 production wells, 16 booster pump stations, 29 reservoirs, and 14 pressure zones. Of the 15 wells, 3 are located in the Las Flores Creek watershed and the remaining 12 wells are within the Lower SMR Basin. Nine of the 15 wells are utilized; 6 wells are out of service requiring repair, replacement, or investigation.

Key features of the existing facilities of the MCB Camp Pendleton South System are in listed in Table 1.6-1 and shown Figure 1-2.

Table 1.6-1. Key Features of MCB Camp Pendleton South Water System

Facility	Notes/Capacity
Production Wells and Manifold System	Approximately 20 cfs
IM-2 at Haybarn Canyon	Approximately 13.4 cfs
AWTP at Haybarn Canyon (P-113)	Approximately 11,600 af/y (to be completed in FY 2013)
Reservoir Ridge tank	4 million gallons, elevation 540 ft
South System distribution system	
SRTTP	3.75 million gallons per day

Notes: cfs = cubic feet per second; IM-2 = Iron and Manganese Plant 2; AWTP = Advanced Water Treatment Plant; af/y = acre-feet per year; FY = fiscal year; ft = foot/feet; SRTTP = Southern Region Tertiary Treatment Plant.

<u>Water Treatment Facilities</u>

Construction of the Iron and Manganese Plant 2 (IM-2) in Haybarn Canyon was completed in 2006 to comply with California Health and Safety Code 11655(a) and CCR, Title 22, 64449(s), 64449(b)(3), and 64449.5(d) by delivering water to customers that meets secondary standards for manganese, iron, color, and particulate matter. Naturally occurring manganese levels in parts of the South System can be approximately 100 times the secondary maximum contaminant level of 0.05 milligrams per liter (mg/L). In 2003, MCB Camp Pendleton prepared an Environmental Assessment (EA) and issued a Finding of No Significant Impact for the Iron/Manganese Treatment Plant and Reservoir (MCB Camp Pendleton 2003a).

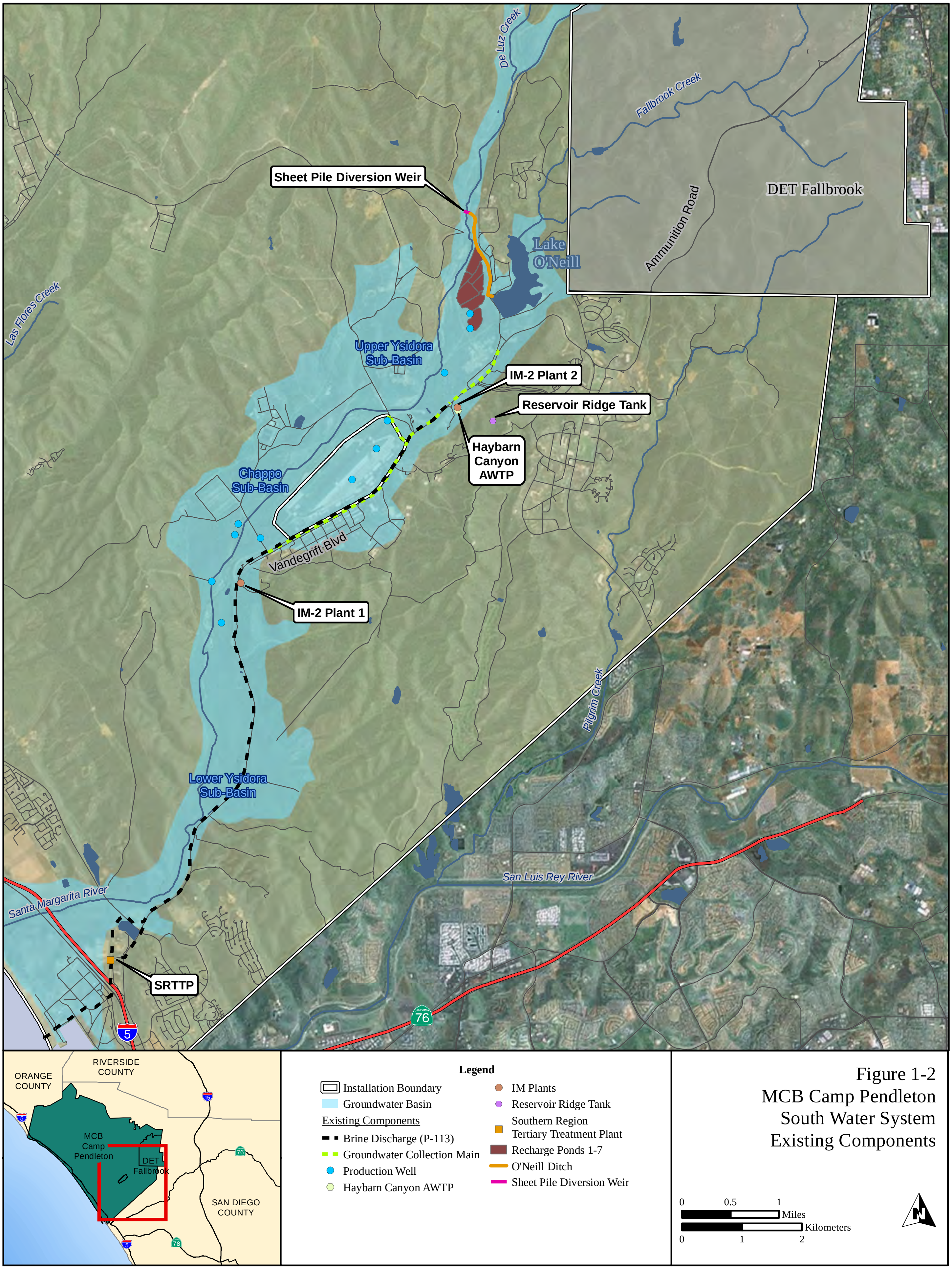


Figure 1-2
MCB Camp Pendleton
South Water System
Existing Components

The capacity of IM-2 was expanded and a new advanced water treatment plant (AWTP) (P-113) was constructed adjacent to IM-2 in FY 2013. The Haybarn Canyon AWTP is needed to ensure compliance with more stringent secondary drinking water standards for total dissolved solids (TDS) and to meet the Federal Stage 2 Disinfectants and Disinfection Byproducts Rule requirements for total trihalomethanes in drinking water by removing the total organic carbon in well water. The Haybarn Canyon AWTP will also provide corrosivity reduction by controlling the acidity (pH) in the water. This method of corrosion control will support efforts by MCB Camp Pendleton to meet wastewater discharge requirements by reducing the levels of dissolved copper below the level which requires that wastewater sludge be handled as hazardous waste. An additional benefit of reducing TDS in potable water at the Haybarn Canyon AWTP will be the subsequent reduction of TDS levels in wastewater, allowing MCB Camp Pendleton to meet current wastewater standards necessary for the wastewater's reuse.

The Haybarn Canyon AWTP will consist of two primary components: granulated activated carbon and RO filtration; and two secondary components: pH stabilization/corrosion control and disinfection units. In addition, an up to 16-inch (in) (41 centimeters [cm]) internal diameter pipeline will be constructed for disposal of brine that will be generated by the upgraded facility. The pipeline will be centered along Vandegrift Boulevard for discharge to the Pacific Ocean via three radial diffusers under the ocean floor offshore from the beach. When all components are operating at their individual design efficiencies, the total production capacity will be 11,600 af/y (10.4 million gallons per day [MGD]) of potable water. More than half of the water will be treated by the RO system to obtain the final product water TDS objective of 325 mg/L for treated water. In 2010, MCB Camp Pendleton prepared an EA and issued a Finding of No Significant Impact for the Advanced Water Treatment Facility/Utility Corridor Project (P-113) (USMC 2010). Construction of the P-113 project began in 2011, and is ongoing.

<u>Existing Production Wells</u>

The South System water supply is exclusively from groundwater, of which approximately 90% is developed within the Lower SMR Basin, specifically the Upper Ysidora and Chappo sub-basins. The existing water diversion and production facilities pump groundwater from the lower basin of the SMR to supply domestic, industrial, military, and agricultural water for beneficial use to the southern portion of MCB Camp Pendleton. Twelve wells within the Lower SMR Basin provide MCB Camp Pendleton with an average production rate of 3,350 gallons per minute based on calendar years 2007-2010. MCB Camp Pendleton previously used approximately 1,500 af/y of groundwater from the Lower Ysidora Sub-basin, primarily to irrigate agricultural lands leased to contracting agricultural businesses at Stuart Mesa. However, this use for agricultural purposes ceased in 2011 when the last agricultural business lease expired.

Twelve production wells in the Upper Ysidora and Chappo sub-basins are already connected to an existing raw water manifold system. These wells and the existing raw water collection pipe system were designed to convey water to MCB Camp Pendleton's Iron and Manganese Plant 1 (IM-1) or IM-2. The main collection pipeline runs in a northeast to southwest direction, along Vandegrift Boulevard, from the Upper Ysidora Sub-basin to the Chappo Sub-basin near MCAS. Water under pressure is collected from the wells along the way, pumped into the main pipe, and then treated at either plant. Upon completion of the AWTP (P-113), all treatment for iron and manganese will occur at IM-2 in Haybarn Canyon. After treatment, water is delivered to MCB Camp Pendleton's southern distribution system reservoir (elevation 266 feet (ft) and 540 ft [81 m and 165 m]).

1.6.1.2 Diversion, Storage, and Recharge Facilities

Facilities currently exist within MCB Camp Pendleton to divert surface water from the SMR and recharge the groundwater basins. This existing system consists of a steel sheet pile diversion weir constructed across the SMR that diverts water through a headgate (i.e., a gate for controlling the flow of water into a ditch) and ditch to a series of five interconnected groundwater percolation ponds, Lake O'Neill, or back to the SMR via an outlet ditch.

<u>Diversion Facilities</u>

The existing sheet pile weir allows water to be collected and diverted into O'Neill Ditch through an existing headgate and diversion structure located on the eastern bank of the river. Diversion typically occurs between November and June.

O'Neill Ditch is used to convey water either to the seven groundwater percolation ponds (Percolation Ponds 1-7) or Lake O'Neill, depending on the time of year, available supply, and required demand. During the diversion season, a series of control structures and measuring devices allows MCB Camp Pendleton personnel to manage, control, and measure the diversion to each of the different facilities. Repairs conducted in 1996 included installation of two 6.33-ft (1.93-m) wide by 5-ft (1.5-m) high removable stoplog slots. However, sediment building on the upstream side has made these difficult to remove and reinstall (Reclamation 2004a). Two road crossings, two concrete Parshall flumes, and two turnout structures are located along O'Neill Ditch between the head of the diversion channel and the lake (Stetson Engineers, Inc. [Stetson] 2004). Table 1.6-2 summarizes the existing diversion facilities on MCB Camp Pendleton used to divert water from the SMR.

Table 1.6-2. Summary of Existing Diversion Facilities

Facility	Description	Current Capacity
Conveyance Facility		
River diversion structure, steel	Sheet pile weir, 283 ft long	
River diversion inlet	60-in × 48-in slide gate mounted on concrete headwall 65-in × 40-in × 45-ft arch corrugated metal pipe	75 cfs
O'Neill Ditch		
Earthen ditch	Unlined earth ditch approximately 5,100 ft long	73-174 cfs
Road crossing (double culvert)	36-in corrugated metal pipe and 36-in reinforced concrete pipe	60 cfs
Upper flume	5-ft Parshall flume; concrete block and concrete lined	105 cfs
Percolation pond turnout structure	Concrete turnout structure with two 48-in slide gates	82 cfs
Lower flume	4-ft Parshall flume; concrete block and concrete lined	62 cfs
Road crossing (single culvert)	42-in corrugated metal pipe	39 cfs
Lake O'Neill turnout structure	Concrete turnout structure with 24-in slide gate	20 cfs
Recharge Facilities		
Groundwater percolation ponds	7 groundwater percolation ponds totaling 74 acres	371 af
Lake O'Neill	Lake formed by earthen levee	1,680 af

Notes: Capacity of conveyance facilities was calculated based on river water levels equal to crest height of the sheet pile weir.
ft = foot/feet; cfs = cubic feet per second; af = acre-feet.
Source: Stetson 2004.

The original SMR diversion structure was lost during the winter rains of 1978 and was reconstructed in 1980, which immediately failed during the winter rains of 1980. The existing diversion structure was constructed in 1982 and consists of a 280-ft (85-m) steel sheet pile weir. The sheet pile weir was constructed as a more permanent structure to replace previous rock weir designs that washed out during the large flood events. According to the 1982 construction drawings, the sheet piles are 30 ft (9 m) long and were driven to a depth that fixed the weir crest elevation at 115.5 ft (35.2 m). The recently reported crest elevation is 116.6 ft (35.5 m) (Reclamation 2004a).

The sides of the sheet pile weir taper into the river channel side banks. Water impounded behind the sheet pile weir may be diverted through a 60-in by 48-in (152-cm by 122-cm) (span by rise) slide gate mounted on a concrete headwall on the eastern bank of the river. The existing slide gate was constructed as a result of MCB Camp Pendleton's Department of Public Works 1970 plans to repair the flood-damaged diversion system. The slide gate is manually operated to pass river diversions through a 45-ft (14 m) long section of arch corrugated metal pipe (CMP) with dimensions of 65 in by 40 in (165 cm by 102 cm). The invert elevation of the arch CMP at the entrance of the diversion is 112.1 ft (34.2 m) according to the 1982 construction drawings.

The capacity of the arch CMP diversion pipe is estimated to be 75 cfs with a water surface elevation 3.4 ft (1.0 m) (115.5 ft to 112.1 ft [35.2 m to 34.2 m]) above the pipe inlet. The riverbed elevation downstream of the diversion is estimated to be approximately 109.25 ft (33.30 m). Current operations require sediment removal behind the sheet pile weir and in front of the headwall and headgate every few years (Reclamation 2004a).

Lake O'Neill

Lake O'Neill is a 1,680 af manmade reservoir formed by an earthen levee/dam located on Fallbrook Creek, a tributary to the SMR. The lake is filled by diversions from the SMR. Originally constructed in 1883 by Richard O'Neill, Sr., the lake was intended to store water to irrigate crops on the Rancho Santa Margarita y Las Flores during the dry season. The water rights associated with Lake O'Neill carry a priority date of 1883 and a maximum diversion rate to the lake of 20 cfs and a total annual volume not to exceed 1,200 af plus carriage and storage losses. Since acquisition by the federal government for MCB Camp Pendleton, Lake O'Neill has been used primarily for water storage and groundwater recharge, and secondarily for military training and recreation (Leedshill and Herkenhoff, Inc. 1988).

Sedimentation has altered the composition of the lake bottom and the bathymetry of Lake O'Neill. The capacity of the lake was last recorded in 2004 at approximately 1,380 af (Stetson 2004). MCB Camp Pendleton recently completed dredging the open water portion of Lake O'Neill (Phase I). Phase II was planned to follow and include the removal of wetland and perimeter vegetation as well as sediment below the wetland areas; however, Phase I may have provided the capacity necessary and Phase II is currently not planning to remove vegetation. This two-phase process will return Lake O'Neill to its original storage capacity of approximately 1,680 af.

Surface water from the SMR is conveyed approximately 6,000 ft (1,800 m) through O'Neill Ditch to the lake. Conveyance of water from the ditch to the lake is made through a concrete turnout structure and a 24-in (61-cm) reinforced concrete pipe located at the lower end of O'Neill Ditch. Adjacent to the 24-in (61-cm) pipe that fills the lake is a concrete overflow outlet structure with four 60-in (150-cm) reinforced concrete pipes. The overflow outlet structure returns reservoir spills to a ditch that drains back to the river. Controlled releases from the lake are made through an outlet pipe located in the southern corner of the lake (Reclamation *et al*. 2005).

Groundwater Percolation Ponds

The SMR diversion system conveys water to either Lake O'Neill or Percolation Ponds 1-7. The percolation ponds have been in operation since 1955 and replenish water pumped from the groundwater basins. This system is located west of the old Naval Hospital by Lake O'Neill and approximately 8 mi (13 km) upstream from the Pacific Ocean. During the diversion season, a series of control structures and measuring devices allows MCB Camp Pendleton personnel to manage, control, and measure the diversion to each of the different facilities. The groundwater percolation pond system was constructed between 1955 and 1962, and SMR diversions to the percolation ponds were first recorded in October 1960. The total surface area of the seven-pond system is approximately 74 acres (30 hectares), and the capacity of the ponds is estimated to be approximately 371 af. Ponds 6 and 7 were rehabilitated in late 2011, but are not currently used for recharge. Table 1.6-3 summarizes the capacity of the seven groundwater percolation ponds.

Table 1.6-3. Capacity of Existing Groundwater Percolation Ponds

Pond	Surface Area (acres)	Average water depth (ft)	Volume (af)
1	13.9	3.2[1]	44.5
2	7.0	6.1[1]	42.7
3	7.0	8.4[1]	58.8
4	16.5	5.4[1]	89.1
5	4.7	5.1[1]	24.0
6[2]	11.8	4.5	53.1
7[2]	13.1	4.5	59.0
Total	**74**		**371**

Note: [1] Approximate average depth of existing ponds based on 1962 survey map
[2] Ponds rehabilitated in late 2011; currently unused.
ft = foot/feet; af = acre-feet.
Source: Reclamation *et al.* 2005; MCB Camp Pendleton 2012a.

Under the current percolation pond operations, water is diverted from O'Neill Ditch into the percolation pond system through a single 79-in by 49-in (201-cm by 125-cm) CMP pipe at the head of Pond 1. When the water level in Pond 1 rises to the pond's outlet pipe invert elevations, flow passes ("spills") from Pond 1 into either Pond 2 or 5. The pipe invert elevations from Pond 1 to Pond 2 are slightly lower (12-15 in [31-38 cm]) than the pipe invert elevations from Pond 1 to Pond 5; therefore, water first spills from Pond 1 into Pond 2 before spilling into Pond 5. Water filling above the invert elevation of the outlet pipes of Pond 2 spills into Pond 3, and water filling above the outlet pipes from Pond 3 spills into Pond 4. Similarly, water filling above the invert elevation of the outlet pipes from Pond 5 spills into Pond 4. Water is designed to spill from Pond 3 and 4 to Pond 6 and subsequently to Pond 7. At the lower end of Pond 4 (the last pond in the system), two 30-in (76-cm) CMP pipes return spills from Pond 4 to the floodplain. Since 1983, Pond 4 has filled four times, spilling twice to the floodplain in March of 1983 and again in February of 2005.

1.6.1.3 Water Rights Permits

Historical operations of the diversion ditch, groundwater percolation ponds, and Lake O'Neill indicate that the diversion facilities are operated in accordance with the requirements of the various water rights held by MCB Camp Pendleton. Existing water rights allow for over 1,100 af/y of water to be diverted to Lake O'Neill and over 4,000 af/y of water to be diverted to the groundwater percolation ponds annually (see Section 1.4 for further details concerning existing water rights). A performance review of the existing facilities was completed as part of the *Santa Margarita River Recharge and Recovery Enhancement*

Program Feasibility Study (Stetson 2001). This study determined that the existing facilities were not properly designed to meet the diversion goals, as evidenced by the large amount of sediment accumulation associated with the diversion weir and headgate and the performance of the percolation ponds. Maintenance and repair projects are required to return the existing system to the capacity it was originally designed for and to allow MCB Camp Pendleton to fully exercise its appropriative rights. These projects include replacement and minor relocation of the existing headwall and headgate, scraping fine sediment from the existing percolation ponds, and installation of control and monitoring devices (sliding weir gate structures) between the ponds.

1.6.2 FPUD Facilities

FPUD is located approximately 5 mi (8 km) northeast of the Upper Ysidora Sub-basin and does not contain large alluvial basins that may be used to produce groundwater. Groundwater supplies are limited to the shallow alluvial fill beneath the SMR upstream of the DET Fallbrook boundary. The alluvial materials along the SMR, within the boundaries of FPUD, are no more than 200 yards wide and approximately 30 to 50 ft (9 to 15 m) deep.

Use of SMR water by FPUD dates back to the 1920s, when wells along the SMR channel were utilized to supply water to Fallbrook area water users. In 1968, an MOU and Agreement was signed with the federal government to develop the Two Dam Project on the river for the benefit of FPUD and MCB Camp Pendleton (see Section 1.4 for further details regarding the Santa Margarita Project). At this point in time, FPUD ceased operations on the SMR. In 1969 floods destroyed the FPUD's diversion works, which were not replaced.

Today, FPUD provides service to approximately 35,000 residents, and includes 28,000 acres (11,331 hectares) in its service area. The FPUD service area includes portions of the community of Fallbrook that border DET Fallbrook and MCB Camp Pendleton to the west and extends into both the SMR and the San Luis Rey river basins.

Since 1969 when the FPUD abandoned the San Luis Rey Valley wells, the domestic, agricultural, and commercial water demands have been exclusively met by imported water supplies purchased from SDCWA, which is the largest single customer of MWD. FPUD currently imports water from the Colorado River and the State Water Project (i.e., water delivered from northern California rivers). FPUD currently has one groundwater well near Red Mountain Reservoir that produces approximately 100 af/y. Based on records published by the SMR Watermaster's office, FPUD purchased 11,760 af of water from the SDCWA in 2010. FPUD's largest import purchase year was water year (WY) 2007 when FPUD received 20,450 af (*Note*: a WY is a 12-month period from 1 October to 30 September). All of the potable water distributed by FPUD is treated at the Lake Skinner Filtration plant, located just east of the City of Temecula. FPUD operates one wastewater treatment plant located along Fallbrook Creek, a tributary of the Lower SMR Basin. Tertiary treated wastewater from the plant is currently either discharged to an outfall pipeline, which is connected near the Pacific Ocean to the city of Oceanside ocean outfall; or used as recycled water to irrigate nurseries, playing fields, landscaped freeway medians, and common areas (Stetson 2002). From 2005 to 2010, FPUD recycled approximately 500 af/y (FPUD 2010).

Key features of the FPUD system are as follows:

- *Pressure Zones* – FPUD features 7 different pressure zones linked by 18 pressure control valves.
- *Reservoirs* – FPUD has 11 reservoirs. The Red Mountain Reservoir, an earthen dam, asphalt-lined reservoir with a total capacity of 1,350 af, is the largest reservoir in the FPUD system. Two

main 24-in (61-cm) pipelines carry water from the Red Mountain Reservoir and connect into the various pressure zones.

- *Aqueduct Connections* – FPUD receives treated imported water from four connections to aqueducts of the MWD and SDCWA. From regional MWD storage and treatment facilities at Lake Skinner near Temecula, California, five large-diameter MWD and SDCWA pipeline aqueducts deliver the imported supply to San Diego County water retail agencies. Turnout Fallbrook Number 3 on the first aqueduct, which feeds the Red Mountain Reservoir, is generally the most heavily used FPUD aqueduct connection.

1.7 Cooperating, Responsible, and Trustee Agencies

Numerous regulatory agencies are involved in the planning and implementation of actions with the potential to affect water resources. As defined under 40 CFR § 1508.5, a cooperating agency may be any federal agency other than the lead agency that has jurisdiction by law or special expertise with respect to the environmental impacts expected to result from a proposal. An agency has "jurisdiction by law" if it has the authority to approve, veto, or finance all or part of the proposal. An agency has "special expertise" if it has statutory responsibility, agency mission, or related program experience with regard to a proposal. A cooperating agency's responsibility includes participation in the NEPA process as early as possible, participation in the scoping process, and, on the lead agency's request, development of information to be included in the EIS and staff support in its preparation (40 CFR § 1501.6). Under 40 CFR § 1501.6, federal agencies with jurisdiction by law shall be cooperating agencies if requested by the lead agency(s). No federal agency volunteered to be a cooperating agency for the proposed project.

Under Section 15381 of CEQA, a "responsible agency" means a public agency that proposes to carry out or approve a project, for which a lead agency is preparing or has prepared an EIR or Negative Declaration. Responsible agencies include all public agencies other than the lead agency that have discretionary approval power over the project. Under Section 15386 of CEQA, a "trustee agency" means a state agency having jurisdiction by law over natural resources affected by a project that are held in trust for the people of the State of California. The CDFW is a trustee agency under CEQA. CEQA responsible agencies include the San Diego RWQCB, SWRCB, and DPH, *Division of Drinking Water and Environmental Management*.

Table 1.7-1 provides a description of the responsible and trustee agencies with regulatory oversight applicable to the Proposed Action. In addition to the regulatory agencies listed below, the Proposed Project must also be in compliance with the requirements of all agencies with discretionary project approval authority.

1.8 Regulatory Setting

Numerous federal and state laws have been enacted to establish requirements for adequate planning, implementation, management, and enforcement of water resource regulations. Regulations and plans have been developed to augment and clarify the laws and provide details not included in the laws. Those adopted by the authoritative governmental body have legal stature and are enforceable. Federal guidelines and state policies express the intent of the governing body and, while they may not be legally enforceable, set forth direction that should be followed to achieve the goals expressed in the laws. The Proposed Action must achieve compliance with applicable rules and regulations promulgated by the USEPA, USFWS, USACE, CDFW, SWRCB, and DPH, among others. A summary of laws, general policies, and regulations that govern each specific resource in the study area is provided in Chapter 4.

Table 1.7-1. Regulatory Agencies Applicable to the Proposed Action

CDFW – CEQA Trustee Agency
As a trustee agency, CDFW cannot approve or disapprove a project; however, CEQA lead agencies and federal lead agencies proposing impoundments or diversions of surface waters are required to consult with CDFW. CDFW, as the trustee agency for fish and wildlife resources, shall provide the requisite biological expertise to review and comment upon environmental documents and impacts arising from project activities, and shall make recommendations regarding those resources held in trust for the people of California according to the Fish and Game Code Section 1802.
SWRCB – CEQA Responsible Agency
The SWRCB has authority over water allocation and water quality protection by assigning water rights, adjudicating water right disputes, developing statewide water protection plans, and establishing water quality standards. The SWRCB guides nine regional water quality control boards, which oversee state and federal water pollution control measures in each of the major watersheds in the state.
San Diego RWQCB – CEQA Responsible Agency
The San Diego RWQCB regulates all discharge of wastewater to groundwater or surface water by issuing discharge permits, enforcement orders, cleanup orders, and fines for non-compliance. Specifically, the San Diego RWQCB issues Waste Discharge Requirement permits and NPDES permits for discharge of treated wastewater into the ocean, into inland surface waters, or on land. Waste disposal requirements are established by the San Diego RWQCB for any entity discharging wastes to waters in the San Diego Basin, including MCB Camp Pendleton.
DPH, Division of Drinking Water and Environmental Management – CEQA Responsible Agency
The DPH is responsible for establishing state drinking water standards that are at least as stringent as the federal standards. In addition, the DPH determines the extent to which a water source influenced by effluent may be used as a potable water source. The DPH also protects groundwater sources or potable water supplies through a series of guidelines that address treatment and recharge methods, the proximity of wells, and the aquifer characteristics. The Drinking Water Program regulates public water systems; oversees water recycling projects; permits water treatment devices; certifies drinking water treatment and distribution operators; supports and promotes water system security; provides support for small water systems and for improving technical, managerial, and financial capacity; oversees the Drinking Water Treatment and Research Fund for Methyl Tertiary Butyl Ether and other oxygenates; and provides subsidized funding for water system improvements under the State Revolving Fund and Proposition 50.

Notes: CDFW = California Department of Fish and Wildlife; CEQA = California Environmental Quality Act; SWRCB = State Water Resources Control Board; RWQCB = Regional Water Quality Control Board; NPDES = National Pollutant Discharge Elimination System; MCB = Marine Corps Base; DPH = California Department of Public Health.

1.8.1 Permits and Consultations Required for Project Implementation

In addition to consideration under NEPA and CEQA, the Proposed Action is subject to various federal and state regulatory requirements that help to mitigate its potential effects on the environment. The anticipated compliance requirements of broadest application to the Proposed Action are briefly described in Table 1.8-1. Agencies that may have discretionary project approval authority over the Proposed Action include the SWRCB, San Diego RWQCB, and USACE. Additionally, consultation is required with the following agencies: USFWS; NOAA Fisheries; CDFW; SHPO; and four tribes within the SMR watershed – Cahuilla, Pechanga, Pauma, and Ramona.

1.9 Public Involvement Process

Both NEPA and CEQA regulations require an early and open process for determining the scope of issues related to a Proposed Action or project. Figure 1-3 depicts the various components of the scoping process and how they are integrated with the EIS/EIR process. In accordance with NEPA and CEQA, the USMC and FPUD initiated a public and agency scoping process to assist with determining the scope of issues to be addressed in this EIS/EIR.

Table 1.8-1. Anticipated Compliance Requirements for Project Alternatives

Law	Responsible Agency
Federal Laws	
NEPA (CEQ Regulations for Implementing the Procedural Provisions of NEPA, 40 CFR §§ 1500-1508, as amended, 42 USC §§ 4321-4370h)	USMC and Reclamation (co-lead agencies)
CWA Section 404 (33 USC § 1344)	USACE
CWA Section 401 (33 USC § 1341)	SWRCB San Diego RWQCB
CWA Section 402 (33 USC §§ 1311, 1342)	San Diego RWQCB
CWA Section 403 (33 USC § 1343)	San Diego RWQCB
DOD Ammunition and Explosives Safety Standards (C5.4.1.1.2)	DOD Explosive Safety Board
ESA (16 USC § 1531 et seq.)	USFWS NOAA Fisheries
Fish and Wildlife Coordination Act (16 USC § 661 *et seq.*)	USFWS CDFW
Federal EO 11990: *Protection of Wetlands*	USMC USACE
NHPA Section 106 (16 USC § 470 *et seq.*)	SHPO Native American Heritage Commission
NHPA Section 110 (16 USC § 470 *et seq.*)	SHPO Native American Heritage Commission
CAA – Authority to Construct and Permit to Operate	SDAPCD
EO 11988: *Floodplain Management*	USMC
EO 13547: *Stewardship of the Ocean, Our Coasts, and the Great Lakes*	USMC
Marine Mammal Protection Act (16 USC § 1361 and 50 CFR § 216)	NOAA Fisheries
Marine Protection, Research, and Sanctuaries Act (33 USC § 1401)	USEPA
EO 13112: Invasive Species	Invasive Species Council USDA
EO 13045: *Environmental Health and Safety Risks to Children*	All federal agencies
Secretary of the Interior Order 3215, Principles for the Discharge of the Secretary's Trust Responsibility	USDI
USDI Manual, Part 303, DM 2, Principles for Managing Indian Trust Assets	USDI
Native American Graves Protection and Repatriation Act (25 USC §§ 3001-3013)	Native American Graves Protection and Repatriation Review Committee
State Laws	
CEQA (PRC Section 21000-21177) and CEQA Guidelines (CCR Sections 1500-15387)	FPUD (lead agency)
State Fish and Game Code Section 1601	CDFW
California ESA (California Fish and Game Code Section 2081 *et seq.*)	CDFW

Notes: NEPA = National Environmental Policy Act; CEQ = Council on Environmental Quality; CFR = Code of Federal Regulations; USC = United States Code; USMC = U.S. Marine Corps; Reclamation = U.S. Department of the Interior, Bureau of Reclamation; CWA = Clean Water Act; USACE = U.S. Army Corps of Engineers; SWRCB = State Water Resources Control Board; RWQCB = Regional Water Quality Control Board; DOD = U.S. Department of Defense; ESA = Endangered Species Act; USFWS = U.S. Fish and Wildlife Service; NOAA Fisheries = National Oceanic and Atmospheric Administration, National Marine Fisheries Service; USC = United States Code; CDFW = California Department of Fish and Wildlife; EO = Executive Order; NHPA = National Historic Preservation Act; SHPO = State Historic Preservation Office(r); CAA = Clean Air Act; SDAPCD = San Diego Air Pollution Control District; USEPA = U.S. Environmental Protection Agency; USDA = U.S. Department of Agriculture; USDI = U.S. Department of the Interior; PRC = Public Resources Code; FPUD = Fallbrook Public Utility District.

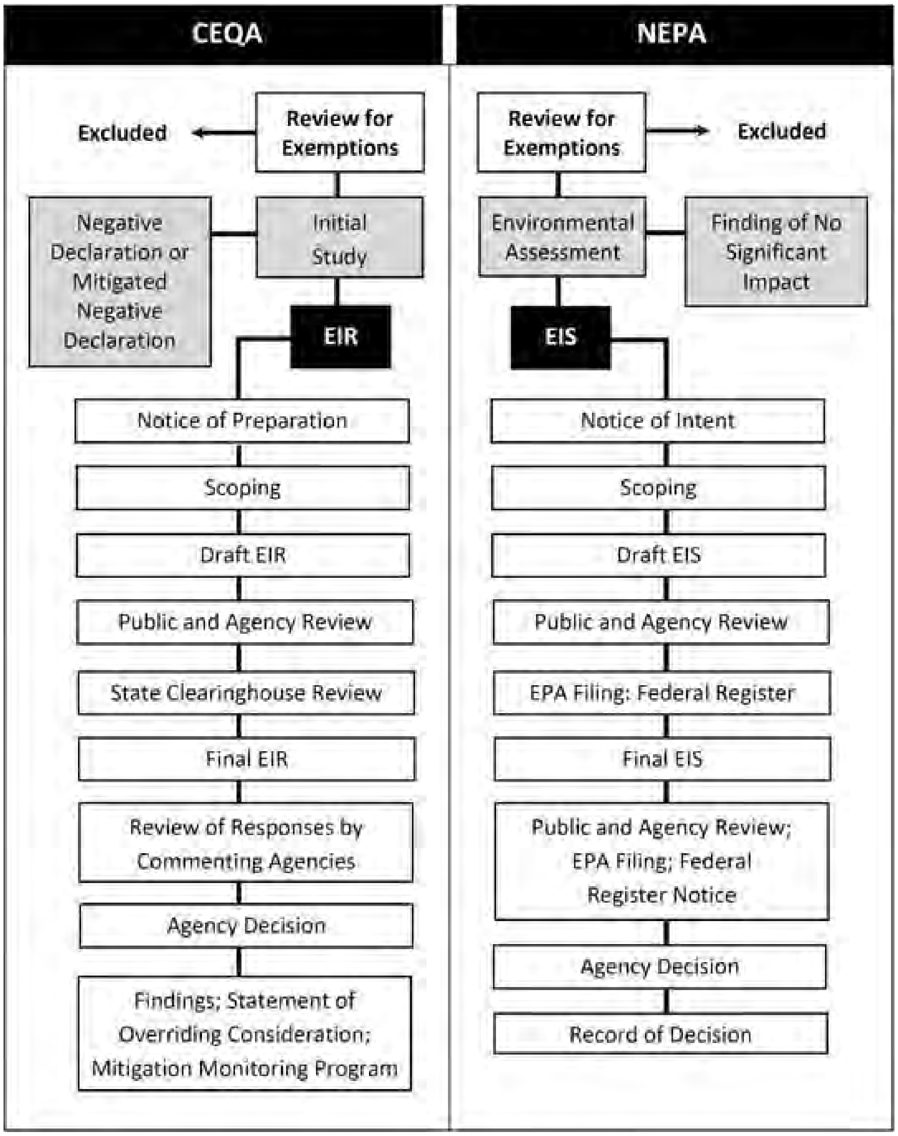


Figure 1-3. Flowchart of the NEPA/CEQA Process

On 1 November 2004, an NOI to *Prepare an EIS/EIR for the Santa Margarita River Conjunctive Use Project, San Diego County, California*, was published in the *Federal Register* (refer to Appendix A). In addition, an NOP was submitted to the State Clearinghouse and County Clerk on 15 December 2004 and published in three local newspapers: the San Diego Tribune, Press Enterprise, and North County Times (refer to Appendix A). The NOI and NOP invited agencies, organizations, and the general public to provide written comments relative to the Proposed Action and issues to be addressed in the Draft EIS/EIR. The NOI and NOP also announced two public scoping meetings, which were held on 12 January 2005 at the Oceanside Civic Center Library and Community Rooms in Oceanside, California, and on 13 January 2005 at the FPUD office in Fallbrook, California. A total of 39 individuals attended the scoping meetings (5 at Oceanside Civic Center and 34 at FPUD).

On 29 October 2008 and 28 January 2013, public meetings were held at the FPUD office in Fallbrook, California. The purpose of the meetings was to update the public on the status and changes that have been made to the project since the Public Scoping meetings held in January 2005. A total of 33 individuals attended the meeting on 29 October 2008 and 9 individuals on 28 January 2013.

As discussed under Section 1.2, the range of issues analyzed in this EIS/EIR was determined from initial Reclamation, USMC, and FPUD evaluation of the action alternatives as well as comments received during the public scoping process and written and verbal comments received during the 2010 public review period for the SWRCB water rights permit petitions. Written comments received during the public scoping process and the government's responses to those comments are presented in Appendix A.

A Notice of Availability/Notice of Completion for the Draft EIS/EIR was published in the *Federal Register* on 9 May 2014 and a Notice of Completion was provided to the State Clearinghouse on 9 May 2014 to initiate a 45-day public review of the Draft EIS/EIR. The public review period for the Draft EIS/EIR will conclude on 23 June 2014. A public meeting will be held on 29 May 2014 at FPUD. The Draft EIS/EIR has been made available to the public via the MCB Camp Pendleton website: http://www.pendleton.usmc.mil/base/environmental/index.asp and the Fallbrook Public Utility District website: http://www.fpud.com, and at the following local libraries: City of San Clemente Public Library, Fallbrook Public Library, and the City of Oceanside Public Library.

1.10 AUTHORITY

In 2003, Congress directed Reclamation, through P.L. 108-7, "to perform the studies needed to address current and future municipal, domestic, military, environmental, and other water uses from the SMR, California." In 2004, Congress appropriated funds to initiate the studies (P.L. 108-137). Reclamation divided the studies into two parts: pre-feasibility and feasibility. The pre-feasibility study was completed by Reclamation in May 2005. The purpose of the pre-feasibility study was to evaluate a wide range of alternatives at an appraisal level of analysis to recommend the most attractive alternatives for further study during feasibility analysis. The pre-feasibility analysis and recommendations are described in greater detail in Chapter 2. Following completion of the pre-feasibility analysis and report, the feasibility study, public scoping, and NEPA and CEQA compliance were initiated.

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CHAPTER 2
PROPOSED ACTION AND ALTERNATIVES

2.1 Introduction

This chapter includes detailed descriptions of the Proposed Action and action alternatives. It describes the process used to formulate the action alternatives selected for analysis in this EIS/EIR and outlines other potential alternatives that were initially considered but eliminated from detailed analysis.

2.2 Process Used to Formulate Alternatives

Numerous studies have been conducted and reports written regarding use of water from the SMR and how to best achieve the water supply improvement objectives of MCB Camp Pendleton and FPUD. These studies include the following:

- *Santa Margarita Project, San Diego County, California, Draft Supplemental Environmental Impact Statement* (Reclamation 1984). This supplemental EIS analyzed the Santa Margarita Project or Two Dam Project (refer to Section 1.4 for details on this project), which consisted of the 36,500 af Fallbrook Dam and Reservoir; the 142,950 af De Luz Dam and Reservoir; the Fallbrook Pumping Plants and Conveyance Line; the Cross-Base Aqueduct and Pumping Plants; recreation and fishing facilities; and wildlife conservation and enhancement management areas.
- *Santa Margarita River Recharge and Recovery Enhancement Program: Permit 15000 Feasibility Study for Marine Corps Base Camp Pendleton* (Stetson 2001). This study analyzed the alternatives for perfecting Permit 15000, maximizing the amount of water available for diversion from the SMR without adversely impacting the groundwater basins located within MCB Camp Pendleton.
- *Draft Recycle and Reuse Study: Conjunctive Use Project for the Lower Santa Margarita River Basin. Supplemental Study to Santa Margarita River Recharge and Recovery Enhancement Project - Permit 15000 Feasibility Study for Marine Corps Base Camp Pendleton* (Stetson 2002). This study analyzed project alternatives that may be used to develop a conjunctive use program between the FPUD and MCB Camp Pendleton, and focused on enhancing local water supplies, the recycling and reuse of tertiary treated wastewater effluent, and improving the SMR Basin water quality.
- *Santa Margarita River Conjunctive Use Project Pre-Feasibility Plan Formulation Study, San Diego, California* (Reclamation *et al.* 2005). This pre-feasibility plan formulation report compared, at appraisal level, conceptual alternatives to put to beneficial use both naturally occurring streamflow, groundwater, and tertiary treated wastewater to provide additional and/or replacement water supplies for FPUD and MCB Camp Pendleton. The intent was to provide information needed to select alternatives and/or project elements to be studied at a feasibility level.
- *Final Technical Memorandum No. 1: Santa Margarita River Conjunctive Use Project, Statistical Analysis of Santa Margarita River Surface Water Availability at the Conjunctive Use Project's Point of Diversion* (Reclamation 2007a). This technical memorandum described the hydrology and hydrogeology of the SMR Basin, addressed the historical variation of flows in the SMR over the historical period of record, and presented statistics that described those flows in terms of both total water supply and water available for project diversion.

- *Final Technical Memorandum No. 2.2: Santa Margarita River Conjunctive Use Project, Surface Water and Groundwater Modeling Analysis to Determine Santa Margarita River Conjunctive Use Project Yield* (2 Volumes) (Reclamation 2007b). This technical memorandum continued to build upon the characterization of the SMR Basin's water resources by developing the 2006 groundwater model which was originally developed by MCB Camp Pendleton in 2001. The purpose of the model was to characterize the total groundwater yield from aquifers in the Lower SMR watershed. Twelve management scenarios were developed to estimate impacts on basin yield as a result of variations in SMR CUP components and management strategies.
- *Surface Water and Groundwater Modeling Analyses of Gallery Well Alternatives for the Santa Margarita River Conjunctive Use Project (CUP)* (Stetson 2008a). This technical memorandum presented surface water and groundwater modeling analyses to characterize gallery well alternatives for SMR CUP.

The common goal of these studies was to develop feasible alternatives that would enhance and optimize the productivity of the Lower SMR groundwater basin while protecting environmental resources. Various potential alternatives were examined in these previous studies, including local and regional projects located within and outside the SMR Basin. Factors that were considered in these studies when identifying potential action alternatives included:

- the quantity of water diverted from the SMR,
- the amount of water available for direct and indirect use,
- potential impacts to the local environment,
- engineering efficiencies, and
- costs.

On 29 and 30 June 2004, Reclamation, FPUD, MCB Camp Pendleton, and DET Fallbrook conducted a pre-feasibility alternatives development workshop. The purpose of the workshop was to refine the purpose of and need for the Proposed Action, as well as to develop conceptual alternatives that could be constructed to provide additional and/or replacement water supplies to FPUD and MCB Camp Pendleton. The 44 conceptual alternatives that were selected during the workshop were subsequently evaluated and compared at an appraisal level, to determine which alternatives could be constructed to put naturally occurring streamflow, groundwater, and tertiary treated wastewater to beneficial use. The collective project features presented some opportunity for flexibility. Alternative locations and design of some features, such as pipeline routing and percolation ponds were reviewed. For example, various river diversion types and designs and pipeline alignments were considered during formulation of the alternatives selected for further consideration. The resulting report, *Santa Margarita River Conjunctive Use Project Pre-Feasibility Plan Formulation Study* (Reclamation *et al.* 2005) provided Reclamation, MCB Camp Pendleton, and FPUD with information sufficient to screen and identify alternatives and/or project components to be carried forward for evaluation in a feasibility study and under NEPA and CEQA.

In 2006, a Decision Memo was created by Reclamation, MCB Camp Pendleton, and FPUD describing an inter-agency agreement on a Proposed Action and two action alternatives recommended for economic and environmental feasibility analysis (Reclamation 2006a). The alternatives were selected or modified from the Pre-Feasibility Plan through engineering designs from the Reclamation Technical Service Center, hydrologic models provided by Stetson (an engineering company hired by MCB Camp Pendleton), and environmental work performed by North State Resources, Inc. The agencies considered jurisdictional wetlands and designed/revised the action alternatives to avoid (to the maximum extent practicable) jurisdictional areas. Post approval of the 2006 Decision Memo, the Proposed Action and alternatives were further refined following additional feasibility analysis and design.

Preliminary Draft EIS/EIR, engineering, and economic feasibility documents addressing the three modified Decision Memo alternatives were prepared in August 2009. Work on the draft documents was placed on hold as coordination meetings were held to address significant design issues between MCB Camp Pendleton's Haybarn Canyon AWTP (P-113) and the proposed expansion of the Haybarn Canyon AWTP to meet the treatment needs under the 2009 Proposed Action. In addition, in the summer of 2010 the SWRCB published for public review the project's water rights time extension and change petitions. Comments received during public review provided new information regarding the anadromous form of steelhead trout (*Oncorhynchus mykiss*). The AWTP design coordination meetings and steelhead trout comments resulted in the revision of the former Proposed Action (now Alternative 2 in this EIS/EIR), the removal of two alternatives (former Alternatives 1 and 2), and the inclusion of a new alternative (Alternative 1 in this EIS/EIR). The EIS/EIR now addresses two action alternatives and a No-Action Alternative. The action alternatives provide water supply for both MCB Camp Pendleton and FPUD.

Those alternatives and/or project components that were eliminated from further analysis are discussed in Section 2.4, *Alternatives Considered and Eliminated from Detailed Study*.

2.3 PROPOSED ACTION

The Proposed Action would enhance groundwater recharge and recovery capacity within the Lower SMR Basin and develop a conjunctive use program that would increase the sustained basin yield of the Lower SMR Basin for the benefit of MCB Camp Pendleton and FPUD. SMR CUP would construct facilities within the Lower SMR Basin to capture additional surface runoff during high streamflow events that currently flows to the Pacific Ocean. This surface water would be recharged through renovated groundwater percolation ponds and stored or "banked" in groundwater basins during wet years and used to augment water supplies during dry years. Specifically included are improvements to the diversion weir and increased capacity of the headgate and the O'Neill Ditch; improvements to seven existing percolation ponds; installation of new groundwater production wells and gallery wells; treatment of water at an existing, expanded, or new water treatment plant (WTP); and a bi-directional pipeline to deliver water to FPUD and provide MCB Camp Pendleton with an off-base (i.e., imported) water supply during drought or emergency situations; and the potential establishment of an OSMZ.

The diversion and recharge components of the Proposed Action would include improvements to the existing surface water diversion and groundwater recharge facilities located on MCB Camp Pendleton near the old Naval hospital by Lake O'Neill. The proposed improvements to the existing diversion and recharge facilities would allow for the proper management of flows to Lake O'Neill and the seven recharge ponds. The proposed improvements to the diversion facilities are designed to capture larger amounts of water in shorter periods of time and, therefore, would provide additional groundwater supplies to meet current and future pumping requirements. The maximum diversion rate of 200 cfs would occur only during infrequent periods of higher flow, which typically occur between October and April of each year. The average monthly distribution of groundwater pumping would meet the seasonal demands of both MCB Camp Pendleton and FPUD.

MCB Camp Pendleton could receive imported water via the bi-directional pipeline during extended drought. This would allow for curtailment of groundwater pumping during these dry periods, and thereby expand the sustained basin yield of the Lower SMR Basin. Due to the natural variability of the hydrology that controls water supply in the Lower SMR Basin, the Proposed Action would rely on reductions in groundwater pumping to meet hydrogeological constraints during drought or consecutive-year dry hydrologic conditions. These environmental constraints vary by alternative and would include maintenance of groundwater levels within their historical range (Alternative 1), no aquifer compaction (both action alternatives), and/or no seawater intrusion (both action alternatives) (*Note*: additional environmental constraints may be identified and developed through the consultation process). All water supplies available to MCP Camp Pendleton would be assessed during these hydrologic conditions, including water from the Northern Water System (P-1045) as well as imported water deliveries through the bi-directional pipeline. Therefore, access to imported water via the bi-directional pipeline or the P-1045 pipeline would allow for a more liberal pumping schedule that can be adjusted in real-time through an Adaptive Management Plan/Facilities Operation Plan (AMP/FOP), thus resulting in expanded sustained basin yield within the physical and environmental constraints of the project. In addition, delivery of project water to FPUD would reduce FPUD's dependence on imported water.

The following sections describe the two action alternatives that are carried forward for analysis in this EIS/EIR. A comparison of the various project components associated with Alternative 1 and Alternative 2 is presented in Table 2.3-1; details on each component are provided in Sections 2.3.1 and 2.3.2, respectively. In accordance with NEPA, Alternatives 1 and 2 represent a range of reasonable alternatives that would meet the purpose of and need for the Proposed Action.

Table 2.3-1. Components of Alternative 1 and Alternative 2

Project Components	Alternative 1	Alternative 2
Improvements to Existing Facilities		
Replacement of Existing Sheet Pile Diversion with Inflatable Weir Diversion Structure	**X**	**X**
Improvements to O'Neill Ditch and Headgate	**X**	**X**
Improvements to Percolation Ponds 1-7	**X**	**X**
Expand Haybarn Canyon AWTP and Add a Surface Water Treatment Facility		**X**
Proposed New Facilities		
Four New Groundwater Production Wells and Associated Collection System Infrastructure	**X**	**X**
Water Conveyance/Distribution System, including Bi-Directional Pipeline from MCB Camp Pendleton to Red Mountain Reservoir via new FPUD WTP	**X**	
FPUD WTP	**X**	
SCADA System	**X**	**X**
OSMZ (1,392 acres)	**X**	**X**
Four New Gallery Wells and Associated Collection System Infrastructure		**X**
Water Conveyance/Distribution System, including Bi-Directional Pipeline from Reservoir Ridge to the Gheen Zone		**X**

Notes: AWTP = Advanced Water Treatment Plant; MCB = Marine Corps Base; FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant; SCADA = Supervisory Control and Data Acquisition; OSMZ = Open Space Management Zone.

2.3.1 Alternative 1

This alternative would include diversion system upgrades, groundwater recharge, and groundwater production. Raw groundwater would then be delivered to Haybarn Canyon for delivery to MCB Camp Pendleton and FPUD. Raw groundwater delivered to MCB Camp Pendleton would be treated at the Haybarn Canyon AWTP; while water would be delivered to FPUD via a new bi-directional pipeline for treatment in a new WTP operated by FPUD. Project components associated with Alternative 1 are depicted in Figure 2-1 and described in detail below.

2.3.1.1 Improvements to Existing Facilities

Alternative 1 includes improvements and/or replacement of the existing structures discussed below.

<u>Replacement of Existing Sheet Pile Diversion with Inflatable Weir Diversion Structure</u>

The existing sheet pile diversion structure on the SMR would be replaced by a new inflatable weir diversion structure consisting of rubber bladders and steel plates. The new inflatable weir would allow the diversion of up to 200 cfs of surface flow from the SMR, while also providing the opportunity of being deflated during stormwater runoff events. Fully lowering the weir would restore a more natural sediment transport regime, thereby reducing the recurrent costs of removing sediment accumulated behind the weir, in front of the diversion headwall and headgate, and within O’Neill Ditch.

The inflatable weir diversion structure would be approximately 250 ft (76 m) in total length spanning the SMR, east to west at the location of the existing sheet pile diversion weir (Figure 2-2). The inflatable weir would contain two separate gate panels that could be raised and lowered pneumatically using heavy gauge inflatable air bladders that support the gates on their downstream side. The west gate panel would be approximately 204 ft (62 m) in length with an operational crest elevation of 118.7 ft (36.1 m) mean sea level (msl) throughout the year unless lowered to pass flood flows. The east gate panel would be approximately 46 ft (14 m) in length and would have an operational crest elevation of 118.7 ft (36.1 m) msl from June through November and 117.7 ft (35.9 m) msl from December through May. During large streamflow events (10-year flow or greater) both inflatable gates would be fully lowered to an elevation 114.5 ft (34.9 m) msl. There would also be a small vertical sluice gate that would be used for sediment management near the O’Neill Ditch headgate.

The inflatable weir would be installed on a new 24-in (61-cm) thick reinforced concrete slab foundation. The existing sheet pile weir would be cut off such that the underground portion can be capped by the slab foundation and used as a cut-off wall to retard seepage and piping beneath the slab foundation. The slab foundation would extend 20 ft (6 m) upstream of both gate panels. Downstream of the 204-ft (62-m) gate panel, the slab foundation would extend 40 ft (12 m) with an additional 20 ft (6 m) of rock armor (rip rap) incorporated into the streambed. Downstream of the 46-ft (14-m) gate panel, a reinforced concrete plunge pool would be incorporated into the slab foundation (Figure 2-2). Final engineering design of the plunge pool would incorporate an appropriate slope at the downstream end, between the bottom of the pool to the natural river bed elevation, to allow sediment to pass through so that it would not fill and become unsuitable for fish passage.

The placement of a shorter section of gate panel near the O’Neill Ditch headgate (Figure 2-2), combined with the capability of lowering of this gate panel during smaller storm events, would allow for flushing of trapped sediment from behind the weir. This would reduce both the transport of sediment into the O’Neill Ditch, percolation ponds, and Lake O’Neill, as well as the amount of sediment trapped behind the weir. The diversion structure would be designed to release not less than the historic leakage through and flow under the existing sheet pile weir (i.e., 3 cfs, when available). Water diverted from the proposed inflatable weir diversion structure would flow to the percolation ponds, be stored in Lake O’Neill, or bypassed back to the SMR.

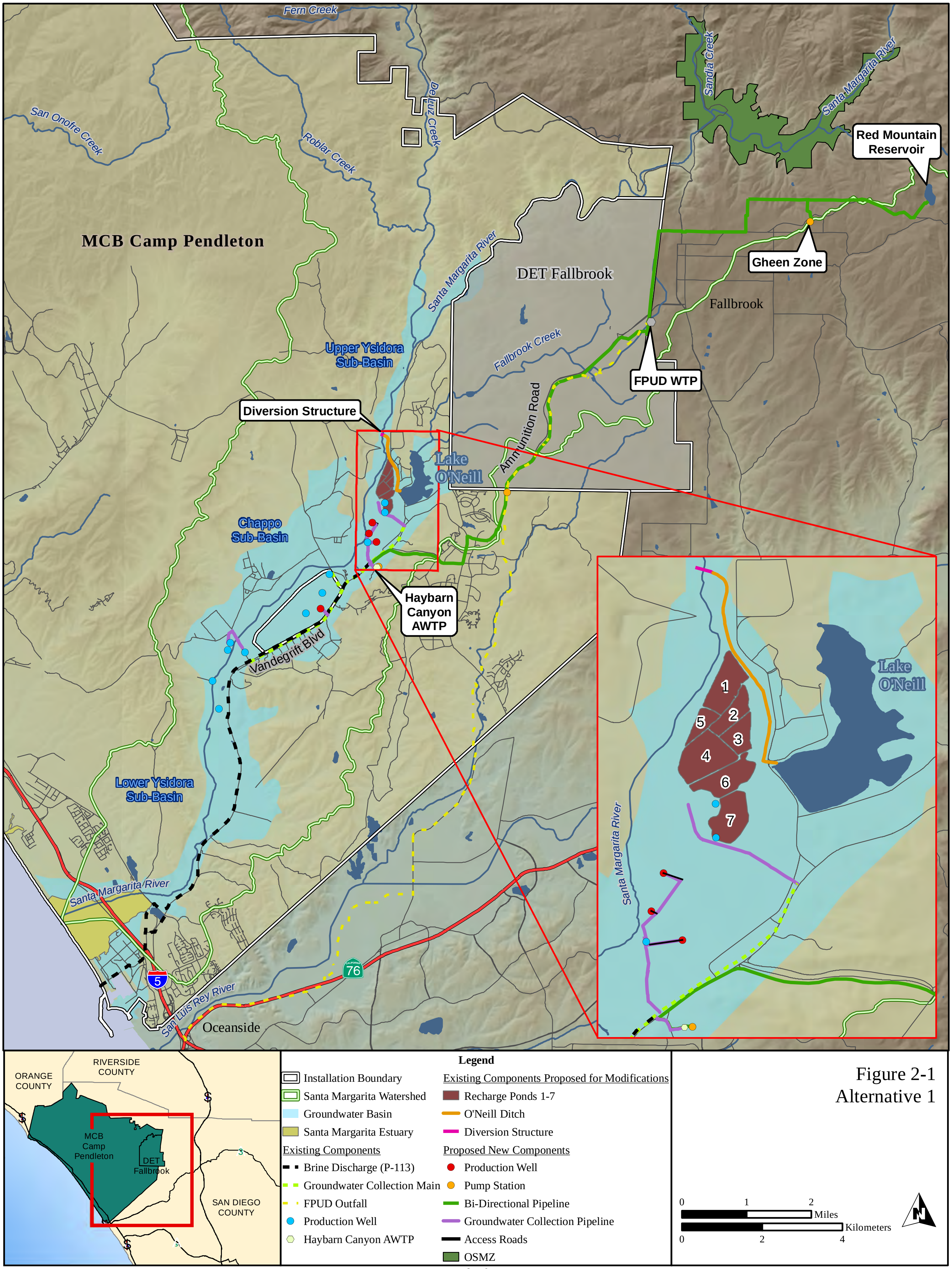
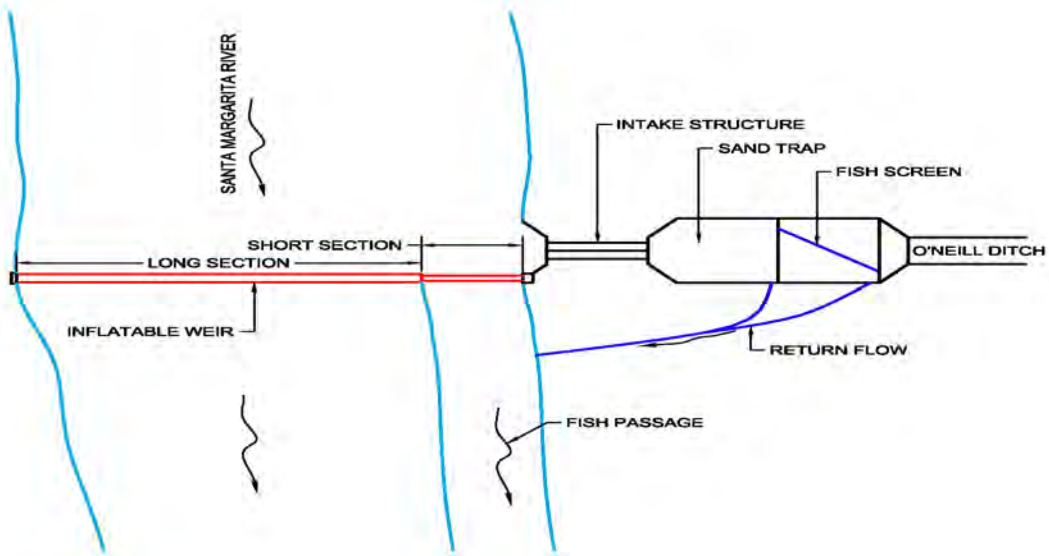


Figure 2-1
Alternative 1



Notes: Sediment trap and fish screen final design to be determined.
Source: Stetson 2013a.

Figure 2-2. Conceptual Design of Proposed New Inflatable Weir and O'Neill Ditch Headgate

Each gate panel would consist of collapsible steel armor plates hinged to the upstream portion of a slab foundation and heavy rubber air bladders also attached to the slab foundation on the downstream side of the steel plates. The steel plates are necessary to provide protection to the rubber bladders from punctures. The bladders would be inflated with compressed air, raising and lowering the steel plates as required. As the air bladders are inflated and deflated, the plates would raise and lower to control the water surface elevation of the diversion impoundment. Two separately functioning weir panels would allow one section of the weir to remain fully raised while the other is partially lowered as necessary to accommodate fish passage and surface water diversion into the O'Neill Ditch.

A small building would be required to shelter air compressors and system control equipment for the inflatable weir structure. The proposed building would be a maximum of 12 ft by 15 ft (4 m by 5 m), prefabricated, and installed on a concrete base on the east bank of the river near the headgate (Figure 2-2). Elevation for this building base slab would be about 127 ft (39 m). Power would be supplied by a drop from existing lines serving the Naval hospital. Air piping would cross the sluiceway and run in a channel in the concrete apron.

Construction

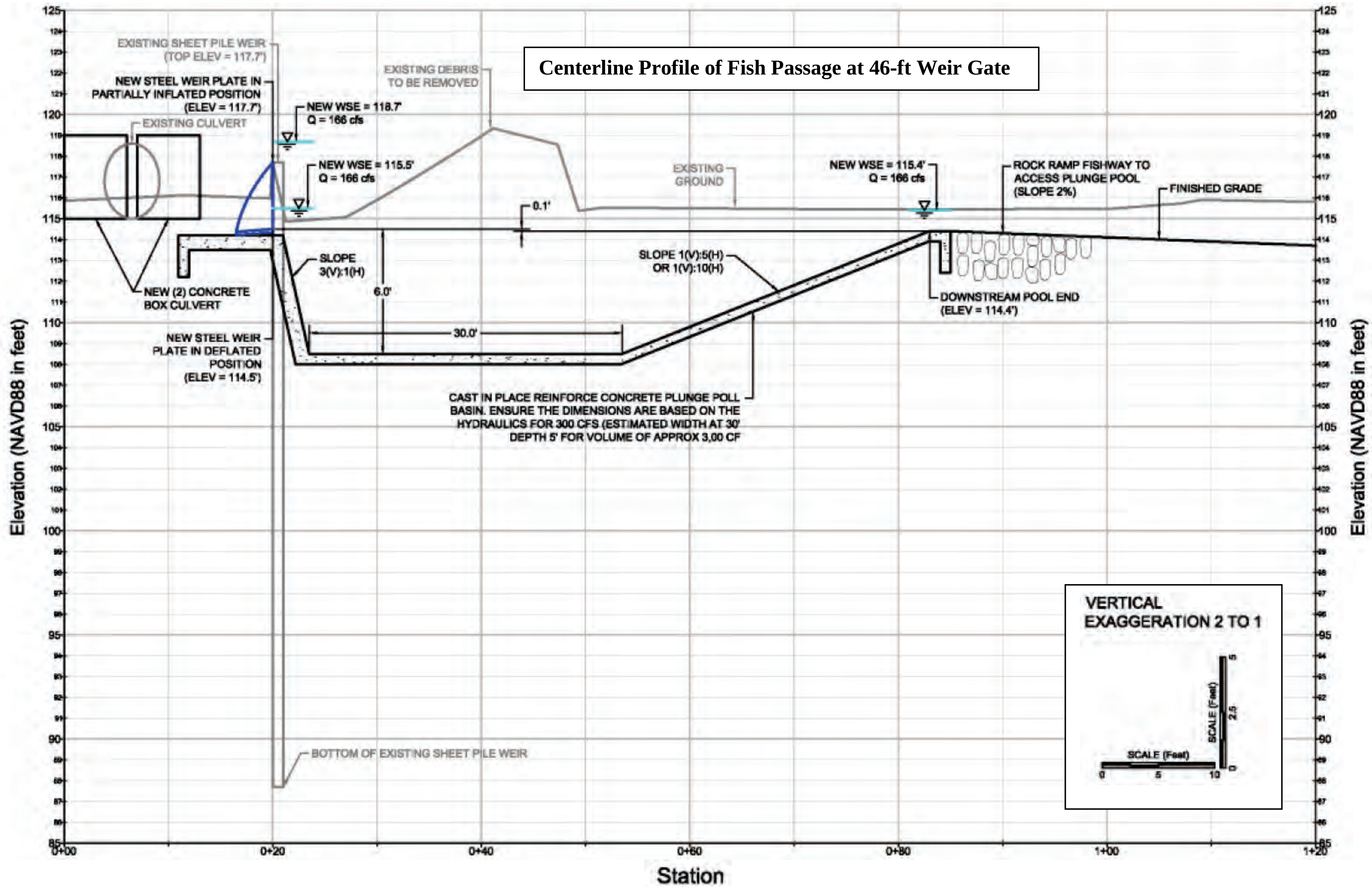
Construction of the inflatable weir diversion structure would take approximately 2 months to complete and would be coordinated with improvements to the headgate and O'Neill Ditch. All in-channel construction would occur during the dry season when flows are lower to facilitate maintaining bypass flows. Construction for the inflatable weir would commence by removing approximately 5 ft (1.5 m) of the top of the existing sheet piles for a width of approximately 280 ft (85 m). The buried portion of the existing sheet pile structure would be left in place. The bottom would serve as a cutoff for the replacement structure. The cutoff top sheet pile portion would be embedded in the new structural slab concrete. Removal of some sediment upstream (approximately 1,000 cubic yards [cy]) may be required for cutting off the top of the existing sheet pile structure.

After removing the upper part of the sheet piles, temporary diversion of the SMR to one side of the river channel may be required. Although exact details of the diversion are not known, methods for diverting flow during construction (e.g., coffer dams or temporary diversion channels and piping) would utilize the wide channel by diverting flows to one side of the channel while work is occurring in the other side. The temporary diversion would function to convey surface and shallow subsurface water around the construction area for the weir and downstream into the existing channel, avoiding any loss of flow below the construction area. Construction (and subsequent removal) of the diversion would occur within the overall footprint of weir construction, with access by existing roads. For permeable sand materials, well points or sumps could be used to further lower the water table a few feet below the impacted construction area. Concrete work would follow water control installations.

Operations

The inflatable weir diversion structure would allow diversion to O'Neill Ditch to increase from 60 cfs to 200 cfs. The inflatable weir is designed to be self-cleaning, thereby minimizing operational and maintenance costs associated with the removal of sand that currently builds up behind the existing structure.

The operation plan presented in Table 2.3-2 outlines how and when the two inflatable gate panels would be operated and shows the diversion, bypass, and spill rates for various streamflows at the POD. The operation plan is based upon SMR hydrology and the streamflow rate needed to provide for potential steelhead migration (1) between the SMR Estuary and the inflatable weir, and (2) over the weir. Both gates on the inflatable weir would be raised to an elevation of 118.7 ft (36 m) msl (i.e., 1 ft [0.3 m] above the elevation of the existing sheet pile weir) from June through November. The shorter 46-ft (14-m) gate would be lowered to an elevation of 117.7 ft (35.9 m) msl (i.e., the same elevation as the existing sheet pile weir) from December through May and when instantaneous flows at the POD exceed 153 cfs (*Note:* the December through May period coincides with the adult and/or juvenile steelhead migration season). Partially lowering the shorter gate would hydraulically constrict flows through a 46-ft (14-m) wide channel with the plunge pool, increasing channel depth and thereby facilitating upstream migration (Figure 2-3). During large streamflow events (i.e., 10-year event and greater), both inflatable gates would be fully lowered and the diversion gate to O'Neill Ditch would be closed. This action would allow floodwaters, sediment, and debris to pass downstream without adversely affecting water diversion facilities. After the initial flood flow has passed, the long and short gate(s) would be raised/inflated 118.7 ft msl and 117.7 ft (36.1 m and 35.9 m) msl, respectively, to re-allow full diversion capacity to be restored. In addition to the operation plan outlined in Table 2.3-2, operations of the inflatable weir would be based on AMP/FOP guidelines and procedures as described in Section 2.3.1.4, *Special Conservation Measures*.



Notes: Elevations shown are based on the benchmark PC 14 found by the Navy Hospital and the survey work performed by Stetson Engineers on 16-17 January 2013.
Source: Stetson 2013a.

Figure 2-3
Conceptual Design of Inflatable Weir with Plunge Pool

Table 2.3-2. Proposed Operation Plan for the Inflatable Weir Diversion Structure and O'Neill Ditch Headgate

Instantaneous Streamflow at POD (cfs)	Diversion (cfs)	By-Pass (cfs)	Inflatable Weir Gate Elevations		Spill (cfs)[1]	Fish Screen in Use?[2]	Notes
			204 ft	46 ft			
0 to 3	0	0 to 3	118.7	118.7	0	No	
4 to 153	1 to 150	3	118.7	118.7	0	No	
154 to 303	150	3	118.7	117.7	1 - 150[3]	Yes[2]	December through May
304 to 353	151 to 200	3	118.7	117.7	150	Yes[2]	December through May
354 to 15,000	200	3	118.7	117.7	>150	Yes[2]	December through May
>15,000	0	>15,000[4]	114.5	114.5	0	No	O'Neill Ditch headgate would be closed

Notes: [1] Spill would occur over the 46-ft weir when lowered to an elevation of 117.7 ft msl.
[2] Fish screen would be installed seasonally; December through May, when adult and/or juvenile steelhead may occur in the Lower SMR.
[3] Spill primarily to river channel would potentially benefit downstream juvenile steelhead migration.
[4] When instantaneous streamflow at the POD reaches 15,000 cfs (i.e., the 10-year event), both weir gates would be lowered to the bed elevation of 114.5 ft msl.
POD = point of diversion; cfs = cubic feet per second; ft = foot/feet; SMR = Santa Margarita River.

<u>Improvements to O'Neill Ditch and Headgate</u>

The existing O'Neill Ditch conveys water from the sheet pile diversion structure on the SMR to existing groundwater percolation (recharge) ponds or Lake O'Neill, depending on the time of year, available water supply, and required demand. The existing capacity of the O'Neill Ditch is restricted at the location of the first road crossing in the upper reach of the ditch, and sediment accumulation, vegetative growth, and other debris also reduce channel capacity (Stetson 2001). Under Alternative 1, the headgate and O'Neill Ditch would be modified to increase the capacity from 60 cfs to 200 cfs to accommodate the amount of water required under the project design. A water depth in the existing ditch of 5 ft (1.5 m) is required for a 200 cfs flow. The proposed capacity is based on the hydrology of the river for a 75-year period of record (1925 to 1999), CWRMA flows, and available off-stream storage in the groundwater percolation ponds and Lake O'Neill. The total length of O'Neill Ditch would remain at 5,100 ft (1,554 m) from the head of the diversion ditch to the turnout structure at Lake O'Neill.

Headgate and intake facility modifications are illustrated in Figure 2-2. Water would enter the O'Neill Ditch through two 48-in (122-cm) box culverts that would be operated individually or in tandem, depending upon the diversion rate. Two vertical lift headgates protected by a common trash rack would be used to allow SMR water to enter the box culverts. A rock/sand trap would be constructed downstream of the two box culverts to capture sediment that might accompany diversion flow as bed load or wash load. It is not practical to construct a sediment trap large enough to capture suspended sediments or high wash loads so the vertical lift headgates would be closed and no streamflow diverted during high streamflow events. A sluiceway would be installed to allow flushing of the sand trap.

A fish screen would be incorporated onto the diversion headgate to minimize the possibility of entraining adult and juvenile steelhead if they were migrating downstream (Figure 2-2). A concrete basin large enough to screen juvenile steelhead at a diversion rate of 150 cfs would be constructed downstream of the rock trap. Diversion rates are expected to vary from less than 5 cfs to a maximum of 200 cfs but would be less than 10 cfs most of the time. Thus, the screen basin would be by-passed and de-watered when streamflow is too low or too warm to support steelhead smolt migration. The proposed design includes a fish screen immediately below the headworks to protect steelhead from entrainment in the ditch during downstream migration. The fish screen would be installed seasonally from December through May when adult and/or juvenile steelhead may occur in the Lower SMR and when conditions (i.e., river flows) are adequate to support migration.

Existing undersized road crossing culverts, a Parshall flume, and control gates would be replaced by reinforced concrete structures and enlarged to allow for the capacity of the existing ditch to increase to 200 cfs. The portion of the ditch beyond the turnout to the percolation ponds would not be excavated because the current capacity of this portion is sufficient to convey 20 cfs (i.e., the permitted amount of diversion to Lake O'Neill).

Construction

The new diversion headgate and O'Neill Ditch would be modified to increase the capacity from 60 cfs to 200 cfs. A backhoe would be used to widen the ditch by 1 to 2 ft (0.3 m to 0.6 m) and to excavate an average depth of 2 ft (0.6 m) of material over a total distance of 1,900 ft (580 m) from the diversion headgate at the SMR to the turnout to the percolation ponds. This excavation would remove approximately 6,000 cy of depositional material from O'Neill Ditch. The material would be placed in Ponds 6 and/or 7 for dewatering and then used as topsoil or hauled off to Las Pulgas Landfill. Construction would also include replacement of existing undersized road crossing culverts, Parshall flumes, and control gates.

Operations

The diversion headgate would be operated to allow flow into the O'Neill Ditch following the schedule outlined in Table 2.3-2. The proposed design includes a fish screen immediately below the headworks to protect steelhead from entrainment in the ditch during downstream migration. The fish screen would be installed seasonally; December through May, when adult and/or juvenile steelhead may occur in the Lower SMR. In addition to operation plan outlined in Table 2.3-2, operations of the headgate and O'Neill Ditch would be based on AMP/FOP guidelines and procedures as described in Section 2.3.1.4, *Special Conservation Measures*.

<u>Improvements to Percolation Ponds 1-7</u>

Water diverted from the SMR would flow to a series of seven percolation ponds for groundwater recharge or be stored in Lake O'Neill. Because of the proposed increase in the capacity of the diversion structure and conveyance facilities, capacity improvements to the percolation ponds would be required to control the flow of water between each of the seven ponds. Under Alternative 1, the control gates between Ponds 1-7 would be upgraded. Historical performance of the ponds indicates their location in the Upper Ysidora Sub-basin would meet the diversion and recharge needs of the project (Stetson 2001).

Proposed improvements to Percolation Ponds 1-7 include redesigning the culverts and weirs that transfer water from one pond to the next. This includes increasing the capacity of the culverts and adding new control structures to better regulate the flow between ponds. Flow over the weirs would be conveyed between ponds through corrugated metal pipes buried in the sand levees separating the ponds. New control structures would include motor-operated sliding weir gates mounted on cast-in-place concrete box structures to control pond water levels and to measure flow between ponds. The sliding weir gate structures would control pond water levels such that flow from one pond would cascade to another without backwater effects between ponds that are in series. Eliminating the backwater effects between ponds would allow flow to be easily and accurately measured. The maximum allowable pond water levels would be fixed by the crest height of each sliding weir gate.

Additional improvements may include the use of remote-controlled floating dredges for cleaning of one or more of the percolation ponds. Historically, fine sediments suspended in flows diverted to the percolation ponds have consolidated on the bottom into a hardened crust layer that reduces the infiltration capacity of the ponds. Automatic silt removal equipment of this type is currently being tested by the Orange County Water District and the results may be used to make recommendations for use in MCB Camp Pendleton's percolation ponds. Future use of this type of equipment is considered in this document.

Construction

Construction at the percolation ponds would include replacement of control gates, culverts, and weirs that control and transfer water from one pond to the next.

Operations

Under Alternative 1, Ponds 1-7 would be operated and maintained to provide continued infiltration capacity. Operation of the percolation ponds would be based on AMP/FOP guidelines and procedures as described in Section 2.3.1.4, *Special Conservation Measures*.

2.3.1.2 Proposed New Facilities

Groundwater Production Wells and Associated Collection System Infrastructure

The existing groundwater production wells operated and maintained by MCB Camp Pendleton would be augmented by the installation of four new groundwater production wells in the Upper Ysidora and Chappo sub-basins (Figure 2-1), along with appurtenant collection pipelines, power lines, and access roads (refer to Section 1.6.1.1 for a description of existing wells). Each new well would include a high pressure pump. The wells are expected to have individual proposed pumping rates of about 800 to 1,000 gallons per minute (1.8 to 2.2 cfs). The new production wells would have the combined maximum capacity to extract up to 10 cfs of water and increase the operational flexibility of groundwater extractions.

Construction

Placement locations for the new groundwater production wells are located within the Lower SMR Basin and downstream of the existing percolation ponds. Each well requires a ground disturbance of approximately 324 square feet (ft^2) (30 square meters [m^2]) (18 ft by 18 ft [6 m by 6 m]). Raw water lateral lines would be installed underground through trenching to connect the wells with the existing raw water collection system. In addition, sections of MCB Camp Pendleton's existing raw water collection system would be repaired and/or expanded to handle additional capacity. The raw water lateral lines and collection system pipelines would convey groundwater and be subject to requirements for potable water pipelines (refer to Section 2.3.1.4 for special conservation measures [SCMs] specific to potable water pipelines).

Access to the three new groundwater production wells in the Upper Ysidora Sub-basin would be provided by a new graded dirt access road off of the existing access roads in the well basin. The new roads would be 12 ft (4 m) wide and may be covered with gravel. The roads would be bordered on both sides by a 20 ft (6 m) wide buffer that would be used to accommodate 18-in (46-cm) diameter power poles, overhead power lines, and a 12-in (31-cm) diameter collection pipeline. The power pole centerline would be approximately 4 ft (1.2 m) off the road edge, with power poles located approximately every 100 ft (31 m).

Access to the one new groundwater production well in the Chappo Sub-basin would be provided by existing roads and no access road is needed.

Wells and/or pipelines and access roads would be sited to avoid known cultural resources. Whenever practicable, impacts on riparian vegetation and any sensitive species would be avoided or mitigated through measures developed through coordination of MCB Camp Pendleton Environmental Security (ES) with USFWS. The locations of the proposed production wells were selected to achieve the necessary aquifer storage and to minimize potential adverse impacts on riparian vegetation resulting from the periodic lowering of groundwater levels in the aquifer.

Placement of the proposed new production wells would also require coordination and approval by MCB Camp Pendleton's Federal Facilities Agreement (FFA) team, which consists of the San Diego RWQCB, the USEPA (Region IX), the California Environmental Protection Agency (Cal EPA) Department of Toxic Substances Control (DTSC), DON, and MCB Camp Pendleton. MCB Camp Pendleton's FFA team makes joint decisions on Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) cleanup actions at MCB Camp Pendleton. A number of former and active sites identified under the CERCLA and petroleum cleanup programs exist in the Lower SMR groundwater basin; if unaccounted for, drinking water wells located in the groundwater basin have the potential to draw in contaminated groundwater from some of these sites if situated too close or down-gradient. Groundwater modeling utilized to locate proposed new SMR CUP well sites relied on the best available information on contaminant plumes provided by the FFA team. The proposed four new well locations depicted in Figure 2-1 have been sited, using available data and models, to avoid adverse impacts from known contaminant plumes. Based on the dynamic nature of contaminant transport in the aquifer, and currently undiscovered plumes that may exist, measures would be taken in the AMP/FOP to avoid production of contaminated groundwater as new data become available.

Operations

The groundwater available for pumping fluctuates seasonally and varies by hydrologic condition. Operation of existing and new production wells would be based on AMP/FOP guidelines and procedures as described in Section 2.3.1.4, *Special Conservation Measures*. The pumping schedule would be designed to optimize groundwater levels during the winter to create storage in the aquifer, capture wintertime flow events, and minimize groundwater mounding at the percolation ponds. The operation and management of groundwater production under Alternative 1 would be constrained by: (1) maintenance of groundwater levels within their historical range, (2) no aquifer compaction, and (3) no seawater intrusion. Pumping rates would be managed during the summer to reduce potential impacts to riparian habitat. Pumping would also be reduced during dry years to prevent seawater intrusion and protect riparian habitat by maintaining minimum groundwater levels. During consecutive below normal water years, pumping rates would be further reduced, with restricted groundwater production continuing until wetter hydrologic conditions occur.

The groundwater produced from existing and new groundwater production wells operated and maintained by MCB Camp Pendleton would be collected via new and existing conveyance pipelines connected to the existing raw water collection system. The collection main conveys water to the Haybarn Canyon area and has a flow capacity of approximately 20 cfs to handle the existing and new groundwater well capacity. Where undersized, the collection main would be replaced or enlarged within its existing footprint to convey the maximum groundwater pumping capacity to Haybarn Canyon. Each new well would have a 12-in (30-cm) steel pipe connecting individually to the collection main. The steel collection pipelines would be installed by trenching. Well operations would follow the facility operation plan (FOP) and be manually controlled by Office of Water Resources (OWR) personnel on MCB Camp Pendleton. Wells would be turned on or off according to water demands and the monitored groundwater table levels in the aquifers.

Typical annual operational activities associated with pipeline systems would include painting aboveground storage tanks, monitoring pressure, repairing occasional pipe breaks, exercising valves, and corrosion monitoring. Pumps and motors have life spans of about 20 to 30 years, depending on water quality. Typical operational activities would include occasional replacement of parts and other minor repairs.

<u>Water Conveyance/Distribution System, including Bi-Directional Pipeline from MCB Camp Pendleton to Red Mountain Reservoir via new FPUD Water Treatment Plant</u>

Raw groundwater would be pumped from the aquifer and conveyed to the Haybarn Canyon area on MCB Camp Pendleton (Figure 2-1) for delivery to MCB Camp Pendleton and FPUD. The water delivered to MCB Camp Pendleton would be treated at the existing Haybarn Canyon AWTP (P-113). Raw groundwater delivered to FPUD would be treated at the new FPUD WTP and then delivered to Red Mountain Reservoir via a new bi-directional pipeline. MCB Camp Pendleton would continue to process water for its own use at the existing Haybarn Canyon AWTP (P-113) (refer to description of the *Water Treatment Facilities* in Section 1.6.1.1) and FPUD would treat its portion of the project water at a new FPUD WTP (see detailed description below). Raw groundwater delivered to FPUD would average 3,100 af/y and would not exceed 800 af in any given month. However, total volumes of raw water deliveries to FPUD would vary annually, depending upon multiple factors including, but not limited to, precipitation, river surface flows, surface diversions, and environmental considerations (refer to *Replacement of Existing Sheet Pile Diversion with Inflatable Weir Diversion Structure* in Section 2.3.1.1 for details on the operation plan). Treated imported water from SDCWA would also be delivered through the same bi-directional facility from Red Mountain Reservoir in Fallbrook to MCB Camp Pendleton, if and when needed.

Construction

From Haybarn Canyon, a new pump station would lift raw groundwater north along Vandegrift Boulevard to Rattlesnake Canyon Road in a new 18-24 in (46-61 cm) diameter bi-directional pipeline. The pipe would turn east and follow Rattlesnake Canyon Road to Vandegrift Boulevard (Vandegrift Boulevard makes a loop around a ridgeline and circles back). At Vandegrift Boulevard, the pipe would turn north along the road to the intersection with 19th Street. The pipe would then turn east and follow 19th Street, which becomes Fallbrook Street on MCB Camp Pendleton, and then Ammunition Road on the DET Fallbrook. A booster pump station would be located along the pipe alignment on the east side of Fallbrook Road at the boundary of MCB Camp Pendleton and the DET Fallbrook; the pump station would require associated electrical power drops. The pipe alignment would exit the pump station, continuing northeast on Ammunition Road and crossing Fallbrook Creek. Near the intersection of Ammunition Road and Redeye Road, the pipe would turn east, then northeast around an existing storage yard, and then turn east again, crossing Fallbrook Creek and continuing across the boundary of DET Fallbrook to a connection with the new FPUD WTP. At the two Fallbrook Creek crossings, the bi-directional pipeline would either (1) span the channel, supported by piers or suspended from a new utility I-beam, or (2) be installed beneath the stream channel through trenchless construction. If suspended above the channel, the pipeline would be placed at an elevation above the 100-year flood event. The total length of the pipeline from Haybarn Canyon to the Fallbrook WTP would be 36,818 ft (11,222 m) of which

17,000 ft (5,182 m) would be located on MCB Camp Pendleton and 19,818 ft (6,041 m) on DET Fallbrook.

A new pump station and clear-well located adjacent to the new FPUD WTP would lift the treated water north through an 18-24 in (46-61 cm) diameter pipe along the DET Fallbrook boundary fence line. The total length of the pipeline within DET Fallbrook, from the Fallbrook WTP to the Fallbrook service area, would be 7,380 ft (2,249 m). The bi-directional pipeline would again cross Fallbrook Creek within the roadbed of an existing bridge and then cross Ammunition Road near the DET Fallbrook gate. The alignment along the fence line would follow an existing dirt access road. At the termination point of Dougherty Street on the fence line, the pipeline alignment would turn east onto Dougherty Street. This east heading alignment would intersect Mission Road and continue east to a south turnout for the Knoll Park-Gheen Zone tank site, where a new storage/regulating reservoir tank would be constructed for system operations. A final pump station would lift the water north from the site back to Mission Road and a new 24-in (61-cm) diameter pipe would connect to an existing FPUD pipeline located just east of the intersection of Red Mountain Dam Road and Mission Road to provide a connection to the Red Mountain Reservoir. Red Mountain Reservoir has an existing connection to receive water from the San Diego County Aqueduct. A new connection between Red Mountain Reservoir and the San Diego County Aqueduct may be added in the future to allow for delivery of project water to the San Diego County Aqueduct. However, the connection between Red Mountain Reservoir and the SDCWA Aqueduct is not part of SMR CUP and would be subject to a separate analysis under NEPA/CEQA, as appropriate.

It is assumed that the pipe alignment would traverse commonly excavated materials. At creek or river crossings, the pipe would be routed along bridges, where possible, to avoid excavation in stream channels (*Note*: not all crossing have existing bridges and would involve temporary disturbance of the stream channel). The bi-directional pipeline would be installed in a Type 1 flexible pipe trench by trenching with at least 2 ft (0.6 m), and on average 4 ft (1.2 m) of cover over the pipe. Construction within Fallbrook would follow San Diego County guidelines. The pipe would be cement mortar lined and coated. The bi-directional pipeline would be subject to requirements for potable water pipelines (refer to Section 2.3.1.4 for SCMs specific to potable water pipelines).

Operations

The rate of raw water pumped from Haybarn Canyon to the FPUD WTP would vary based on hydrologic conditions. Maximum pumping would occur during the winter months of very wet years while minimum pumping would occur during drier conditions. During the driest years, project groundwater would not be delivered to FPUD. Normal daily operations would be at a rate that would be dependent upon the hydrologic relationship between groundwater levels, aquifer volumes, and predicted incoming flows in the SMR.

The bi-directional pipeline between FPUD and MCB Camp Pendleton would also allow imported water to be delivered to MCB Camp Pendleton from the SDCWA Aqueduct during drought periods when groundwater is insufficient to meet demands or during emergency situations. Delivery of imported water would be based on the AMP/FOP that triggers the curtailment of groundwater pumping if physical and environmental constraints are not being met (refer to SCM in Section 2.3.1.4 for guidelines and procedures outlined in the AMP/FOP). The average annual delivery of imported water to MCP Camp Pendleton would be anticipated to be 500 af/y.

Flow metering would occur upstream of the pump station at Haybarn Canyon, where meters would measure the total raw water made available under Alternative 1; and downstream of the pump station at

Haybarn Canyon where meters would measure the flow going to FPUD. Alternately, for bypass flow, the meters would measure flow conveyed to MCB Camp Pendleton from FPUD.

Typical annual operational activities associated with pipeline systems would include painting aboveground storage tanks, monitoring pressure, repairing occasional pipe breaks, exercising valves, and corrosion monitoring. Pumps and motors have life spans of about 20 to 30 years, depending on water quality. Typical operational activities would include occasional replacement of parts and other minor repairs.

FPUD WTP

A new FPUD WTP would be constructed on FPUD property adjacent to DET Fallbrook (Figure 2-1). The new FPUD WTP would be located on the same property as the existing FPUD wastewater treatment plant and would retrofit some of the existing solids drying beds. The FPUD WTP would use a treatment facility designed to provide potable water and would include an iron and manganese removal and demineralization plant. The FPUD WTP would have the capacity to treat a maximum of 800 af per month. The average annual raw water delivery to the FPUD WTP would be 3,100 af/y. The FPUD WTP would be connected to and controlled by the existing FPUD SCADA system.

Pretreatment/Iron and Manganese Removal

Groundwater delivered from MCB Camp Pendleton via the bi-directional pipeline would enter an equalization tank. The groundwater would first undergo pretreatment oxidation with sodium hypochlorite (NaOCl) and then the iron and manganese filters would remove 97% of the iron and manganese in the system, reducing the effluent iron and manganese concentrations to below 0.3 mg/L and 0.05 mg/L, respectively. Iron and manganese system reject streams would flow to reclaim tanks for solids separation. The liquid would be decanted and returned to the start of the iron and manganese process for treatment. The remaining solids would be pumped to existing sludge drying beds at the facility. Decant from the drying beds would be pumped to the sewer and remaining dry solids would be removed for disposal at a landfill. The volumetric product from the iron and manganese plant is expected to be 99.7% of the feed flow.

Demineralization

The feed water for the plant would have relatively low salinity based on water quality data from existing production wells in the Lower SMR Basin. Therefore, to maximize the RO treatment process efficiency, the effluent from the iron and manganese plant would be split into two lines prior to demineralization. The first split line would be the RO bypass line which would feed directly into the clearwell and receive no further treatment until the post-treatment disinfection. The volumetric flow of this line would be 4.27 MGD (6.6 cfs) or 49% based on the RO unit salt rejection and recovery to ensure that the blended flow in the clearwell achieves a TDS concentration of 500 mg/L.

The second line would feed the RO demineralization process at a maximum flow of 4.46 MGD (6.9 cfs). Sodium bisulfite would be added prior to contact with the RO system for membrane protection from chlorine. Antiscalant would also be added to the RO feed. Treated flows from the RO plant would be neutralized with sodium hydroxide with maximum flows of 3.81 MGD (5.9 cfs). Concentrate flows (i.e., brine) from the RO unit would be discharged to the Pacific Ocean via Fallbrook’s Oceanside Ocean Outfall with a maximum flow of about 0.65 MGD (1.0 cfs) and a TDS concentration of 5,816 mg/L based on the 900 mg/L design TDS feed concentration.

Post-treatment

The RO feed water product and the RO bypass line would be blended in the clearwell to achieve the target TDS of 500 mg/L. NaOCl would be added for primary disinfection and ammonia hydroxide would be added last to form a chloramine residual in the pipeline. The maximum treated flow for the FPUD AWTP is estimated to be about 8.01 MGD (12.4 cfs), or 92% of the feed groundwater flow based on cumulative process recoveries in the system. Treated water from the clearwell would be transported to the Gheen Tank.

Brine Discharge to Fallbrook's Oceanside Ocean Outfall

Brine from the FPUD WTP would be discharged to the Pacific Ocean via FPUD's Fallbrook Outfall pipeline to the Oceanside Ocean Outfall (Figure 2-1). FPUD's existing National Pollutant Discharge Elimination System (NPDES) Permit (CA0108031) would be amended to allow for the inclusion of the additional brine from the project. The existing FPUD NPDES Permit currently has a permitted average annual discharge of 2.4 MGD.

SCADA System

A Supervisory Control and Data Acquisition (SCADA) system would be included in the project. The spillway gates on the inflatable weir diversion structure, turnouts to the percolation ponds and Lake O'Neill, production and monitoring wells, flow measurement, and pumping plants would be designed for remote operation and/or data acquisition. These facilities would be connected to a control room for the SCADA via existing utility poles. The control room would be located in Building 1142 and operated by OWR personnel (*Note*: The FPUD WTP would be connected to and controlled by the existing FPUD SCADA system).

Open Space Management Zone

A framework would be established by FPUD to permanently preserve 1,392 acres (563 hectares) of riparian open-space land that was acquired by FPUD in 1958 for water supply development purposes. Under Alternative 1, all or most of the OSMZ is intended to be placed in conservation management to preserve open space and riparian values that currently exist on the site. Conservation approaches currently being considered by FPUD include, but are not limited to: (1) purchase and management of the OSMZ by Reclamation, MCB Camp Pendleton, or another agency or conservation related organization; (2) continued ownership of the property by FPUD subject to a conservation easement purchased by a third party that restricts future development; or (3) management of the property as a mitigation bank by FPUD or its designee.

Whichever conservation approach is ultimately selected by FPUD would comply with Senate Bill 1148, guidelines developed to implement Senate Bill 1148, and any other applicable federal, state, and local regulations and policies. Senate Bill 1148 authorizes private and public conservation and mitigation banks to serve an important function of managing the mitigation provided by private applicants when aquatic or terrestrial mitigation is required as a condition of a permit from a public agency. Should the site be established as a mitigation bank, FPUD would mitigation credits to proponents of other projects within San Diego and Riverside counties having mitigation responsibilities that require compensation for impacts to wetlands, threatened or endangered species, and other sensitive resources, but the intended approach under Alt 1 is for the open space status of the 1,392 acres (563 hectares) to be maintained.

The OSMZ would continue to serve as a critical parcel for ensuring a healthy watershed in the community of Fallbrook. It would also have the effect of protecting downstream water quality and preventing development of riparian water rights within the OSMZ that, if developed, would decrease in-stream flows reaching MCB Camp Pendleton and the SMR Estuary.

2.3.1.3 General Construction Methods

New facilities associated with the project would be located in roadways, existing rights-of-way, and other disturbed areas as much as possible to minimize impacts to existing environmental resources. It is assumed, unless otherwise noted, that the direct impact area for proposed new facilities (e.g., pump stations, groundwater production wells, and treatment facilities) would include the following: a 30-ft (9-m) perimeter for parking/facility access, a fence surrounding the facility at the edge of the 30-ft (9-m) perimeter, and a 10-ft (3 m) wide firebreak outside and surrounding the fence line. For the purpose of this analysis, it is assumed that construction-related activity and temporary disturbance may also occur within a 50-ft (15-m) wide "buffer" around these areas.

Pipeline Construction

Pipeline construction would be similar to previous projects in northern San Diego County. The descriptions below are expected to be equivalent to construction methods for SMR CUP. For the purposes of analysis in this EIS/EIR, an approximately 50-ft (15-m) wide construction buffer corridor has been identified for the conveyance pipeline from the wells and an approximately 100-ft (30-m) wide construction buffer corridor has been identified for the bi-directional pipeline. The construction buffer corridor is centered on the anticipated pipeline alignment and has been identified for impact analysis. The final pipeline construction would occur within a 20-ft (6-m) wide corridor (impacted temporarily for pipeline burial) situated within the 50- to 100-ft (15- to 30-m) wide construction buffer corridor to avoid significant biological/cultural resources and drainages, as feasible. Potable water pipelines, including groundwater collection system pipelines and the bi-directional pipeline, would be vertically or horizontally separated from sewer pipelines.

The 20-ft (6-m) wide corridor would be cleared and grubbed prior to construction, and vegetation would be chipped/mulched on-site and recycled for use as ground cover. Trenching to place pipelines would occur along the center of the 20-ft (6-m) wide corridor. A typical pipe trench would be approximately 3 to 5 ft (1 to 1.5 m) wider than the outside diameter of the pipe. Pipelines would be placed at typical depth to ensure a minimum of 2-3 ft (0.6-1 m) of cover over the pipe. Accordingly, the trench for the 18- to 24-in (46- to 61 cm) diameter bi-directional pipeline to the community of Fallbrook would be 7 ft (2 m) wide and 4 ft (1.2 m) deep, with up to a maximum depth of 10 ft (3 m) below ground surface at road crossings, where 5 ft (1.5 m) of cover fill above the pipe would be used. Shallower trenches would be used for the 12-in (30-cm) diameter groundwater collection pipeline system.

Trenches would be excavated using common excavating equipment (i.e., trenchers and track backhoes). An exception to the mechanical excavation would be hand-digging to locate buried utilities, such as other pipelines, cables, water mains, and sewers. No blasting would be required. The trench would be excavated and backfilled incrementally as pipeline assembly progresses. After placement of pipelines, the trench would be backfilled, the original ground contours would be restored, and, where applicable, the roadway would be repaved to match existing roadway. There would be little or no export of materials from the trenches or import of backfill for the pipe sections since the material would be suitable for backfill into the trenches. Pipeline excavations would occur above the groundwater table; however, dewatering may be necessary if perched groundwater is encountered during wet months (refer to SCMs listed in Section 2.3.1.4 for measures taken when groundwater is encountered). Pipeline would be installed on the surface in locations where trenching is infeasible. In locations where the pipeline would be on the surface, it would be elevated sufficiently to allow high-water flows and wildlife to pass underneath. Surface laid pipe would be secured to ground with anchors. If feasibility design determines that pipeline construction would differ significantly than as described below, additional analysis would be necessary.

Pipe Handling

Pipe-stringing trucks would be used to transport the pipe from the shipment point or storage yards to the pipeline construction area. Trucks would carry the line pipe along the pipeline construction area, and sideboom tractors would unload the joints of pipe from the stringing trucks and lay them end to end beside the ditch line for future line-up and assembly. The pipe joints would be rubber gasketed and would be tested for leaks during construction. The entire pipeline would be hydrostatically tested before being used to convey water under pressure.

Lowering and Backfilling

The pipe would be lifted and lowered into the ditch by two side-boom tractors spaced so that the weight of unsupported pipe would not cause mechanical damage. Cradles with rubber rollers or padded slings would be used so the tractors could lower the pipe without damage as they travel along the ditch line.

Backfill material would be obtained from excavation ditch spoils. Spoils would generally be returned to the ditch within one week of trenching. Spoils would be screened as the material is returned to the ditch using standard construction screening equipment, as required. The pipe would be covered along the sides with a maximum of 6 in (15 cm) of native fill free of rocks, and then covered on top with a minimum of 12 in (30 cm) of backfill free of rocks. This zone is referred to as the pipeline padding and shading. In certain areas where damage might occur to the pipe coating from abrasive soils, clean sand or gravel backfill would be used to pad the pipeline. Any required padding material would be obtained from local commercial sources. The backfill in the remainder of the trench above the padding would be native material excavated during trenching. At the time of backfilling, a colored warning tape and/or locator wire would be buried approximately 18 in (46 cm) above the pipeline to indicate the presence of a buried pipeline to future third-party excavators. In roadways, the backfilled soil would be compacted using a roller or hydraulic tamper before paving or sand slurry. Any excess ditch spoils generated during construction would be spread along the construction right-of-way, used as topsoil, or hauled off to Las Pulgas landfill.

Water Course Crossings

The SMR, Fallbrook Creek, and Lake O'Neill overflow outlet are the major waters of the U.S. that would be crossed by pipelines, while several smaller drainage channels, tributaries, and wetlands would also need to be crossed. The SMR and Lake O'Neill overflow outlet would be crossed by conveyance pipelines from the production wells. Where possible, the conveyance pipelines would be installed through pipe-bursting and/or trenchless construction in areas with sensitive water resources and wetlands. At Fallbrook Creek, the bi-directional pipeline would either (1) span the channel, supported by piers or suspended from a new utility I-beam, or (2) be installed beneath the stream channel through trenchless construction. If suspended above the channel, the pipeline would be placed at an elevation above the 100-year flood event.

Trenchless construction refers to the installation of underground pipelines with minimal surface disturbance by avoiding the use of open-trench construction. Methods of trenchless construction that would be used include bore-and-jack or horizontal directional drilling. Trenchless construction would involve the use of working pits that would be filled and restored after construction was completed.

Road Crossings

The proposed pipeline would be constructed along or parallel to Vandegrift Boulevard, Ammunition Road, and roads within the community of Fallbrook. Where road crossings are necessary, surface preparation would include breaking and removing pavement with concrete saws, pavement breakers, and, where necessary, jack hammers. Once traffic control measures are in place, ditching operations would begin. Typically, the excavated trench depth would be enough to provide 5 ft (1.5 m) of cover over sections of pipe located under roads. The trench would be excavated using backhoes and trackhoes. An exception to the mechanical excavation would be hand-digging to locate buried utilities, such as other pipelines, cables, water mains, and sewers. The crossings would occur during non-peak traffic periods, as determined by the contractor.

<u>Equipment and Material</u>

Most of the heavy construction equipment would be delivered to staging areas on lowboy trucks or trailers. Mobile cranes and dump trucks would be driven in from existing local contractors' yards. Construction equipment would be left overnight at the site as feasible, at the contractor yards, or at other existing storage yards in the area. All construction materials would be taken to the staging/laydown areas by truck on existing roadways.

The construction contractor would be required to implement approved safety measures for lane closures or other disruptions in traffic. Construction in corridors would be designed to allow at least one lane of traffic wherever feasible. Appropriate warning signs would be placed at strategic locations to warn drivers of closed lanes. Flagmen may also be used at particularly busy intersections or roadways.

The construction equipment that would be utilized would include bulldozers, excavators, loaders, a bore-and-jack machine, and dump trucks. All construction equipment would be fitted with appropriate mufflers and all engines would be maintained regularly according to manufacturers' specifications.

The major material component of the project would be ductile iron, welded-steel, or high-density polyethylene (HDPE) pipe. It would be stored at a vendor's coating yard or existing storage yards until it is unloaded along the pipeline route. Aggregate, asphalt, sand, and slurry materials would be purchased locally and storage would be provided by local suppliers until it is unloaded along the route. During all phases of construction, refueling and lubrication of construction equipment would occur in areas designated by MCB Camp Pendleton ES, DET Fallbrook Public Works, or FPUD, as applicable.

<u>Construction Access, Staging, and Storage Areas</u>

During construction, existing roads would be used to provide access from public streets to staging areas, laydown and storage areas, and work zones. Preference would be given to utilizing existing roads over developing new roads.

Excavation spoils from construction would be stored in either construction laydown areas or exported from the construction site to a location approved by the Resident Office in Charge of Construction (ROICC) or FPUD, as applicable. The staging, laydown, and storage areas include heavy use recreation areas with a high percentage of bare ground, areas that are currently paved or otherwise disturbed, and road shoulders. Staging area locations on MCB Camp Pendleton and DET Fallbrook would be approved by MCB Camp Pendleton ES, DET Fallbrook's Department of Public Works and Conservation Program Manager in coordination with a biological monitor, if needed, prior to the start of construction related activities.

For construction on MCB Camp Pendleton and DET Fallbrook, the construction contract would require the contractor to identify all MCB Camp Pendleton and DET Fallbrook laydown and storage areas on construction plans and to have all laydown and storage areas approved by MCB Camp Pendleton ES, DET Fallbrook's Department of Public Works and Conservation Program Manager, and the ROICC, with final approval by the ROICC.

Tentative Schedule

Construction is contingent on Congressional appropriations and would follow a ROD, local approvals, and issuance of necessary permits. Construction of the project is estimated to take 36 months, assuming that some project components would be constructed concurrently when feasible. Pipeline construction would proceed at approximately 100-150 ft (30-46 m) per day. Within FPUD, construction would take approximately 18 months; MCB Camp Pendleton construction would take approximately 30 months, and DET Fallbrook construction would take approximately 12 months. Construction activities would be anticipated to occur during normal working hours between 7:00 am and 4:30 pm, Monday through Friday.

2.3.1.4 Special Conservation Measures

Implementation of Alternative 1 would incorporate the SCMs identified below, as part of project development to avoid or minimize any potential environmental impacts. The operations SCM (i.e., the AMP/FOP) has been provided first, followed by general construction SCMs that apply to multiple resource areas, and then resource-specific construction SCMs.

Operations

1. As part of the project, an AMP/FOP would be developed by MCB Camp Pendleton to manage project diversion, recharge, production, and delivery facilities. Management of the Base's resources occurs using the AMP, while implementation of management decisions and operation of facilities occur through the FOP. The proposed adaptive management of water-related resources in the SMR is best described as an empirical method of management. First, tools and models would be developed that describe the natural system's response to various stressors. Next, management objectives and a series of actions would be developed so that a logic-based series of responses can be created to guide active basin management. Finally, a monitoring system would be employed to gather near real-time physical data so that the tools and models test the management objectives. Through the on-going operation of the AMP, actions would be performed to adjust the project-related stresses that affect the natural system so that management objectives would continue to be met. The FOP provides the tool to operational personnel for controlling and operating facilities to meet management objectives.

   An important feature of the AMP/FOP is the ability to adjust operations based on measured and observed data so that refinements and improvements may be made to the available tools and models. The following physical and environmental parameters would be measured and recorded to actively improve and empirically manage the effect of the project on environmental resources:

   - climate data (i.e., precipitation and evaporation rates),
   - streamflow and diversion rate data (i.e., U.S. Geological Survey [USGS] gages throughout the SMR watershed and project gages at the diversion weir and in O'Neill Ditch),
   - percolation pond diversion and percolation data,
   - groundwater level data,
   - groundwater quality and related IR Site data,

- groundwater production data,
- surface water and groundwater quality data,
- estuarine data,
- geomorphologic data,
- riparian data, and
- fisheries data.

The AMP/FOP would identify triggers, which are hydrologic related parameters (e.g., groundwater level or streamflow), and thresholds, which are numeric values for triggers that would initiate a modification to project operations. Thresholds would vary from year-to-year based on hydrologic condition. The AMP/FOP would rely on near real-time environmental and hydrologic data from existing and proposed stream gages and monitoring wells to determine project operations and meet delivery requirements.

The AMP/FOP operation schedule would follow a May through April pumping year, with the hydrologic condition being identified on May 1, based on the previous winter's runoff. The pumping schedules and proposed operations for the subsequent year would then be published annually in a FOP that would describe how and when the inflatable weir, headgate, turnout gates, and wells are to be operated on a seasonal and monthly basis. The AMP/FOP would be developed, updated, and implemented by appropriate subject matter experts (e.g., hydrologists and biologists).

The AMP/FOP provides a stakeholder developed rule based method for meeting management goals that are intended to represent all interested parties. Once established, physical, environmental, and regulatory requirements would be continually tested by against actual field data collected through an extensive long-term monitoring plan described below in items 2 and 3.

The AMP/FOP would also provide guidelines for determining the magnitude of a storm and the timing for when to lower and raise the inflatable weir gate(s) during significant flows to flush accumulated sediments downstream. Water diverted from the SMR would be released into the percolation ponds for recharge to the groundwater aquifer or bypassed to Lake O'Neill. Water stored at Lake O'Neill would continue to be released to the SMR for recharge during periods of low river flow on an annual basis consistent with current practice. These operations would be controlled by a SCADA system (refer to Section 2.3.1.2).

2. To minimize impacts on aquatic and riparian habitats and species of the Lower SMR, the AMP/FOP would include a long-term Monitoring and Management Plan. The Plan would incorporate parameters in the MCB Camp Pendleton Riparian/Estuarine Biological Opinion (BO) (USFWS 1995a), including:

    - "Groundwater levels shall be monitored and basin withdrawals managed to avoid loss and degradation of habitat quality, to the extent practicable. Where vegetation monitoring programs demonstrate effects on habitat, compensation would be implemented, based on the best available hydrogeochemical and biological modeling available. The Base will not be penalized for upstream development, use and their (upstream) over-withdrawals from the Basin" (Appendix 1, page 47 of USFWS 1995a).

    - The USFWS (1995a) indicates that pumping regimes should minimize the drawdown to not exceed 15 ft (5 m) depth to groundwater level, because this is the upper limit of willow riparian root zone depth, beyond which plants are unable to utilize groundwater. The

AMP/FOP would be developed to improve the relationship between the 15-ft (5-m) depth to water and health of the riparian vegetation to prevent changes to the environment that are not within the natural range of conditions.

In addition to the measured and recorded data indicated above, the Plan would look at comparable data from one or more reference sites not subject to diversions and/or groundwater extraction; it would design and implement a comprehensive monitoring program for arroyo toads (ARTO) pursuant to the CWRMA (Reclamation 2008a); it would incorporate review and input from key stakeholders and regulatory agencies; and it would provide recommendations to adaptively manage water withdrawals to minimize adverse impacts on the river and its resources. Specific elements of the plan would include, but are not limited to, the following:

- Establishment of a comprehensive quantitative habitat baseline for the Lower SMR, using Geographic Information System (GIS) mapping of physical and biological features; definition of acceptable ranges of distribution, total abundance, and variability for these features; and a repeatable annual sampling program, including the use of aerial imagery, to track changes in the Lower SMR ecosystem.
- Continued implementation of Riparian/Estuarine BO (USFWS 1995a) habitat protection and enhancement measures that include the removal of non-native predatory (or parasitic) aquatic and riparian species on the Lower SMR, the eradication of non-native plant species, and minimization of training impacts on the SMR.
- Continued beaver removal program. Beaver dams have been identified and/or were removed in upper sections of the SMR consistently on an annual basis. These dams increase water levels, potentially reducing the number of breeding pools and creating suitable habitat for invasive aquatic species. The dams may also inhibit upstream and downstream movement of ARTO and fish larvae and adults. Beavers have also been observed in the Lake O'Neill ditches in recent years, and have been successfully trapped out of the Lower SMR percolation ponds.
- Continued annual sampling of fish and aquatic habitats in the Lower SMR to assess possible use by southern California steelhead (SCS).
- Monitoring for non-native invasive aquatic species, and the implementation of proactive measures to limit their spread and influence on the river ecosystem.
- The use of hydrologic and biological monitoring data from the Lower SMR in conjunction with data from stream gages and groundwater monitoring wells to refine the conjunctive use strategy for withdrawals to avoid the loss of essential aquatic habitat for native fishes and the ARTO, and to avoid significant losses of riparian scrub and woodland habitats.

3. The AMP/FOP would address physical and regulatory requirements through a long-term monitoring plan consistent with stakeholder interests. Management goals may include, among others not discussed below, protection of the physical environment and the delivery of safe and reliable water. In addition to those parameters described in SCM #2 above, the following data would monitored and assessed on a continuous basis by the AMP/FOP:

   - Groundwater levels to avoid aquifer compaction and seawater intrusion that could potentially result in permanent loss of storage.

- Groundwater quality to avoid adverse impacts that may result in loss of usable storage.
- Surface water flows and diversions to Lake O'Neill and the recharge ponds to assure maximum beneficial use of the surface flows.
- Surface water quality in the Santa Margarita River, tributaries, and Lake O'Neill to manage water quality of recharge water to the aquifer.
- Other physical and environmental parameters required to meet management goals and objectives.

In addition to the collection and analysis of physical and environmental data, the AMP/FOP would incorporate region-wide decisions and orders that may potentially impact the management of water resources on Camp Pendleton. These orders may include changes in stormwater and wastewater management practices that occur upstream of MCB Camp Pendleton, but within the watershed that affects water related resources. These non-numerical datasets would be assessed by water managers on a continuous and on-going basis during implementation of the AMP/FOP.

Other on-base activities such as recycled water use, IR Site remediation, and other water-related management activities would be incorporated in the AMP/FOP. Rule-based management that includes trigger and threshold levels would be tested by the hydrologic tools and monitoring plan that supports the AMP/FOP. If physical and environmental management objectives are not being met, the AMP/FOP would develop and implement alternative courses of action which may include, but not be limited to, changes in conjunctive use pumping or alternative water management techniques as discussed in Chapters 4 and 5.3.9.

<u>General Construction Conservation Measures</u>

4. All mechanized clearing and grading, vehicle traffic, equipment staging, and the deposition of soil would be confined to the footprints defined in this EIS/EIR. Construction site boundaries would be clearly delineated by flagging, stakes, survey lath, or snow fencing, as practical.
5. Contractors would be provided with digital files and hardcopy maps showing the project footprints that were used for the environmental analyses in this EIS/EIR and would be informed that construction activity must be confined within those limits. Digital files and hardcopy maps would also include the locations of federally listed species, sensitive habitats (including vernal pools), jurisdictional waters of the U.S. and cultural resources. Any work that is proposed outside those corridors would be subject to review by MCB Camp Pendleton ES and DET Fallbrook's Conservation Program Manager to determine if potential impacts would occur to environmental resources.
6. Project design would incorporate correct use of grading and drainage control to minimize erosion during the construction period, and procedures to ensure that slopes and backfilled areas do not erode when construction is completed. To prevent erosion and soil loss, excavation and grading during the rainy season (November 1 to May 1) would be minimized. Where it is impractical to avoid grading during the rainy season, erosion and sedimentation BMPs would be installed and maintained immediately downslope of work areas until work is completed and graded areas have been re-contoured, physically stabilized, and planted. Erosion and sedimentation BMPs would be monitored during construction to ensure stabilization of the site.
7. The proposed project would have a total area of greater than 1 acre (0.4 hectare) of soil disturbance and therefore, would be required to obtain coverage under the California Construction General Permit

(CGP) for stormwater: SWRCB Order No. 2009-0009-DWQ (National Pollutant Discharge Elimination System [NPDES] No. CAS 000002) (SWRCB 2009a). Coverage under the CGP would be established for both traditional construction sites as well as Linear Utility Projects. Linear Utility Project activities include, but are not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits; substructures; pipelines; towers; poles; cables; wires; connectors; switching, regulating, and transforming equipment). Soil disturbance includes, but is not limited to, clearing, grading, grubbing, excavation, demolition, stockpiling, trenching, laydown areas, and construction of access roads. The project would comply with the provisions described below:

- The contractor would complete a risk determination and prepare a draft Stormwater Pollution Prevention Plan (SWPPP) in accordance with the risk level requirements in the CGP. The draft SWPPP and risk determination would be submitted to the ROICC or FPUD, as applicable, for review at least 60 days prior to initiation of any soil disturbance. The risk determination and SWPPP would be prepared, stamped, and revised by a Qualified SWPPP Developer (licensed engineer, hydrologist, or other qualified professional identified in the permit).
- The contractor would obtain coverage under the CGP by uploading an NOI, approved SWPPP, risk determination, site map, and other supporting documentation to the California Stormwater Multi-Application and Report Tracking System (SMARTS) website. The ROICC or FPUD, as applicable, would review, certify, and submit the NOI to the SWRCB. The contractor would submit a hard copy of the certification statement from SMARTS, together with a check for the permit fee, to the San Diego RWQCB, allowing 7-14 days for fee processing. A Waste Discharge Identification (WDID) number must be received from SMARTS prior to initiation of any soil disturbance.
- The project would comply with all provisions described in the CGP and strictly follow the SWPPP. The SWPPP would be maintained at the project site and updated as necessary to track modifications, Best Management Practice (BMP) location and implementation, training, etc. The certification statement would be included in the on-site SWPPP.
- On-site stormwater compliance would be the responsibility of the contractor’s Qualified SWPPP Practitioner (certified professional identified in the CGP). The Qualified SWPPP Practitioner would be responsible for all required inspections, sampling, recordkeeping, and corrective actions. The contractor would upload all required documentation to the SMARTS website and notify the ROICC or FPUD, as applicable, that documents are ready for review, certification, and submittal.
- Annually by 1 August, or upon completion of construction, whichever comes first, the contractor would upload a draft Annual Report, including records of all inspection, sampling, and corrective actions to the SMARTS website. The ROICC or FPUD, as applicable, would review, certify, and submit the Annual Report to the SWRCB.
- Upon completion of construction, the contractor would upload the Notice of Termination (NOT) and supporting documentation to the SMARTS website. The ROICC or FPUD, as applicable, would review, certify, and submit the NOT to the SWRCB. In order to terminate coverage, the project must meet permanent stabilization requirements specified within the

CGP. The Annual Report and NOT must be accepted by the SWRCB before the contractor would be released from the contract.

8. For construction on MCB Camp Pendleton and DET Fallbrook, a contractor education program would be conducted by a qualified biologist with oversight by MCB Camp Pendleton ES personnel and the Conservation Program Manager on DET Fallbrook. It would be conducted during all project phases and cover the potential presence of listed species; the requirements and boundaries of the project; the importance of complying with avoidance, minimization, and compensation measures; and problem reporting and resolution methods. MCB Camp Pendleton and DET Fallbrook would ensure the placement of signs indicating the necessity for all activities to be strictly confined to the project site.

9. An Operations Manual and a Facility Response Plan would be prepared according to federal regulations and USMC requirements to minimize potential adverse impacts on water quality that would result from operations and potential spill events. In addition, the contractor would implement a Spill Prevention and Response Procedures Program to prevent spills and minimize potential adverse impacts. On MCB Camp Pendleton, fueling of equipment would be conducted in accordance with applicable Range Regulations as well as with the MCB Camp Pendleton Spill Prevention, Control and Countermeasures Plan.

10. Fueling and lubrication of equipment during all phases of construction would be allowed only in designated staging areas specified on the construction maps or on construction right-of-way and would not occur within 100 ft (30 m) of drainages. Portable fuel tanks would be secured in moving vehicles to prevent spills. Emergency provisions would be in place at all crossings before the onset of construction to prevent accidental spills from contaminating downstream habitats.

11. Heavy equipment and construction activities would be restricted to existing roads and disturbed areas to the maximum extent practicable. Staging areas would be located in disturbed habitats and would be delineated on the grading plans. Vehicle operation and laydown areas would be defined by staking and flagging between stakes to prevent operations outside these areas.

12. Construction work at night would be avoided to the greatest extent possible. Where it cannot be avoided, nighttime construction lighting would be shielded so that light dispersal into adjacent native habitats is significantly reduced. Other methods of reducing light pollution (e.g., dusk-to-dawn sensor activation, motion-sensitive activation, low-lumen or limited-spectrum lighting) would also be applied as possible. Permanent outdoor lighting installed at proposed facilities would also be shielded (or use other methods of reducing light pollution; e.g., motion-sensitive activation) to maximally reduce light pollution into adjacent native plant communities.

13. Project design would avoid direct and indirect impacts to riparian habitats, jurisdictional waters, and other sensitive wetlands to the greatest extent feasible. The limits of sensitive wetlands would be clearly marked in the field with markers or exclusion fencing, and these restricted areas would be monitored by the project biologist during construction phases to ensure that these areas are not being directly or indirectly impacted by project activities.

14. To control the spread of weeds that may degrade native plant communities on MCB Camp Pendleton ES and/or DET Fallbrook, all construction equipment and vehicles would be thoroughly power-washed before entering MCB Camp Pendleton and/or DET Fallbrook. On MCB Camp Pendleton, the project biologist would identify weed species that become established at the various project sites and report all new weed species invasions to MCB Camp Pendleton ES.

15. All in-stream construction or dredging would incorporate equipment decontamination before construction activities begin to prevent the potential spread of non-native aquatic species.

16. Construction workers would be prohibited from bringing domestic pets to construction sites to ensure that domestic pets do not disturb or depredate wildlife in adjacent habitats.

17. The project site would be kept as clean as possible to avoid attracting predators. All food-related trash would be placed in sealed bins or removed from the site regularly.

18. All construction and maintenance-related debris would be disposed of properly and would not be discarded on site. The site would be restored to as near the original biological condition as possible once the project is completed. If MCB Camp Pendleton's or DET Fallbrook's USEPA hazardous waste generator identification number is utilized on the manifest for hazardous waste disposal, then the manifest would come through the responsible installation Hazardous Waste Branch office for signature.

19. Construction workers would use portable chemical toilets, with secondary containment basins to prevent spillage, during construction. Chemical toilets would not be placed within 100 ft (30 m) of riparian habitat except on existing roads.

20. Conservation measures specified herein for construction activities would also apply during operations to non-emergency maintenance or repair activities that necessitate heavy equipment operation, excavation, or vegetation removal. Such activities would be coordinated with MCB Camp Pendleton ES on MCB Camp Pendleton, with natural and cultural resource managers on DET Fallbrook, or with CDFW on non-federal land, as applicable.

21. An Emergency Response Plan would be prepared to specify measures to be taken in emergencies that pose an immediate threat to public safety or property. The plan would identify points of contact and appropriate notification and monitoring protocols in the event of potential damage to sensitive natural or cultural resources.

22. The contractor would prepare an Environmental Protection Plan (EPP) to address areas within the project footprint where environmental impacts may be encountered from active or closed Installation Restoration (IR), or Resource Conservation and Recovery Act (RCRA) sites, including munitions. For portions of the project within MCB Camp Pendleton, the EPP would be submitted for approval by the Naval Facilities Engineering Command Southwest (NAVFAC SW) Contracting Officer prior to the start of any construction activity. The EPP would include measures the contractor would take to prevent or control release of contaminants to air, land, and water during the construction activities. The EPP would address solid and sanitary waste management, recycling project waste and demolition debris, air pollution controls on equipment and operations, application of paints and coatings, contractor parking and laydown, equipment fueling, hazardous material use, hazardous waste storage and disposal, and procedures to follow in the event that site contamination is discovered. For portions of the project within DET Fallbrook, the EPP would be submitted to the Naval Weapons Station Seal Beach Environmental Program Services Office (EPSO) for review and approval. Any recommendations or requirements made by the EPSO would be incorporated into the EPP and implemented to ensure there are no hazardous materials or hazardous materials impacts at MCB Camp Pendleton and DET Fallbrook.

23. The project site-specific excavation, grading, and filling plans, SWPPP, and BMPs for portions of the project within DET Fallbrook would be reviewed by the Naval Weapons Station Seal Beach EPSO. The plans and BMPs would be approved by the EPSO and any recommendations made by the

Environmental Program Services would be incorporated into the project plans to ensure that soil loss and erosion at DET Fallbrook are minimized. Within the community of Fallbrook, erosion control measure would also include any additional requirements of the applicable jurisdiction. Provisions for both temporary and permanent erosion and sediment controls would be implemented in accordance with the SWPPP prepared and designed specifically for the construction sites.

<u>Geological Resources</u>

24. Before construction begins, a project-specific geotechnical study would be conducted that would provide seismic design parameters in accordance with the Uniform Building Code and the California Building Code; specify requirements for trench excavation and pipeline construction to prevent collapse during construction; and slope stability parameters and foundation setbacks. The geotechnical study would include the following:

    - The geotechnical report would include an evaluation of the suitability of excavated materials as trench backfill, and recommendations for screening, compaction, and filling procedures to ensure stability of the pipe bedding and cover. The geotechnical report would also evaluate the engineering characteristics of the soils in the area where the retaining walls and concrete slab apron for the inflatable weir diversion structure would be constructed and provide recommendations for slope excavation and compaction to ensure foundation stability. During the geotechnical study, soil corrosive potential would also be evaluated, and recommendations would be provided for concrete and metal component design to provide corrosion resistance as needed, and ensure slope/surface stability.

    - Design and construction procedures would use recommendations from the geotechnical study based on site specific information regarding groundwater depth and soil characteristics to minimize differential settlement in specific areas determined to be subject to liquefaction.

    - The overall project siting would conform to existing topography to minimize slope cut and fill; levees and berms would be properly designed and constructed to ensure constructed slope stability, and subsurface filling would be done in accordance with the geotechnical report recommendations for stability. These procedures would be utilized to ensure that there would be no significant impacts with respect to slope stability and landslides with implementation of the project.

    - Prior to installation of geotechnical borings, active IR and RCRA sites would be identified within or near the proposed project footprints to mitigate and/or avoid environmental impacts.

25. All new MCB Camp Pendleton facilities would be designed to comply with the NAVFAC P-355 Seismic Design Manual and the criteria identified. All new FPUD facilities would be constructed in accordance with FPUD design standards and any excavations in County roads or right-of-ways would be coordinated with the County and meet County of San Diego requirements.

<u>Water Resources</u>

26. For project components that would, or would be likely to, involve groundwater extraction (dewatering) at construction sites, foundation dewatering, or groundwater extraction associated with a remediation/cleanup project, MCB Camp Pendleton ES, DET Fallbrook's Conservation Program Manager, or FPUD, as applicable, would be contacted for guidance. Disposal options for groundwater may include the following:

- (1) Discharges of uncontaminated groundwater to land would comply with the *San Diego Basin Plan Conditional Waiver No. 2-"Low Threat" Discharges to Land* found in San Diego RWQCB Resolution No. R9-2007-0104 (San Diego RWQCB 2007). Land applied water may not discharge to Clean Water Act (CWA) jurisdictional surface waters.
- (2) Discharges to the sanitary sewer system would be requested through the MCB Camp Pendleton ES, DET Fallbrook's Conservation Program Manager, or FPUD, as applicable.

If options (1) and (2) are not feasible, discharges to storm drains or surface waters (including seasonally dry channels) would obtain coverage under the San Diego General Groundwater Permit, San Diego RWQCB Order No. R9-2008-0002 (NPDES No. CAG919002) (San Diego RWQCB 2008). Sampling and/or treatment may be required and would be the responsibility of the contractor performing the work. Application for permit coverage must be submitted to the ROICC or FPUD, as applicable, at least 60 days prior to the planned commencement of the discharge. The ROICC or FPUD, as applicable, would review and certify the application, and the contractor would then submit the application and permit fee to the San Diego RWQCB. A WDID number must be received from the San Diego RWQCB prior to initiation of dewatering. A NOT must be accepted by the San Diego RWQCB before the contractor would be released from the contract.

27. Discharges of uncontaminated groundwater to land from well replacements and/or well development would comply with the *San Diego Basin Plan Conditional Waiver No. 2-"Low Threat" Discharges to Land* found in San Diego RWQCB Resolution No. R9-2007-0104 (San Diego RWQCB 2007). Land applied water may not discharge to CWA jurisdictional surface waters. MCB Camp Pendleton ES would be contacted for guidance.

28. For discharges of potable water resulting from hydrostatic testing, repair, or maintenance of potable water pipelines, tanks, or vessels associated with drinking water purveyance and storage, MCB Camp Pendleton ES, DET Fallbrook's Conservation Program Manager, or FPUD, as applicable, would be contacted for guidance. Disposal options for discharged potable water may include the following:

    - (1) Discharges to land would comply with the *San Diego Basin Plan Conditional Waiver No. 2-"Low Threat" Discharges to Land* found in San Diego RWQCB Resolution No. R9-2007-0104 (San Diego RWQCB 2007). Land applied water may not discharge to CWA jurisdictional surface waters.
    - (2) Discharges to the sanitary sewer system would be requested through the MCB Camp Pendleton ES, DET Fallbrook's Conservation Program Manager, or FPUD, as applicable.

    If options (1) and (2) are not feasible, discharges to storm drains or surface waters (including seasonally dry channels) would obtain coverage under the San Diego RWQCB Order No. R9-2010-0003 (NPDES No. CAG679001) (San Diego RWQCB 2010).

29. Discharges of uncontaminated slurries or drilling muds (i.e., from horizontal directional drilling) to land would comply with *San Diego Basin Plan Conditional Waiver No. 9-Discharges of Slurries to Land* found in San Diego RWQCB Resolution No. R9-2007-0104 (San Diego RWQCB 2007). MCB Camp Pendleton ES, DET Fallbrook Public Works, or FPUD, as applicable, would be contacted for further guidance.

30. Concreting operations would be conducted to ensure discharge water, including washout, associated with these operations does not reach surrounding water bodies or pools unless specifically authorized in a CWA discharge permit.

31. Projects on MCB Camp Pendleton and DET Fallbrook with a footprint of 5,000 ft^2 or greater would implement Low Impact Development (LID) features in accordance with the *Department of Defense Unified Facilities Criteria Low Impact Development* (Unified Facilities Criteria [UFC] 3-210-10) (2010) and Section 438 of the Energy Independence and Security Act (2007). A comprehensive set of stormwater planning, design, and construction elements would be used to maintain or restore predevelopment hydrology of the site with regard to volume, rate, and duration of flow, pollutant loading, and temperature for the 95th percentile, 24-hour storm. LID strategies are described in detail in UFC 3-210-10, Chapter 2. These strategies address the long-term post construction (operational) phase where enduring water quality benefits are provided by low impact design, source controls, and treatment controls. Depending on site conditions, purpose, and surrounding landscape, strategies would include, but not be limited to, the following:

   - Integrating detention basins, biofiltration cells, vegetated swales, infiltration strips, or other similar earth-based vegetated system for accepting and conveying runoff associated with new paved surfaces and other permanent impervious features. Designs should consider, but not be limited to, increasing the size of local flood control sites serving the project areas or including detention/retention systems in designs for parking areas or other sites.
   - Optimizing the use of suitable pervious materials for hardscaped surfaces (e.g., porous pavements, gravel walkways, grass pavers, etc.).
   - Maximizing soft-bottom drainage that is amenable to vegetative planting and natural treatment of runoff.
   - Integrating natural rock or similar material for protection against scour and sediment transport at discharge points and on stream banks of soft-bottom drainages.
   - Integrating meandering pathways within soft-bottom watercourses for increased residence time and improved vegetated runoff treatment.
   - Incorporating low-flow pathways for new hardscaped impervious drainages (e.g., concrete channels) to concentrate dry-weather flows along the thalweg (i.e., lowest point of flow), minimize vegetative growth, and reduce long-term maintenance.
   - Enhancing stormwater infiltration in areas of poor soil permeability by incorporating buried percolation conveyance components (e.g., buried roof downspouts, subdrains for vegetated areas).
   - Selecting and designing project-related access routes to minimize impacts to receiving waters, in particular the discharge of identified pollutants to an already impaired water body.
   - Designing projects located within the 100-year flood zone to minimize the risk of property loss, injury, or death from flooding events.

<u>Biological Resources</u>

Temporary Impact Restoration and Permanent Impact Compensation

32. A detailed Restoration Plan would be developed and approved by MCB Camp Pendleton ES and DET Fallbrook's Conservation Program Manager for restoring disturbed lands and native vegetation along their respective portions of the construction footprint before construction start. The contractor

shall obtain approval of seed mixes, container plants, planting/seeding, and monitoring methods proposed for use in revegetation.

- To successfully restore the area to native vegetation, the topsoil in these areas would be salvaged, stockpiled, and then reapplied as the surface horizon where applicable. Where feasible, restored areas would be re-contoured to match the surrounding landscape. Plant species used must be derived from local source populations. Noxious weeds (as listed by the California Invasive Plant Council) may be controlled by hand weeding or herbicide application in disturbed areas as necessary to prevent their establishment.
- MCB Camp Pendleton would provide a copy of the Restoration Plan to the USFWS for comment, review, and approval. The Restoration Plan would be submitted to the USFWS prior to initiating project activities that would impact federally-listed species habitat. The plan would include the proposed restoration location, existing conditions of the restoration site, methodology for creating/restoring habitat, monitoring requirements and time periods, success criteria, and follow-up measures if needed.
- Restoration for temporary impacts to federally-listed species occupied habitat would be initiated within 6 months of completion of construction.

33. Final designs for construction would minimize the removal of riparian habitat that could support listed species (riparian ARTO aestivation habitat is included in this habitat type). The permanent loss of riparian habitat on MCB Camp Pendleton would be compensated in accordance with the Riparian/Estuarine BO (USFWS 1995a). MCB Camp Pendleton proposes three locations for compensating impacts to riparian habitat: (1) the OSMZ, predicated on the establishment of an agreement with the Resource Agencies and FPUD creating a "bank" in the OSMZ, (2) off-base at the Carlsbad Oaks Mitigation Bank, and (3) on-base at the SMR. Any reduction of impacts to riparian habitat achieved as a result of further minimizing the project footprint would proportionately reduce the amount of restoration implemented.

34. Final designs for construction would minimize the removal of coastal sage scrub (CSS) that could support the coastal California gnatcatcher (CAGN). Permanent impacts to CAGN-occupied CSS on MCB Camp Pendleton would be offset generally at a 2:1 ratio, because the impacted CSS is outside of the coastal terrace zone, unless a lower ratio is approved by the USFWS due to habitat quality, fragmentation, etc. MCB Camp Pendleton proposes three locations for compensating impacts to occupied CSS: (1) the OSMZ, predicated on the establishment of an agreement with the Resource Agencies and FPUD creating a "bank" in the OSMZ, (2) off-base at the Buena Creek Mitigation Bank, and (3) on-base at Lima. Any reduction of impacts to CAGN-occupied CSS achieved as a result of further minimizing the project footprint would proportionately reduce the amount of restoration implemented.

35. Permanent impacts to occupied ARTO upland aestivation habitat would be offset by restoring riparian habitat that has been invaded by non-native plant species on MCB Camp Pendleton at a ratio of 0.5:1 (restored:impacted). The permanent loss of ARTO upland aestivation habitat would be offset by restoration riparian habitat following SCM 32. Alternatively, the Marine Corps may restore upland habitat on MCB Camp Pendleton that is mutually agreed to by MCB Camp Pendleton ES and the USFWS at a ratio of 2:1.

Primary Project Biologist

36. A primary project biologist would oversee avoidance and minimization measures specified within these SCMs. Different project biologists may be designated for specific measures listed based on the qualifications necessary to satisfy the specific measure. If multiple project biologists are required, their activities would be coordinated through one primary project biologist. The primary project biologist would have sufficient training and experience to identify all of the federally listed species and their habitats that are likely to be encountered within or near the project footprint. The project biologist(s) would have experience and training necessary to conduct tasks described in BO for this project.

    - The project biologist would be knowledgeable of and able to identify weed species listed in the California Invasive Plant Inventory.
    - The project biologist for measures associated with ARTOs would have at least 2 years of independent experience conducting arroyo toad surveys and have demonstrated experience in handling ARTOs.
    - The project biologist for measures associated with the riparian birds or CAGN would be a trained ornithologist with at least 40 hours of observation in the field of least Bell's vireo (LBVI) and CAGN and documented experience locating and monitoring nests of these species.

37. For construction on MCB Camp Pendleton and DET Fallbrook, a contractor education program would be conducted by a qualified biologist with oversight by MCB Camp Pendleton ES personnel and the Conservation Program Manager on DET Fallbrook. It would be conducted during all project phases and cover the potential presence of listed species; the requirements and boundaries of the project; the importance of complying with avoidance, minimization, and compensation measures; and problem reporting and resolution methods. MCB Camp Pendleton and DET Fallbrook would ensure the placement of signs indicating the necessity for all activities to be strictly confined to the project site.

38. The primary project biologist would monitor all construction activities to ensure compliance with compensation measures and would keep the project engineer and MCB Camp Pendleton ES and DET Fallbrook, as applicable, informed of construction activities that may threaten significant biological resources, particularly sensitive species and their habitats.

39. The project biologist would provide electronic versions of quarterly biological monitoring reports to MCB Camp Pendleton ES and DET Fallbrook. All "take" of federally-listed species would be reported electronically to MCB Camp Pendleton ES and/or DET Fallbrook, as applicable, within 24 hours of the action.

40. The project biologist would have the ability to halt construction activities, if necessary, to avoid unanticipated impacts to sensitive resources. If it is necessary to halt construction activities, the project biologist would contact MCB Camp Pendleton ES and DET Fallbrook immediately to discuss appropriate actions. As needed, MCB Camp Pendleton ES and DET Fallbrook staff would confer with the USFWS to ensure the proper implementation of species and habitat protection measures. The project biologist would provide a brief written report of the incident within 24 hours of the action to MCB Camp Pendleton ES and/or DET Fallbrook, as applicable.

Seasonal Restrictions

41. All vegetation clearing required by the proposed project would occur outside of the nesting season for avian species (February 15 to August 31). If nesting season avoidance is not possible, then the following additional measures would be employed:

    - The project biologist would conduct pre-clearing surveys for active bird nests in and within 250 ft (76 m) of the area proposed for clearing.
    - For active bird nests found within the survey area, the project biologist would use the distance to the project limits and local topography to determine if clearing activities are likely to directly damage a nest or significantly disturb nesting activities.
    - Where damage or disturbance of any nest is likely, MCB Camp Pendleton, DET Fallbrook or FPUD would implement further measures to avoid the likelihood of nest destruction or disturbance, including temporarily halting clearing activities until nesting is completed.

42. Construction activities would be scheduled to avoid management/breeding seasons designated for select federally-listed species to the greatest extent feasible. Where the management/breeding season cannot be avoided, additional species-specific avoidance and minimization measures are defined later in section 2.3.2.3 and 2.3.2.4.

Arroyo Toad Year-Round Measures

Year-round, for all construction and maintenance activities (maintenance activities as deemed necessary by MCB Camp Pendleton ES; e.g., with ground disturbance) on MCB Camp Pendleton within occupied ARTO habitat (both breeding and aestivation/movement habitat), the following measures apply.

43. The ARTO biologist would monitor all construction activities in and adjacent to occupied ARTO riparian and aestivation habitat to ensure compliance with the avoidance, minimization, and compensation measures and would keep MCB Camp Pendleton ES informed of construction activities that may threaten significant biological resources. The project biologist would ensure that incidental disturbance is minimized and limited to activities essential to the project in accordance with the BA prepared for this project.

44. The ARTO biologist would also be on call and available as needed at other times in the event that an ARTO is encountered during project activities. The ARTO biologist would be present onsite full-time for the 3 days following any measurable rainfall event (i.e., 0.05 inch or greater) or other appropriate climatic conditions (e.g., high relative humidity and moderate temperatures) that are likely to elicit above-ground ARTO movement.

45. Any ARTOs found within the project footprint would be captured and released by the ARTO biologist to the closest area of suitable habitat outside the project footprint but in the same watershed. The ARTO biologist would immediately notify MCB Camp Pendleton ES.

46. Dirt/sand piles left overnight would be covered with tarps or plastic with the edges sealed with sandbags, bricks, or 2 x 4’s to prevent ARTOs from burrowing into the dirt. Holes or trenches would be covered with material such as plywood or solid metal grates with the edges sealed with sandbags, bricks, or 2 x 4’s sufficient to prevent wildlife from falling into holes or trenches. If toads are observed in or adjacent to the project work site, work would stop immediately and MCB Camp Pendleton ES notified.

47. All nighttime construction activities would be prohibited in and/or adjacent to occupied ARTO habitat. In addition, to the greatest extent possible, access to the project construction site would occur via preexisting access routes. Project-related vehicle traffic would be limited to daylight hours, as ARTO movement across roadways occurs primarily during nighttime hours.
48. Ingress and egress of construction equipment and personnel would be kept to a minimum and would use a single access point to the site where possible.
49. Dust control measures (i.e., water truck spraying) would be conducted in a manner that does not attract ARTOs into the project activity areas (e.g., avoid over-spraying of water).
50. If pipelines are constructed above ground in occupied ARTO habitat, they would be raised to allow toad passage under the pipes.

Arroyo Toad Non-Breeding Season Measures

In the non-breeding season for ARTO (August 16-March 14), for all construction and maintenance activities (maintenance activities as deemed necessary by MCB Camp Pendleton ES; e.g., with ground disturbance) on MCB Camp Pendleton within occupied ARTO habitat (both breeding and aestivation/movement habitat), the following conservation measures are applicable.

51. Each morning, the ARTO biologist would monitor the ingress/egress area prior to vehicular movement, and the removal of excavation unit covers and soil stockpile tarps, to ensure that ARTOs have not entered the project site. In the event soil piles have not been covered properly, the project biologist would sift through the top eight inches of soil to ensure ARTOs are not present.
52. The ARTO biologist would monitor for ARTOs within both breeding and aestivation habitat during excavation.
53. The ARTO biologist would be present at the end of the day to ensure that the excavations are properly covered to prevent toads from entering any open pits and trenches.

Arroyo Toad Breeding Season Measures

In the breeding season for ARTO (March 15-August 15), for all construction and maintenance activities (maintenance activities as deemed necessary by MCB Camp Pendleton ES; e.g., with ground disturbance) on MCB Camp Pendleton within occupied ARTO habitat (both breeding and aestivation/movement habitat), the following conservation measures are applicable.

54. Temporary silt fencing would be installed around the perimeter of all work areas within occupied ARTO breeding habitat with the ARTO biologist present (*Note*: ARTO fencing may not be effective in all situations; the ARTO biologist should confer with MCB Camp Pendleton ES if fencing is not warranted due to climatic conditions, topography, etc.).
    a. The silt fencing would be installed at least 14 days prior to construction to allow enough time for ARTO surveys to be completed during optimal weather conditions. MCB Camp Pendleton ES would provide requirements for the toad fencing to the contractor.
    b. All fencing materials (i.e., mesh, stakes) would be removed following construction.
    c. If construction extends over two ARTO breeding seasons and halts for a period of one or more months, then the fence must be removed in the interim and re-established following protocol during the second breeding season.

55. After exclusionary fencing has been installed within work areas located in occupied ARTO breeding habitat, but prior to initiation of construction, at least 3 nighttime surveys for ARTOs would be conducted within the fenced area by the ARTO biologist. These surveys would be conducted during appropriate climatic conditions and during the appropriate hours (i.e., evenings, nights, and mornings) to maximize the likelihood of encountering ARTOs. If climatic conditions are not highly suitable for ARTO activity, ARTO habitat in the project footprint would be watered to encourage aestivating toads to surface. All ARTOs found within the project area would be captured and translocated by the project biologist to the nearest suitable riparian habitat. Upon completion of these surveys and prior to initiation of construction activities, the project biologist would report the capture and release locations of all ARTOs found and relocated during this initial survey to MCB Camp Pendleton ES, who in turn would submit it to the USFWS.

56. After the initiation of construction, the ARTO biologist would be present each morning before construction activities begin and during removal of excavation unit covers and soil stockpile tarps. The ARTO biologist would check the integrity of the ARTO fence and locate and remove any ARTOs that may have entered the area.

57. The ARTO biologist would survey the area inside the fence just prior to ground disturbing activities.

58. If ARTO egg masses or larvae are found within permanent or temporary impact areas during construction (e.g., in the open water habitat in the SMR), the ARTO biologist would consult with MCB Camp Pendleton ES, who in turn would consult with the USFWS on translocation methods. The project biologist would report the locations of all egg masses/larvae found and relocated to MCB Camp Pendleton ES, who in turn would submit it to the USFWS.

59. The ARTO biologist would monitor for ARTOs during excavation within both breeding and aestivation ARTO habitat.

60. The ARTO biologist would be present at the end of the day to ensure that that the excavations are properly covered to prevent ARTOs from entering any open pits and to check the integrity of the ARTO fence.

California Gnatcatcher, Least Bell's Vireo, and Southwestern Willow Flycatcher

61. To the maximum extent possible, construction and other project-related activities that occur within 250 ft (76 m) of occupied CAGN habitat (i.e., CSS) would take place outside the CAGN breeding season (February 15 to August 31).

62. To the maximum extent possible, construction and other project-related activities that occur within 250 ft (76 m) of occupied LBVI habitat (i.e., riparian habitats) would take place outside the LBVI breeding season (March 15 to August 31).

63. Construction activities and maintenance activities would not occur within 250 ft (76 m) of occupied southwester willow flycatcher (SWFL) habitat during the breeding season (March 15 to August 31).

64. If avoiding the breeding seasons for CAGN or LBVI at specific locations is not possible, then the following additional measures would be employed:

    a. The avian biologist would conduct pre-construction surveys for active CAGN and LBVI nests in and within 250 ft (76 m) of the construction/maintenance footprint.

b. For active CAGN or LBVI nests found within the survey area, the avian biologist would use the distance to the project limits and local topography to determine if construction activities are likely to directly damage a nest or significantly disturb nesting activities.

c. Where damage or disturbance of any CAGN or LBVI nest(s) is likely, MCB Camp Pendleton ES or DET Fallbrook, as applicable, would implement further measures to avoid the likelihood of nest destruction or disturbance, including temporarily halting clearing activities until nesting is completed, with construction/maintenance activities directed to other areas further than 250 ft (76 m) from the active nest(s).

d. Where mutually agreed by MCB Camp Pendleton ES or DET Fallbrook and the USFWS, straw bale walls (or other sound minimization devices) may be constructed along the project perimeter to block visibility and sound from adjacent construction/maintenance, thereby reducing potential disturbance to active CAGN or LBVI nests. Also, signage would be installed to deter people from entering the area with an active nest(s).

e. The avian biologist would provide an electronic report of nest survey results to MCB Camp Pendleton ES or DET Fallbrook, as applicable, within 7 days of survey completion.

San Diego and Riverside Fairy Shrimp

65. Any previously undocumented and/or unsurveyed vernal pools encountered during construction would be staked and protected from disturbance during pipeline construction unless and until the absence of listed species of fairy shrimp is confirmed by a qualified (USFWS-permitted) biologist using an approved methodology.

Cultural Resources

66. Should buried cultural resources and/or human remains be encountered during any construction activities on MCB Camp Pendleton or DET Fallbrook, the discovery would be treated according to procedures outlined in the MCB Camp Pendleton Integrated Cultural Resource Management Plan (ICRMP) or DET Fallbrook ICRMP, respectively. These procedures are also specified in 36 CFR § 800.13, the implementing regulations of the NHPA, while Native American Graves Protection and Repatriation Act would be applied if any human remains are identified as having Native American decent. Should buried cultural resources and/or human remains be encountered during construction activities on non-DOD lands, the discovery would be treated according to procedures outlined in the County of San Diego guidelines for determining significance of cultural resources pursuant to CEQA (County of San Diego 2007a), and PRC Section 5097.98 for human remains. In addition, any required cultural monitoring, development, and or review of a monitoring plan would be consistent with the Section 106 consultation.

Air Quality

67. Fugitive dust control measures would be implemented to reduce emissions of particulate matter (less than or equal to 10 microns in diameter [PM_{10}] and particulate matter less than or equal to 2.5 microns in diameter [$PM_{2.5}$]) to the extent possible. These measures include watering unpaved roads and actively graded surfaces up to three times daily, as well as reducing speeds on unpaved roads to 15 miles per hour (mph) (24 kilometers per hour [kph]), suspending grading activities if wind speeds exceed 25 mph (40 kph), and replacing ground cover in graded areas as soon as possible. Watering would be done lightly to avoid the accumulation of surface water.

Hazardous Wastes and Materials

68. If construction would occur within or near an IR Program Site on MCB Camp Pendleton, all project activities in the IR site and the surrounding area would require approval of MCB Camp Pendleton ES. ES would notify the MCB Camp Pendleton's FFA Team, which consists of MCB Camp Pendleton, DON, USEPA, Cal EPA DTSC, and San Diego RWQCB.

69. The contractor would prepare a Soil Management Plan to address potential soil impacts from IR Program, RCRA, or munitions sites identified within, or near the proposed project footprint. The procedures described in the Soil Management Plan would be followed for installation of the pipeline. Under direction of MCB Camp Pendleton ES, the contractor would prepare a Soil Management Plan for handling, testing, and disposing of the soils. The procedures described in the Soil Management Plan would be followed for installation of the pipeline. The contractor would coordinate with MCB Camp Pendleton ES to determine appropriate disposition for the soil based on the analytical results; this would ensure that all potentially contaminated soil would be disposed of in accordance with applicable federal, state, and local regulations and MCB Camp Pendleton requirements. Appropriate health and safety measures would be followed and all requirements of USACE Manual EM 385-1-1 *Safety and Health Requirements* and Title 29 CFR (Labor) § 1910 *Occupational Safety and Health Standards Subpart H Hazardous Materials Section 120 Hazardous Waste Operations and Emergency Response* would be met.

    If pipeline construction activities encounter potentially contaminated soil (i.e., discolored and or odorous) at DET Fallbrook or within the community of Fallbrook, the soil would be managed in accordance with all applicable federal, state, County of San Diego, and federal requirements, as well as any additional requirements specific to the applicable jurisdiction.

70. It is likely that the proposed project footprint may encounter contaminated groundwater from active IR or underground storage tank sites. If pipeline construction activities encounter potentially contaminated groundwater, the water would be managed in accordance with all applicable federal, state, County of San Diego, and federal requirements, as well as any additional requirements specific to the applicable jurisdiction.

    Groundwater is known to be contaminated at various IR locations throughout MCB Camp Pendleton. If dewatering operations are taking place within a suspected groundwater contaminant plume, the action proponent or their contractor would coordinate with MCB Camp Pendleton ES (i.e., Stormwater Branch, Wastewater Branch, and IR Branch) to ensure that all reporting requirements and regulatory approvals are obtained. Potentially contaminated groundwater encountered during construction activities on MCB Camp Pendleton would be tested and handled in accordance with the direction of MCB Camp Pendleton ES. MCB Camp Pendleton ES would review and approve a proposed sampling plan. Arrangements would be made with the MCB Camp Pendleton Facilities Maintenance Department for acceptability of the water for discharge into the sanitary sewer based on the results of the laboratory analysis, volume, and accessibility to a sewer manhole. Appropriate health and safety measures would be followed and all requirements of USACE Manual EM 385-1-1 *Safety and Health Requirements* and Title 29 CFR (Labor) § 1910 *Occupational Safety and Health Standards Subpart H Hazardous Materials Section 120 Hazardous Waste Operations and Emergency Response* would be met.

71. It is likely that monitoring wells would be encountered during construction. If monitoring wells are encountered during construction activities, they would not to be damaged or destroyed, and the IR

Branch would be alerted. Reconstruction/renovation of destroyed or damaged wells would be the responsibility of the project proponent.

72. A Hazardous Materials Business Plan would be prepared in accordance with County of San Diego guidelines to describe how the construction worker would manage their hazardous materials during construction.

73. An Oil Spill Response Plan (OSRP) would be prepared and reviewed and approved by appropriate federal, state, and local agencies. The OSRP is required under state and federal regulations (Senate Bill 2040 and 40 CFR § 300, the *National Oil and Hazardous Substances Pollution Contingency Plan*). The OSRP provides a list of emergency service providers. For project components on MCB Camp Pendleton, the procedures outlined in the *Oil and Hazardous Substance Integrated Contingency Plan Amended April 2011* would be followed. For project components on non-federal land, FPUD would comply with requirements of CDFW, Office of Spill Prevention and Response.

Utilities

74. During project design, pipeline alignments and construction footprints would be selected to avoid or minimize disruption of existing utilities. The location of underground utilities would be verified prior to excavation to further avoid impacts. Also, the design of new electrical transformers and panels that would be needed to supply power to the wells would be coordinated closely with MCB Camp Pendleton and San Diego Gas & Electric (SDG&E) to minimize or eliminate any temporary disruption of power supplies during construction and start-up.

75. For any wells located within the project footprint, the contractor would contact MCB Camp Pendleton ES to determine if the well is active or abandoned.

76. Newly constructed or repaired wells that are not in service for more than three months would be sampled for bacteriological quality prior to use in accordance with the American Water Works Association C654-03 (CCR Title 22 §64583).

77. The contractor would coordinate well closure and application review with MCB Camp Pendleton ES.

78. The project proponent or contractor would submit an amended drinking water permit to modify, add to, or change the source of supply or method of treatment of, or change in the distribution system as authorized by a valid existing permit in accordance with California Health and Safety Code §116550.

79. The existing MCB Camp Pendleton Domestic Water Permit for the Southern Water System would be amended to include the four new wells and any associated changes to the existing water system. Appropriate permits for water well drilling would be obtained from the San Diego County Department of Environmental Health and water wells would be constructed in accordance with the California Water Well Standards utilizing a C-57 Contractor.

80. The contractor would ensure potable water pipeline separation and installation standards are followed as outlined in CCR Title 22, § 64572.

81. To avoid cross contamination of potable water lines to be installed adjacent to sanitary sewer lines, the contractor would coordinate installation and inspection of newly installed backflow control devices and air gaps with the Facilities Maintenance Department in accordance with CCR Title 17.

82. The contractor would ensure that new potable water pipelines installed or that have been taken out of service for repairs (de-pressurized) would be disinfected and sampled for bacteriological quality prior to use, in accordance with the American Water Works Association Standard C651-05. Water samples

would be required to be negative for coliform bacteria prior to the main (s) being placed in service in accordance with CCR Title 22, §64580.

83. The water source of a public water system would be required to have the capacity to meet the system's maximum day demand regularly, in accordance with CCR Title 22 §64554. A Source Capacity Planning Study may be required if there is difficulty with the water system's source capacity or proposed expansion by the DPH.

2.3.2 Alternative 2

Alternative 2 is similar to Alternative 1 in terms of diversion system upgrades, groundwater recharge, and groundwater production (see Table 2.3-1); but includes the direct diversion and use of surface water. Project components associated with Alternative 2 are depicted in Figure 2-4. Alternative 2 includes the following components described under Alternative 1 (see Section 2.3.1 for details on each of the following components):

- Replacement of Existing Sheet Pile Diversion with Inflatable Weir Diversion Structure,
- Improvements to O'Neill Ditch and Headgate,
- Improvements to Percolation Ponds 1-7,
- Groundwater Production Wells and Associated Collection System Infrastructure,
- The OSMZ, and
- SCADA system.

Alternative 2 differs from Alternative 1 in that the existing Haybarn Canyon AWTP would be expanded to treat all groundwater produced under the project. Additionally, a new surface water treatment facility located adjacent to the Haybarn Canyon AWTP would treat surface water diverted from four new gallery wells installed between the percolation ponds and SMR. Treated water would be delivered to FPUD via a bi-directional pipeline located along a different route through MCB Camp Pendleton and DET Fallbrook.

Under Alternative 2, an AMP/FOP would be developed and an annual FOP would be published, as described under Alternative 1. However, environmental constraints on the operation and management of groundwater production would differ under Alternative 2: maintenance of groundwater levels within their historical range would not be included, but no aquifer compaction and no seawater intrusion constraints would be included under Alternative 2.

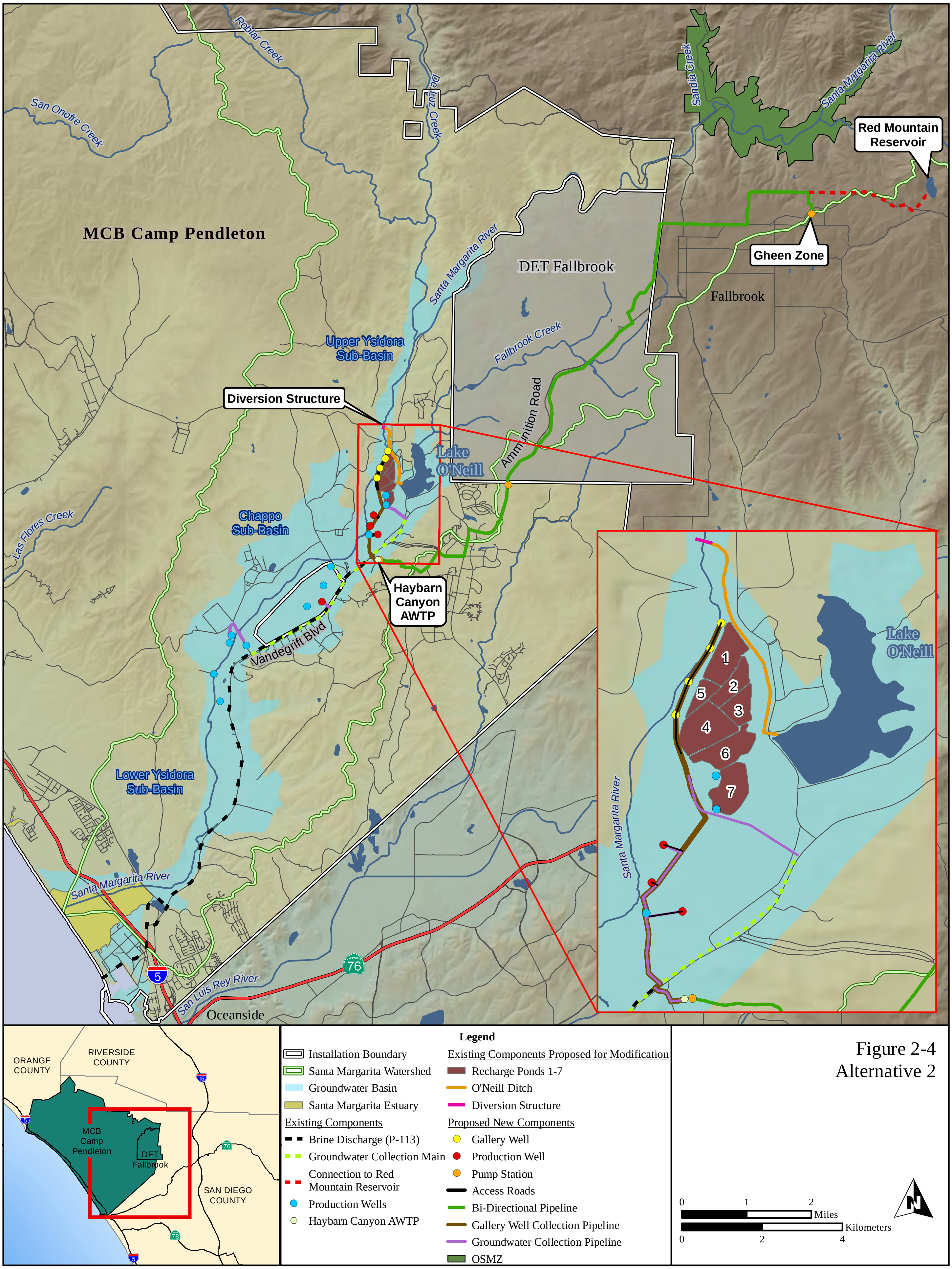


Figure 2-4
Alternative 2

2.3.2.1 Improvements to Existing Facilities

Expand Haybarn Canyon AWTP and Add a Surface Water Treatment Facility

Groundwater from MCB Camp Pendleton's existing wells and SMR CUP's four new production wells would be treated at an expanded Haybarn Canyon AWTP. The expansion of MCB Camp Pendleton's existing Haybarn Canyon AWTP (P-113) would occur to handle the increased Alternative 2 flow volumes. The existing Haybarn Canyon AWTP's groundwater water quality treatment goals would continue to be met under this expansion (a description of the existing Haybarn Canyon AWTP and treatment goals is provided in Section 1.6.1.1).

The gallery wells would produce surface water that would be treated at the proposed new surface water treatment facility located adjacent to the existing Haybarn Canyon AWTP. The surface water treatment facility would be designed to treat surface water with organics removal and membrane filtration to comply with the surface water treatment rule. The surface water treatment process would include micro/ultra-filtration for the removal of suspended solids, *Giardia*, *Cryptosporidium*, and the reduction of turbidity. Waste streams from micro/ultra-filtration membrane backwash would undergo backwash recovery to allow suspended solids to settle out in recovery tanks. Water from the recovery tanks would be reintroduced to the treatment process. All solid wastes from backwash recovery would be treated and disposed of in accordance with MCO 5090.2A, Chapter 17 and in compliance with all state and federal regulations and respective permits regarding waste disposal. This includes all relevant Waste Discharge Requirements from the SWRCB and San Diego RWQCB and Solid Waste Facility Permits issued by the County of San Diego as the local enforcement agency.

The treated surface water would then be blended with the treated groundwater to reach a product TDS of approximately 325 mg/L and distributed to MCB Camp Pendleton and FPUD. A clearwell main lift pumping plant would be constructed at Haybarn Canyon to deliver the treated water to the Reservoir Ridge storage tanks.

Under SMR CUP, an additional average daily brine discharge of 3.5 cfs would be produced and discharged to the Pacific Ocean via the existing Oceanside Ocean Outfall. The additional brine would be conveyed to the Oceanside Ocean Outfall via the existing brine discharge pipeline constructed for MCB Camp Pendleton's P-113 project, which is connected to the Oceanside Ocean Outfall via P-113's connection to the Oceanside Ocean Outfall Pump Station. Under P-113, this connection provides for secondary emergency brine discharge; however, under Alternative 2 of this project, all additional brine would utilize this connection. The brine discharge would be covered under either an amendment to FPUD's existing NPDES Permit (CA0108031) to the Oceanside Ocean Outfall or an amendment to MCB Camp Pendleton's NPDES Permit (CA0109347). The existing FPUD NPDES Permit currently has a permitted average annual discharge of 2.4 MGD.

2.3.2.2 Proposed New Facilities

Gallery Wells and Associated Collection System Infrastructure

Four gallery wells would be installed adjacent to the SMR along the west side of Percolation Ponds 1, 4, and 5 (see Figure 2-4). Gallery wells are generally shallow wells comprised of a vertical reinforced concrete shaft or caisson that extends from the well head through the subsurface sediment (i.e., sands and gravels) comprising the streambed. Beneath the streambed, the caisson would be connected to a series of lateral pipelines projected under the river channel bottom to collect and filter surface water from the SMR. Water extracted from the gallery wells would be transported to the proposed new surface water treatment facility located adjacent to the existing Haybarn Canyon AWTP (see Section 2.3.2.2 for details).

Construction

Each gallery well would require ground disturbance of approximately 324 ft^2 (30 m^2) (18 ft by 18 ft [6 m by 6 m]). The wells would be placed between the SMR channel and Percolation Ponds 1, 4, and 5. The wells would extend into the aquifer with the depth being determined during the feasibility study. The lateral pipelines would be installed by horizontal directional drilling through the main well shaft.

Access to the gallery wells would be provided by existing roads and a new graded dirt road located between the SMR and to Ponds 1, 4, and 5 (Figure 2-4). The new road would be 12 ft (4 m) wide and may be covered with gravel. The road would be bordered on both sides by a 20-ft (6-m) wide buffer that would be used to accommodate 18-in (46-cm) diameter power poles and overhead power lines. The power pole centerline would be approximately 4 ft (1.2 m) off the road edge with poles located approximately every 100 ft (31 m). Conveyance pipelines would be installed in trenches leading from the proposed new gallery wells to Haybarn Canyon. The pipelines would be installed along the existing road corridor to minimize new ground disturbance.

Operation

The gallery wells would be operated based on AMP/FOP guidelines and procedures as described in Section 2.3.1.4, *Special Conservation Measures*. The gallery wells would capture water in the streambed sediments, which is closely tied to the streamflow in the SMR during the wet season. This would induce additional streambed recharge during high flow storm events in most wet years, and some dry years, to optimize the storage capacity of the streambed sediments. The four gallery wells would have the capacity to extract a combined maximum of 18 cfs of surface water (only during the winter months of very wet years).

Typical annual operational activities associated with pipeline systems would include painting aboveground storage tanks, monitoring pressure, repairing occasional pipe breaks, exercising valves, and corrosion monitoring. Pumps and motors have life spans of about 20 to 30 years, depending on water quality. Typical operational activities would include occasional replacement of parts and other minor repairs.

<u>Water Conveyance/Distribution System, including Bi-Directional Pipeline from Reservoir Ridge to the Gheen Zone</u>

The pipeline system from the Haybarn Canyon AWTP to the Gheen Zone in Fallbrook would have two main turnouts to provide water directly to the users. The first turnout would be at Reservoir Ridge on MCB Camp Pendleton. The second turnout on the pipeline system would be in the community of Fallbrook. At the Gheen Zone, the pipeline would be connected to an existing pipeline to Red Mountain Reservoir, which has a connection to the SDCWA Aqueduct.

Construction

The first segment of pipeline would run upslope to the east from the Haybarn Canyon AWTP to Reservoir Ridge, where MCB Camp Pendleton maintains five reservoirs located approximately 500 ft (152 m) higher than Haybarn Canyon. A primary pumping station would be constructed in Haybarn Canyon near the AWTP. It would be capable of lifting up to 35 cfs of the treated water to Reservoir Ridge. The primary pumping station would have a permanent disturbance footprint of approximately 1,000 ft^2. Elevation for the clearwell is assumed near the ground surface elevation (115 ft [35 m] above sea level).

The pipeline from the Haybarn Canyon AWTP to Reservoir Ridge would be 42 in (107 cm) in diameter; approximately 3,000 ft (914 m) of welded steel pipe would be installed in a Type 1 flexible pipe trench, with at least 2 ft (0.6 m), and on average 4 ft (1.2 m) of cover over the pipe. From Reservoir Ridge, treated water would be delivered to MCB Camp Pendleton's existing storage and distribution facilities. Water would be distributed to MCB Camp Pendleton's southern area distribution system (at approximate elevation of 540 ft [165 m]) via existing pipelines.

Excess water produced beyond MCB Camp Pendleton's demand would be conveyed to FPUD through a bi-directional pipeline extending to the Gheen Zone, which would be connected via existing pipelines to the Red Mountain Reservoir, an existing 1,300 af treated water reservoir located at an elevation of 1,137 ft (347 m) near the community of Fallbrook. Delivery to FPUD would be via a 42-in (107-cm) welded steel pipeline, a distance of approximately 11 mi (18 km). The total length of the pipeline from Haybarn Canyon to the Fallbrook service area boundary would be 44,198 ft (13,472 m) of which 17,000 ft (5,181 m) would be located on MCB Camp Pendleton and 27,198 ft (8, 290 m) on DET Fallbrook.

The proposed bi-directional pipeline would leave Reservoir Ridge following an access road east to the intersection with A Street. At A Street, the pipe alignment would turn north. At the intersection of A Street and Rattlesnake Canyon Road, the pipe alignment would turn east. At the intersection of Rattlesnake Canyon Road and Vandegrift Boulevard, the pipe alignment would turn north again. At the intersection of Rattlesnake Canyon Road and Fallbrook Road (called Ammunition Road on DET Fallbrook), the pipe would turn east again, continuing on Ammunition Road and crossing Fallbrook Creek. At the Fallbrook Creek crossing, the bi-directional pipeline would either (1) span the channel, supported by piers or be suspended from a new utility I-beam, or (2) be installed beneath the stream channel through trenchless construction.

Near the intersection of Towe Road and Ammunition Road, the pipe would turn north on Towe Road. At the first intersection, the pipe would turn east and then north at the next intersection following the curved access road around until it intersects Sparrow Road. The pipe alignment would then turn northeasterly paralleling Sparrow Road and continue this direction onto a dirt access road that follows the Fallbrook and DET Fallbrook fence line. At the termination point of Dougherty Street on the fence line, the pipe alignment would turn east onto Dougherty Street. This east heading alignment would intersect Mission Road and continue east to the south turnout for the Knoll Park-Gheen Zone. An existing FPUD pipeline would provide a connection to the Red Mountain Reservoir.

Two booster pumping stations would be required for water conveyance to Red Mountain Reservoir. The first booster pumping station would be located near the guard station on the MCB Camp Pendleton side of the boundary between MCB Camp Pendleton and DET Fallbrook (elevation 385 ft [117 m]). Existing electrical power lines that are located along the fence line would be used for powering the pumping station. The pumping station would boost water under pressure from the headquarter mains zone (elevation 540 ft [165 m]) to Fallbrook's Gheen Zone (elevation 1,037 ft [316 m]).

The second booster pumping station would be incorporated at the site of the Gheen Zone in the community of Fallbrook. This pumping station would boost water under pressure to Fallbrook's Red Mountain Reservoir (elevation 1,137 ft [347 m]).

Operations

The rate of potable water pumped from Haybarn Canyon to the FPUD would vary based on hydrologic conditions. Maximum pumping would occur during the winter months of very wet years while minimum pumping would occur during drier conditions. During the driest years, treated project water would not be delivered to FPUD. The bi-directional pipeline between FPUD and MCB Camp Pendleton would allow imported water to be delivered to MCB Camp Pendleton from the SDCWA Aqueduct during drought periods when groundwater is insufficient to meet demands or during emergency situations.

Flow metering would occur downstream of the pumps at the Haybarn Canyon AWTP, where meters would measure the total product water made available under Alternative 2; and at the Reservoir Ridge tank, where meters would measure the flow going to FPUD. Alternately, for bypass flow, the meters would measure flow conveyed to MCB Camp Pendleton from FPUD.

Typical annual operational activities associated with pipeline systems would include painting aboveground storage tanks, monitoring pressure, repairing occasional pipe breaks, exercising valves, and corrosion monitoring. Pumps and motors have life spans of about 20 to 30 years, depending on water quality. Typical operational activities would include occasional replacement of parts and other minor repairs.

2.3.2.3 General Construction Methods

Alternative 2 would utilize the same general construction methods described under Alternative 1 (see Section 2.3.1.3).

2.3.2.4 Special Conservation Measures

Implementation of Alternative 2 would incorporate the same SCMs identified under Alternative 1 (see Section 2.3.1.4) as part of project development to avoid or minimize any potential environmental impacts.

2.3.3 No-Action Alternative

Under the No-Action Alternative, both MCB Camp Pendleton and FPUD would obtain all of their potable water demands from existing water supplies, with an increased reliance on imported water. MCB Camp Pendleton would continue to use its existing diversion, percolation, storage, and recovery system to meet its water demands. FPUD would rely solely on imported water purchased from the SDCWA. If the No-Action Alternative is chosen and the water rights are not perfected, other water development projects upstream of MCB Camp Pendleton could occur that would result in a reduction of water supply available to meet existing and future water demand.

Existing and future water demands on MCB Camp Pendleton would be met through the use of existing facilities or from the development of more expensive alternative water supplies, such as ocean desalination or construction of a new pipeline to an off-base water purveyor and purchase of imported water. Without access to an alternative water supply through the bi-directional pipeline, groundwater level declines during extended drought periods could not be mitigated nor could MCB Camp Pendleton demands be met during emergency conditions.

Without implementation of a “physical solution,” the ongoing *United States v. Fallbrook Public Utility District et al.* litigation likely would not be settled. Although other alternatives may exist, they are not feasible or prudent. Failure to reach a physical solution may propel the parties into active litigation prone to lead to a court judgment not likely satisfactory to either party. Although the No-Action Alternative would not meet the purpose of and need for the Proposed Action, it is included to serve as the baseline against which impacts of the alternatives can be compared.

Under the No-Action Alternative, FPUD has no direct water supply benefit from the OSMZ property and no remaining justification for maintaining this property as open space. Without implementation of SMR

CUP, the OSMZ could revert to the original condemnees and be developed, in which case there could be adverse impacts on wildlife, water quality, aesthetics, and other environmental values at the site and downstream. Under this alternative, the potential development of water resources by condemnees could result in a reduction of available water supply to downstream users.

2.4 Alternatives Considered and Eliminated from Detailed Study

During formulation of each potential alternative, many related projects were considered and reviewed in an effort to minimize any identified constraints. For instance, construction of new percolation ponds, conveyance facilities, and a diversion weir apart from the existing diversion facilities was considered, but was eliminated from further consideration due to geologic conditions and groundwater contamination restrictions within the study area. An additional diversion point on the SMR to an off-stream reservoir was also considered, but was eliminated due to lack of adequate benefits and environmental restrictions.

Several alternatives were initially considered in the following documents:

- *Santa Margarita Project, San Diego County, California, Draft Supplemental Environmental Statement* (Reclamation 1984). Refer to Section 2.2 for description of document.
- *Santa Margarita River Recharge and Recovery Enhancement Program: Permit 15000 Feasibility Study for Marine Corps Base Camp Pendleton* (Stetson 2001). Refer to Section 2.2 for description of document.
- *Draft Recycle and Reuse Study: Conjunctive Use Project for the Lower Santa Margarita River Basin. Supplemental Study to Santa Margarita River Recharge and Recovery Enhancement Project - Permit 15000 Feasibility Study for Marine Corps Base Camp Pendleton* (Stetson 2002). Refer to Section 2.2 for description of document.
- *Santa Margarita River Conjunctive Use Project Pre-Feasibility Plan Formulation Study* (Reclamation *et al.* 2005). Refer to Section 2.2 for description of document.
- *Decision Regarding Alternatives for Further Study Santa Margarita Conjunctive Use Project* (Reclamation 2006a). This memorandum described an inter-agency agreement on a Proposed Action and two action alternatives recommended to be carried forward for economic and environmental feasibility analysis.

2.4.1 Two Direct Diversion Weirs, Separate AWTPs for MCB Camp Pendleton and FPUD, Cross-Base Pipeline, and Recharge of Unpolished Effluent in Lower Ysidora Basin

This alternative (Alternative 2 from the *Decision Regarding Alternatives for Further Study Santa Margarita Conjunctive Use Project*) is similar to Alternative 1 in this EIS/EIR in that it includes replacement of the existing sheet pile diversion weir on the SMR with an inflatable weir diversion structure, improvements to O'Neill Ditch and headgate (capacity increased from 60 to 200 cfs), improvements to five existing percolation ponds, new groundwater production wells, a separate FPUD WTP, and an OSMZ.

However, the key differences with Alternative 1 are that a cross-base bi-directional pipeline would connect MCB Camp Pendleton with an appropriate water authority in Orange County instead of a pipeline between MCB Camp Pendleton and FPUD, a perforated recharge pipeline in the Lower Ysidora basin would be used to recharge groundwater with tertiary treated wastewater effluent, and a separate diversion weir would be constructed for the FPUD. The second diversion weir would be installed on the SMR downstream of the Sandia Creek Road crossing. Water pooled behind the diversion would be pumped and lifted following an existing, abandoned pipeline alignment to Red Mountain Reservoir. FPUD would convert Red Mountain Reservoir to raw water deliveries from the aqueduct. All water would be treated to DPH surface water treatment standards. Filtration would be added adjacent to the current ultraviolet treatment plant below the reservoir.

The cross-base pipeline component of this alternative was eliminated from further consideration because a pipeline connecting to a water authority in Orange County would not provide access to the SDCWA where MCB Camp Pendleton has existing entitlements to imported water. The separate FPUD diversion weir component of this alternative was eliminated from further consideration because seasonal availability of water (winter) does not coincide with peak demand (summer) and there is no groundwater basin for storage at the site, making this component unable to meet FPUD's needs. Otherwise, the improvements to the diversion weir and ditch and increased number of production wells are similar to modifications being carried forward under the action alternatives.

2.4.2 Diversion Weir, Ditch Improvements, Percolation ponds, and an Off-Stream Reservoir

This alternative (Alternative 4 from the *2001 Permit 15000 Feasibility Study)* would include replacement of the existing sheet pile diversion weir on the SMR with an inflatable weir diversion structure, new sluice gates at the river diversion, and relocation of the existing headgate. Also included would be enlargement of the O'Neill Ditch from 60 to 200 cfs, construction of two new percolation ponds with flow control and continuous flow measuring capability, and development of six additional supply wells. Four of the wells would be located within the Upper Ysidora Sub-basin (PW-1, PW-2, PW-3, and PW-6) and two would be located within the Chappo Sub-basin (PW-4 and PW-5).

This alternative included construction of an off-stream reservoir, pump station, and pipeline to convey surplus river diversions from the groundwater recharge pond system to a proposed reservoir site. Development of an off-stream reservoir would provide MCB Camp Pendleton with the flexibility to capture flows that would have spilled from the percolation ponds and would provide 4,800 af of storage capacity. A 40 cfs capacity pump station located in Recharge Pond 6 would lift excess water to the off-stream storage reservoir to be located approximately 2 mi (3 km) east of the percolation ponds on DET Fallbrook. The reservoir would consist of two earth embankment dams and three smaller earthen levees. The surface area of the reservoir would be approximately 55 acres (22 hectares).

Water pumped directly from the recharge pond would be conveyed in a 36-in (91-cm) buried steel pipeline extending generally east along the southern boundary of DET Fallbrook. The pump station would lift water approximately 360 ft (110 m) in elevation through 12,000 ft (3,657 m) of pipeline to the off-stream storage reservoir. Water would be released from the reservoir during prolonged dry periods to augment groundwater levels in the Lower Santa Margarita basin. Stored water would be returned to Recharge Pond 6 by gravity through a pipeline connecting the outlet works of the dam to the same pipeline that would be used to pump water up to the reservoir. This alternative would provide seasonal storage, increase the annual amount of water available for diversion by 21,000 af, provide water for drought relief during extended dry periods, and increase the annual groundwater production by 6,000 af/y.

The alternative was eliminated from further consideration because additional storage volume has already been achieved through completed improvements to Lake O'Neill and construction of Percolation ponds 6 and 7 (refer to Section 1.6.1.2). Otherwise, the improvements to the diversion weir and ditch and increased number of production wells are similar to modifications being carried forward under the action alternatives.

2.4.3 Aquifer Storage and Production Wells

This alternative (Alternative 5 from the *2001 Permit 15000 Feasibility Study)* included the construction of aquifer storage and production wells for the purpose of injecting water directly into the aquifers. Under this alternative, surface water would be diverted from the stream, filtered, and then injected into the aquifer for recovery at a later date.

This alternative was eliminated from further consideration because the high transmissivity of the groundwater basin and the shallow depth to groundwater limits any advantages that could be gained with development of aquifer storage and production wells, when compared to development of additional groundwater percolation ponds.

2.4.4 Recharge and Recovery of Stormwater in the Upper Basin

This alternative (Alternative 6 from the *2001 Permit 15000 Feasibility Study)* included construction of groundwater recharge basins in the upper Santa Margarita basin in the vicinity of the cities of Murrieta and Temecula. Floodwater from Murrieta Creek and its tributaries would be diverted to percolation ponds and recovered from the groundwater system at a later date. This alternative was originally considered because of the large amount of available storage in the upper Santa Margarita basin and the USACE flood study of Murrieta Creek. The groundwater aquifers in the upper basin contain available storage due to the large amount of development and resultant extensive groundwater withdrawals that have occurred over the last 30 years.

This alternative was eliminated from further investigation because the geologic restrictions in the upper basin would inhibit substantial quantities of water from infiltrating into the aquifers. The deep Pauba aquifer that has a large potential for groundwater storage is isolated from the surface by a 30- to 60-ft (9- to 18 m) clay layer, restricting recharge to the deeper aquifer. In addition, the flood control project proposed by the USACE did not provide for long-term (more than one day) storage of water for percolation purposes. Furthermore, the only potential site for groundwater recharge and storage in the upper basin is located in Pauba Valley. This site was found to be infeasible for development of recharge facilities due to the likelihood of adverse environmental impacts, nearby existing and future urban development, and incompatibility with the USACE project.

2.4.5 Enlargement of Lake O’Neill

This alternative (Alternative 7 from the *2001 Permit 15000 Feasibility Study)* consisted of enlarging Lake O’Neill for the purpose of storing high flow events for later release to the percolation ponds. Lake O’Neill is currently used for both water supply and recreational purposes. This alternative would require realignment of the SMR road and removal or relocation of adjacent recreational facilities. Diversions to the enlarged lake would require realignment of the O’Neill Ditch and/or installation of high volume-low lift pumps.

This alternative was eliminated from further consideration due to (1) the likely adverse impacts on existing recreational facilities, and (2) nearby physical constraints. It would not be physically possible to raise the dam on Lake O’Neill without inundating valuable facilities nor economically feasible to deepen the reservoir (Reclamation *et al.* 2005). Review of the soils surrounding Lake O’Neill also suggests that some form of barrier would be required to minimize leakage into the adjacent permeable Visalia, Tujunga, Greenfield, and Cieneba Series soils.

2.4.6 In-Stream Reservoir Sites

2.4.6.1 Fallbrook and De Luz Dams

The Santa Margarita Project or Two-Dam Project (as previously described in Section 1.4) consisted of the 36,500-af Fallbrook Dam and Reservoir, the 142,950-af De Luz Dam and Reservoir, the Fallbrook pumping plants and conveyance line, the cross-base aqueduct and pumping plants, recreation and fishing facilities, and wildlife conservation and enhancement management areas. The average project yield ranged from 10,400 af/y under initial conditions to 11,500 af/y under year 2020 conditions. These dams were studied in detail, as documented in the *Santa Margarita Project, San Diego County, California, Draft Supplemental Environmental Statement* (Reclamation 1984).

This alternative was eliminated from further consideration because the project was not considered to be feasible because the USFWS issued a BO with a determination that the project would jeopardize the existence of threatened and endangered species and due to high costs.

2.4.6.2 Consideration of Additional In-Stream Sites

This alternative (Alternative 8 from the *2001 Permit 15000 Feasibility Study)* included construction of on-stream reservoirs at additional sites for the purpose of diverting large flood events from the SMR. Similar to the Reclamation's Two-Dam Project discussed above, this alternative would capture large flood events on the SMR and release these flows at a controlled rate to recharge groundwater basins on MCB Camp Pendleton.

This alternative was eliminated from further consideration due to (1) the high environmental costs associated with the project (based on findings for the similar project analyzed in *Santa Margarita Project, San Diego County, California, Draft Supplemental Environmental Statement* [Reclamation 1984]), which included the potential adverse impact on beach sand replacement and adverse impacts on federally-listed species such as the California least tern (CLTE) and LBVI; and (2) because additional storage volume has already been achieved through completed improvements to Lake O'Neill and construction of Percolation Ponds 6 and 7 (refer to Section 1.6.1.2).

2.4.7 Brackish Water Desalination

The only local source of brackish water is in the Lower Ysidora Sub-basin, which extends to a narrows in the bedrock near the estuary and mouth of the SMR. This alternative considered desalinating brackish groundwater to support the physical solution between the two parties. Groundwater pumping in excess of the Lower Ysidora Sub-basin water supply yield could result in reverse gradients and the potential of seawater intrusion. This alternative was determined not to be feasible due to limited water supply and was eliminated from further consideration (Reclamation 2005).

2.4.8 In-Stream Check Structures

Some of the pre-feasibility alternatives involved construction of in-stream check structures along the SMR downstream from Basilone Road. The check structures would increase recharge to the Chappo Sub-basin. These structures would be constructed in lieu of re-constructing Ponds 6 and 7. The check structures would be designed to be temporary in nature and would be washed out every 3 to 5 years during high flow events. During low-flow periods, sediment would accumulate upstream of the structures. The temporary nature of the structures would allow flood flows to remove the barriers and transport fine materials downstream of the Chappo Sub-basin. Fine materials, if allowed to accumulate for extended periods of time upstream of the structures, could seal the ponding areas and reduce recharge rates. This project component was eliminated from further consideration because Percolation Ponds 6 and 7 have been constructed.

2.5 SUMMARY OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Environmental impacts on the following resources are evaluated in this EIS/EIR: geological resources, water resources, biological resources, cultural resources, air quality, hazardous materials and wastes, and utilities. Table 2.5-1 provides a summary of potential environmental impacts by resource area. A detailed impact analysis for each of these resources is provided in Chapter 4 and cumulative impact analysis is provided in Chapter 5.

Several additional resources were evaluated: traffic, noise, socioeconomics and environmental justice, land use and recreation, and visual resources. However, because the proposed action alternatives would be unlikely to have any significant impact on these resources, it was determined that further evaluation in the EIS/EIR was not required. A list of these resources as well as the rationale for eliminating them from full analysis is presented at the beginning of Chapter 3 of this EIS/EIR.

2.6 PREFERRED ALTERNATIVE

Based on the analysis presented in this EIS/EIR, Reclamation, USMC, and FPUD have identified Alternative 1 as the Preferred Alternative.

Table 2.5-1. Summary of Potential Environmental Consequences and Proposed Mitigation Measures by Resource Area

Alternative 1	Alternative 2	No-Action Alternative
	GEOLOGICAL RESOURCES	
Through implementation of Special Conservation Measures (SCMs) and the AMP/FOP, significant impacts would not occur; therefore, no additional mitigation measures will be implemented.	Same as Alternative 1.	Without an alternate source of water or reduced demand during sustained dry years, groundwater pumping could exceed safe yield and, therefore, aquifer subsidence is possible. Otherwise, adverse impacts are not anticipated.
	WATER RESOURCES	
Through implementation of SCMs and the AMP/FOP, significant impacts would not occur; therefore, no additional mitigation measures will be implemented.	Potential impacts to groundwater resources in the Upper Ysidora Sub-basin would occur with implementation of Alternative 2. The following mitigation measure to monitor and reduce impacts to groundwater resources to below a level of significance will be implemented: • The AMP/FOP under Alternative 2 would be modified to include the maintenance of groundwater levels within historical range constraint (*Note:* this measure is included in the AMP/FOP as described under Alternative 1). Groundwater levels would be monitored by a series of telemetered groundwater monitoring wells and pumping would be reduced or shut off if the groundwater level drops to within historic levels and remain reduced until the average monthly groundwater levels recover to above historic levels.	Impacts to groundwater could occur if an increase in pumping were to occur during sustained dry years. However, completion of the P-1045 pipeline, which will allow for water transfers between MCB Camp Pendleton's North and South water systems, may help to alleviate this concern during periods of extended drought.

Table 2.5-1. Summary of Potential Environmental Consequences and Proposed Mitigation Measures by Resource Area

Alternative 1	Alternative 2	No-Action Alternative
BIOLOGICAL RESOURCES		
Facilities construction would have direct and indirect impacts due to vegetation removal and disturbance of individuals resulting in the disruption of feeding or reproduction, energetic costs, and predation risks. In most respects, these impacts would be less than significant because they would be temporary and minimized with the implementation of SCMs that are part of the project. Established conservation measures for special status wildlife species would be followed to lessen construction-related disturbance and loss of habitat. Additional mitigation measures (provided below) involving site-specific avoidance, minimization, and/or restoration would be implemented to lessen construction impacts to levels that would be less than significant. The project's use of water in the Lower SMR may reduce streamflow and groundwater levels relative to historic averages. This could indirectly impact riparian habitat through flow-mediated changes in the distribution and duration of seasonal aquatic habitats, as well as reduced productivity of groundwater-dependent riparian vegetation and would have the potential for impacts on riparian and estuarine habitats and associated special status species, including impacts on least Bell's vireo, southwestern willow flycatcher, arroyo toad, light-footed clapper rail, California least tern, southern California steelhead, and Belding's savannah sparrow. However, potential impacts to these species would not be significant with successful implementation of the AMP/FOP and the terms and conditions of the USFWS and NOAA Fisheries BOs. Impacts from discharging the dilute brine to the Pacific Ocean from the existing Oceanside Ocean Outfall would be minor and any secondary effects on organisms in the runoff areas from the pipe would be negligible. Mitigation measures for Alternative 1 include: • Mitigation for any permanent losses of jurisdictional wetlands and other waters of the U.S.	Construction impacts and mitigation measures are similar to Alternative 1. The project's use of water in the Lower SMR may reduce streamflow and groundwater levels relative to historic averages; the inclusion of the gallery wells would result in additional reductions in SMR flow. This could indirectly impact riparian habitat through flow-mediated changes in the distribution and duration of seasonal aquatic habitats, as well as reduced productivity of groundwater-dependent riparian vegetation and would have the potential for impacts on riparian and estuarine habitats and associated special status species, including impacts on least Bell's vireo, southwestern willow flycatcher, arroyo toad, light-footed clapper rail, California least tern, southern California steelhead, and Belding's savannah sparrow. However, potential impacts to these species would not be significant with successful implementation of the AMP/FOP and the terms and conditions of the USFWS and NOAA Fisheries BOs. Impacts from discharging the dilute brine to the Pacific Ocean from the existing Oceanside Ocean Outfall would be minor and any secondary effects on organisms in the runoff areas from the pipe would be negligible. Mitigation measures for Alternative 2 include: • Mitigation for any permanent losses of jurisdictional wetlands and other waters of the U.S.	Without an alternate source of water or reduced demand during sustained dry years, groundwater depletion and its indirect effects on riparian habitat and associated species are anticipated.

Table 2.5-1. Summary of Potential Environmental Consequences and Proposed Mitigation Measures by Resource Area

Alternative 1	Alternative 2	No-Action Alternative
Cultural Resources		
Through implementation of SCMs, significant impacts would not occur; therefore, no additional mitigation measures will be implemented.	Same as Alternative 1.	No impacts would occur.
Air Quality		
Through implementation of SCMs, significant impacts would not occur; therefore, no additional mitigation measures will be implemented.	Same as Alternative 1.	No impacts would occur.
Hazardous Materials and Wastes		
The proposed new wells have been sited so that groundwater pumping would not impact the mapped plumes associated with Installation Restoration Program sites. Through implementation of SCMs and the AMP/FOP, significant impacts would not occur; therefore, no additional mitigation measures will be implemented.	Same as Alternative 1.	No impacts would occur.
Utilities		
Through implementation of SCMs and the AMP/FOP, significant impacts would not occur; therefore, no additional mitigation measures will be implemented.	Same as Alternative 1.	No significant impacts would occur; any future projects to develop potable water for MCB Camp Pendleton would be subject to the NEPA and/or CEQA process, as appropriate.

CHAPTER 3
AFFECTED ENVIRONMENT

This chapter describes the existing environmental conditions in and around MCB Camp Pendleton, DET Fallbrook, and the FPUD service area for resources potentially affected by implementation of Alternatives 1 and 2 as described in Chapter 2. Information presented in this chapter represents existing conditions against which the alternatives are evaluated (in Chapter 4) to identify potential impacts. A region of influence (ROI) is defined for each resource presented. The ROI is a geographic area in which potential environmental effects would occur with regard to a particular resource.

In compliance with NEPA and CEQA, the description of the affected environment focuses only on those resources potentially subject to impacts. In addition, the level of analysis should be commensurate with the anticipated level of impact. Accordingly, the discussion of the affected environment (and associated environmental analyses) focuses on geological resources, water resources, biological resources, cultural resources, air quality, hazardous materials and wastes, and utilities within the defined ROI for each resource. Conversely, the following resource areas were evaluated but not carried forward for detailed analysis in this EIS/EIR because the action alternatives would have only negligible effects on these resources.

Traffic. Increases in traffic volumes due to implementation of the Proposed Action would constitute a negligible portion of the total existing traffic volumes in the project area. However, the design-build contractor would be responsible for developing a traffic study to assess the impacts to traffic associated with construction of pipeline alignments along Vandegrift Boulevard and Ammunition Road. Impacts to traffic along these roads would be minimized by avoiding construction in the road pavement and shoulder except for locations where the pipeline would cross a major road (five times for each alternative). At major road crossings, construction activities would occur at times when traffic congestion would be minimal (i.e., at nighttime). Operation of various components and facilities of the project would be limited to vehicle traffic associated with periodic maintenance, which would be intermittent and would represent a negligible increase in traffic in the project area. Construction trips would be distributed throughout each day and would only intermittently affect individual routes or intersections during any given phase of construction. Excavation activities and placement of pipe across roadways would occur during non-peak traffic periods, as determined by the contractor.

Noise. Construction activities would require the use of heavy equipment for site preparation and development that would result in temporarily increased noise levels within the immediate area; however, noise levels would be typical of standard construction activities and would cease upon completion of proposed construction activities. Operation of various components and facilities of the project would generate instantaneous noise levels between 60 and 70 decibels (dB); however, due to the attenuation of noise with distance from the noise source, noise levels from both construction and operation of the Proposed Action would be reduced to ambient levels before reaching the nearest sensitive noise receptor.

Socioeconomics and Environmental Justice. Proposed construction activities would provide minor short-term economic benefit to the region but such effects would not be significant given the small size of the development and the relatively large size and diversity of the local economy. Implementation of the Proposed Action would not appreciably change the economic character or stability of the surrounding area. Accordingly, socioeconomic impacts of the Proposed Action would be beneficial but not significant.

EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations* requires that "each Federal Agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health effects of its programs, policies, and activities on minority populations and low income populations." There are no minority or low-income populations adjacent to the project area that would be impacted by the Proposed Action. Therefore, impacts related to EO 12898 would not occur.

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, states that each federal agency must, to the extent permitted by law and appropriate and consistent with the agency's mission: (a) make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and (b) ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. The Proposed Action would not substantially affect human health or the environment and, thus, would not create disproportionate risks to children. During the construction phases of the Proposed Action, standard measures to promote work site safety and discourage unauthorized public access (e.g., signs and fencing) would be implemented, thereby minimizing any risks to children or other local residents. In addition, there are no schools, day care facilities, or other known aggregations of children located in close proximity to the affected project areas. Therefore, impacts related to EO 13045 would not occur.

Land Use and Recreation. Implementation of the Proposed Action would not introduce a new land use and would be compatible with all MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook planning policies and surrounding land uses. Much of the project would occur over existing roads and previously disturbed areas. The improvements to the diversion structure, O'Neill Ditch, and percolation ponds would be consistent with current uses and pipelines would be installed alongside existing pipelines or roadways. Groundwater wells would result in a permanent footprint, but would be consistent with current land uses in the existing well basin. The FPUD WTP under Alternative 1 would be constructed in a previously disturbed area of the existing FPUD wastewater treatment plant, and the expansion of the AWTP under Alternative 2 would be constructed in a previously disturbed area of Haybarn Canyon. The proposed project would not change the nature of land use at the project sites or surrounding training facilities and would be compatible with and, therefore, not impact the respective missions of MCB Camp Pendleton and DET Fallbrook.

Construction would not have any permanent effect on public access to, or commercial or recreational use of public lands. MCB Camp Pendleton and DET Fallbrook as a whole are restricted from public access and project areas are not authorized for commercial use.

In the community of Fallbrook, the OSMZ is intended to be preserved with implementation of the Proposed Action. However, under the No-Action Alternative, the OSMZ would likely be sold by FPUD to the previous landowners, their heirs, or others which would potentially result in change in land use and passive recreational use no longer being available in the OSMZ.

Therefore, no significant impacts related to land use or recreational access would occur with implementation of the Proposed Action and potentially significant impacts would occur under the No-Action Alternative.

Visual Resources. Implementation of the Proposed Action would have a negligible effect on visual resources since the major project components would occur in an area where the visual environment is already characteristic of a military installation and the various components and facilities of the project would be consistent with current land use in the project area. Minor landscape modifications would occur during construction activities; however, disturbed areas would be revegetated as appropriate and allowed to return to their natural state.

3.1 GEOLOGICAL RESOURCES

3.1.1 Definition of Resources

Geological resources are defined as the topography, geology, and soils of a given area. Topography is typically described with respect to the elevation, slope, aspect, and surface features found within a given area. Long-term geological, seismic, erosional, and depositional processes typically influence the topographic relief of an area. The geology of an area includes bedrock materials, mineral deposits, soils, and fossil remains. The principal geologic factors influencing the stability of structures are soil stability and seismic properties. Soil refers to unconsolidated earthen materials overlying bedrock or other parent material.

3.1.2 Regulatory Setting

Public health and safety in regard to earthquake-related hazards are addressed by the Alquist-Priolo Earthquake Fault Zoning Act (California PRC §§ 2621-2630; 1972 amended 1994) and State Seismic Hazards Mapping Act (California PRC §§ 2690-2699, 1990); and the California Building Code (California Seismic Safety Commission 2005). The Alquist-Priolo Act prohibits the construction of structures for human occupancy within 50 ft (15 m) of an active earthquake fault, as indicated maps issued by the State Geologist of regulatory zones (known as Earthquake Fault Zones) around the surface traces of active faults (California Public Resources Code 2007). The State Seismic Hazards Mapping Act addresses other earthquake-related hazards, including liquefaction and seismically induced landslides. The State Geologist is in the process of providing a complete set of statewide seismic hazard maps that identify areas susceptible to strong ground shaking, landslides, and/or liquefaction, or other ground failure and seismic hazards caused by earthquakes. Through a national program, the United States is divided into four seismic hazard zones (Zones 1 through 4) based on the likelihood of strong ground shaking. The National Seismic Zone Map is published by the International Code Council in the California Building Code (California Seismic Safety Commission 2005). Although not required, geotechnical investigations are typically performed as part of project design. Construction plans are reviewed for conformance with provisions of the Alquist-Priolo Act, the State Seismic Hazards Mapping Act, and the California Building Code.

Soil erosion at MCB Camp Pendleton is minimized through implementation of terms and conditions of applicable BOs, including the Riparian/Estuarine BO (USFWS 1995a), and by implementation of the measures contained in the *MCB Camp Pendleton Soil Erosion Management Practice Handbook* (MCB Camp Pendleton 2000) and the Integrated Natural Resources Management Plan (INRMP) (MCB Camp Pendleton 2011). Current soil erosion control programs at MCB Camp Pendleton include road maintenance, grading, culvert maintenance and installation, water runoff control, traffic control in erosion damaged areas, and mulching areas with a protective cover of organic material such as wood chips and vegetation. In addition, the INRMP includes measures that minimize the potential for soil erosion from wildfires (MCB Camp Pendleton 2011). At DET Fallbrook, soil erosion is controlled through the use of site-specific excavation, grading, and filling plans, and SWPPPs and BMPs that are reviewed by the Naval Weapons Station Seal Beach EPSO to ensure that soil loss and erosion are minimized (DET Fallbrook 2009a). Construction within the community of Fallbrook is subject to County of San Diego erosion and seismic regulations.

3.1.3 Region of Influence

The ROI for geological resources includes the terrestrial topography, geology (including geologic hazards), and soils of the southeastern portion of MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook. The ROI does not contain a significant amount of mineral resources and no active or abandoned mines are located within the ROI (USMC 1997a,b); therefore, mineral resources are not addressed further in this section.

3.1.4 Existing Conditions

3.1.4.1 Topography

MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook are located within the Peninsular Ranges Geomorphic Province, which is generally considered to have two separate topographic regions. Northwest-trending mountain ranges, foothills, and intervening valleys are found in the inland, eastern, and central portion of the province. The western region is a coastal plain where cliffs rise from the coast into a plain composed of marine and nonmarine terraces (MCB Camp Pendleton 2011). Basilone Road, which bisects MCB Camp Pendleton approximately northwest-southeast, is considered the dividing line between the two topographic regions. Thus, the community of Fallbrook and DET Fallbrook are located in the eastern, inland portion of the province, while MCB Camp Pendleton extends across both.

The coastal cliffs at MCB Camp Pendleton rise from sea level to 100 ft (30 m) msl (MCB Camp Pendleton 1997). From the cliffs, the plain slopes upward at an inclination of 5% or less, to a maximum elevation of about 200 ft (61 m) msl (MCB Camp Pendleton 1997). The width of the plain ranges from 0.25 mi to 2.25 mi (0.40 km to 3.60 km). The coastal plain adjoins the San Onofre Hills, which rise steeply to a maximum elevation of 1,725 ft (526 m) msl, and give way to the Santa Margarita Mountains (maximum elevation 3,000 ft [914 m] msl). MCB Camp Pendleton also includes an area of gently rolling hills and level topography between the San Onofre Hills and the Santa Margarita Mountains. The topography of DET Fallbrook, the community of Fallbrook, and eastern MCB Camp Pendleton is steep and moderately to highly dissected with stream canyons. Aside from the narrow coastal strip, the majority of the land area at MCB Camp Pendleton exceeds a 15% slope (MCB Camp Pendleton 2011).

Natural erosive processes acting on the steep topography of MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook have cut southwest-trending stream valleys through the generally northwest-trending hills and mountains. Each stream contains its own valley fill deposits, as well as an alluvial fan deposit at its mouth at the coastline. The San Onofre Hills are dissected by the major stream systems of the area, including the SMR. The SMR forms a broad alluvial plain as it nears its end point at the Pacific Ocean, forming a level area of land between the steep surrounding hills. The SMR valley plain is the second-largest area of level land on MCB Camp Pendleton, after the coastal plain.

3.1.4.2 Geology

The landforms of MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook are due to the underlying geology. The inland, higher-elevation areas generally consist of granitic and metamorphic rocks composed of interlocking crystals. The coastal plain consists mostly of marine and non-marine sedimentary rocks formed from silt, sands, and larger fragments of other rocks that have been compacted and cemented together; these sedimentary rocks are less resistant to erosion than the crystalline rock types found in the highlands.

Geologic units underlying the ROI on MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook are described briefly below. The Santa Margarita Mountains within the community of Fallbrook, DET Fallbrook, and inland MCB Camp Pendleton include granitic (granodiorite, tonalite, and gabbro) and metamorphosed volcanic and sedimentary rocks which have become recrystallized through the action of intense heat and pressure (California Geological Survey [CGS] and USGS 2007). The area between the Santa Margarita Mountains and the San Onofre Hills consists primarily of two sedimentary formations: the Silverado Formation (sandstone and claystone) and the Santiago Formation (marine sandstone with siltstone layers) (CGS and USGS 2007).

Stream channels at MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook are underlain by unconsolidated active alluvial (water-laid) deposits. The SMR channel contains active floodplain deposits of mostly unconsolidated sand and gravel (CGS and USGS 2007). Older (i.e., not part of an active stream channel), moderately well consolidated alluvial deposits are found on the slopes above the active streams; these materials are moderately well consolidated and include a mixture of sand, silt, and gravel (CGS and USGS 2007).

Landslides

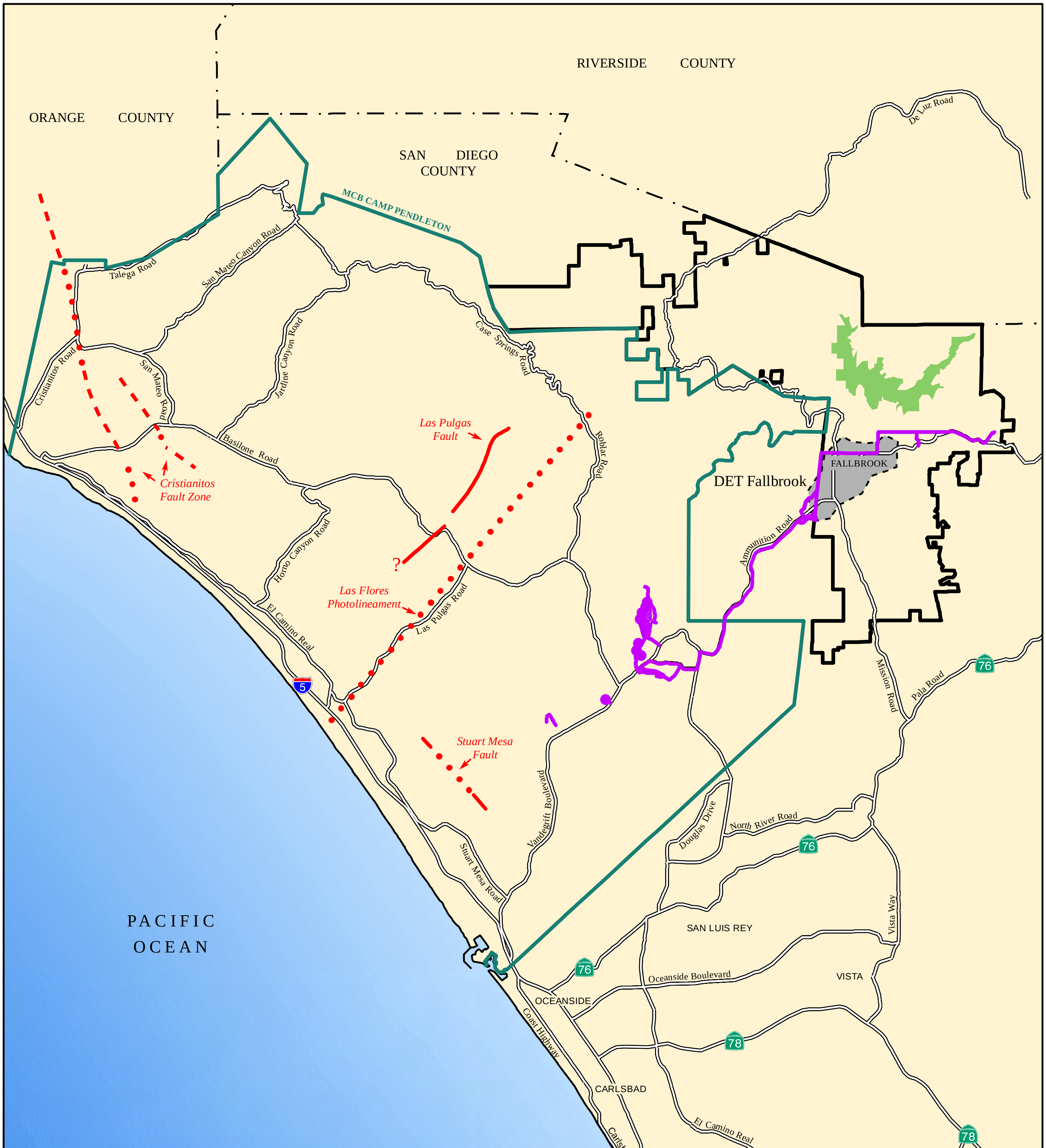
Landslides occur on MCB Camp Pendleton as a result of the steep slopes, soil type, and climate (DON 2003). There is potential for landslides in the Santiago Formation (DON 2003, CGS and USGS 2007), if slopes are steepened or undercut during construction.

Subsidence

Subsidence is defined as the downward movement of the ground surface that occurs when there is a loss of supporting materials or forces below. Drawdown of the water table during an extended drought, or with the introduction of new withdrawal wells, can cause subsidence as support provided by the historical volume of underlying groundwater is lost. Subsidence can cause differential settling of soils in the affected area, and damage to infrastructure located there.

Seismicity and Seismic Hazards

Like all of southern California, the project area lies within a seismically active region. Figure 3-1 shows the locations of regional and local fault zones. The CGS defines an active fault as one for which there is evidence of surface displacement within the last 11,000 years, and a potentially active fault as one for which there is evidence of surface displacement within the last 1.6 million to 11,000 years (CGS 2007). This definition is used as the basis for establishing Earthquake Fault Zones as mandated by the Alquist-Priolo Act (CGS 2007). The purpose of this legislation is to prevent unwise urban development and certain types of habitable structures from being placed across land showing evidence of active faults. There are no active faults within MCB Camp Pendleton, DET Fallbrook, or the community of Fallbrook (CGS 2007; USGS 2006a). Several of the faults and fault zones in the region surrounding the project area are considered to be active by the CGS. Table 3.1-1 lists the active regional faults closest to the project area.



LEGEND

- Project Area (Combination for Both Alternatives)
- Community of Fallbrook
- MCB Camp Pendleton Boundary
- FPUD Boundary
- Open Space Managment Zone
- Fault

Note: Fault Lines are dashed when approximate, dotted where concealed, and queried when uncertain.

Figure 3.1-1
Faults in the Vicinity of the Proposed Project Area

0 2 4 Miles
0 4 8 Kilometers

Sources:USGS 1973a,b; USGS 2006a; CGS and USGS 2007

Table 3.1-1. Major Active Faults in the Vicinity of the Proposed Project Area

Fault Name	Direction Relative to Project Site	Probable Magnitudes	Approximate Distance from Fault to Project Area (in miles)	
			MCB Camp Pendleton (Haybarn Canyon AWTP)	Community of Fallbrook
Whittier-Elsinore Fault	Northeast	6.5-7.5	12	8
Offshore Zone of Deformation[1]	Southwest	6.0-7.2	11	16
Rose Canyon Fault Zone	South	6.0-7.2	17	17
Newport-Inglewood Fault	Northwest	6.0-7.2	28	33

Note: [1] Also called the Newport-Inglewood–Rose Canyon Fault Zone.
MCB = Marine Corps Base; AWTP = Advanced Water Treatment Plant.
Sources: USGS 2006a, Southern California Earthquake Data Center 2012.

Ground acceleration. Ground acceleration is an estimation of the peak bedrock or ground motion associated with a specific earthquake event. It is expressed in terms of “g” forces, where “g” equals the acceleration due to gravity. Acceleration can be measured directly from seismic events or calculated from magnitude and fault distance data. The maximum estimated peak ground acceleration in the ROI would likely be produced by an earthquake event on the Offshore Zone of Deformation (GeoLogic Associates 2003, 2006).

Liquefaction. Liquefaction occurs when the intense shaking motion generated by an earthquake causes soils to lose shear strength temporarily and behave like liquid rather than solid material. Liquefaction can cause differential soil settlement, and thus damage buildings and other structures located in areas where it occurs. For liquefaction to affect structures on the ground surface, underlying soils generally must be granular, loose to medium dense, and saturated with water relatively near the surface. There are nonconsolidated to poorly consolidated sands and gravels in the low-lying areas and along the beaches in the ROI; portions of these areas may have a moderate potential for liquefaction. The remainder of the ROI consists of older, consolidated, and lithified materials in dry, upland areas, so liquefaction potential elsewhere is considered to be low.

3.1.4.3 Soils

Soils at MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook formed as a result of weathering and transport of the underlying parent material. Weathered granites, marine sandstone, metamorphosed sedimentary rocks, and alluvial material are the parent material for soils in the project area (U.S. Department of Agriculture [USDA] 1973).

Soil erodibility and shrink-swell potential are the major soil properties of concern when considering construction activities. Table 3.1-2 lists the major soil series and their properties for the proposed project component locations. Although there are 21 soil types throughout the project area as a whole, many of the proposed project components would be sited in areas where the same soil types occur. As shown in Table 3.1-2, the USDA characterizes the majority of the soil types within the ROI as being extremely erodible and several soil series are categorized as having severe shrink-swell potential.

Table 3.1-2. Major Soil Types/Properties and Project Components

Soil Type	Erodibility	Shrink/Swell Potential	Project Components
Tujunga Series	Severe	Slight	• Inflatable weir and O'Neill Ditch 1, 2 • Production Wells 1, 2 • Gallery wells 2 • Portions of Bi-directional pipeline 1, 2 • Haybarn Canyon 1, 2
Greenfield Series	Severe	Slight to severe	• Production wells 1, 2 • Portions of Bi-directional pipeline 1, 2
Visalia Series	Severe	Slight to moderate	• Production wells 1, 2 • Portions of Bi-directional pipeline 1, 2 • FPUD WTP 1
Las Flores Series	Severe	Severe	• Portions of Bi-directional pipeline 1, 2
Linne Series	Severe	Moderate	• Production wells 1, 2 • Portions of Bi-directional pipeline 1, 2 • Haybarn Canyon 1, 2
Fallbrook Series	Severe	Moderate	• Portions of Bi-directional pipeline 1, 2
Cieneba Series	Severe	Low	• Portions of Bi-directional pipeline 1, 2
Placentia Series	Low to moderate	Severe	• Portions of Bi-directional pipeline 1, 2
Vista Series	Moderate	Moderate to severe	• Portions of Bi-directional pipeline 1, 2 • FPUD WTP 1
Greenfield Series	Severe	Slight to moderate	• Production wells P, 1, 2 • Portions of Bi-directional pipeline 1, 2
Ramona Series	Low to moderate	Moderate	• Portions of Bi-directional pipeline 1, 2

Notes: 1 = Alternative 1; 2 = Alternative 2.
FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant.
Source: USDA 1973.

3.2 WATER RESOURCES

3.2.1 Definition of Resources

Water resources include surface water resources, groundwater resources, hydrology, water quality, and floodplains. Surface water includes lakes, ponds, rivers, streams, impoundments, and wetlands within a defined area or watershed. Groundwater is water that is located below the ground surface and is stored and flows through subsurface aquifers. An aquifer is an underground layer of water-bearing permeable rock or unconsolidated materials (gravel, sand, or silt) from which groundwater can be usefully extracted or pumped using a water well. Hydrology is the science that deals with water, its properties, circulation, and distribution, on and under the surface of the earth and in the atmosphere, from the moment of precipitation until it returns to the atmosphere through evapotranspiration or is discharged into the ocean. Water quality describes the chemical and physical composition of water as affected by natural conditions and human activities. Floodplains are relatively flat areas adjacent to rivers, streams, watercourses, bays, or other bodies of water subject to inundations during flood events. A 100-year floodplain is an area that is subject to a 1% chance of flooding in any particular year, or, on average, once every 100 years.

3.2.2 Regulatory Setting

The primary legal and regulatory drivers that apply to the action alternatives are federal and state water quality laws and regulations addressing different aspects of water quality.

3.2.2.1 Federal Laws

Over the years, applicable federal laws have been enacted and the supporting regulations adopted to control water quality and to establish the requirements for adequate planning, implementation, management, and enforcement, including penalties for non-compliance. These include the CWA which addresses the quality of surface waters and the Safe Drinking Water Act which applies to water supplies delivered for public use.

Clean Water Act

The CWA of 1972 is the primary federal law that protects the nation's waters, including lakes, rivers, and coastal areas. The primary objective of the CWA is to restore and maintain the integrity of the nation's waters. In most states, including California, most responsibilities under the CWA are delegated to the states. In California, the CWA responsibilities lie with the SWRCB and nine RWQCB. The San Diego RWQCB oversees the SMR watershed and therefore all planning and regulatory activities relating to surface water in the watershed. The San Diego RWQCB regulates the discharge of stormwater, groundwater, and potable water to the SMR through the issuance of NPDES permits, which are based on applicable federal standards and policies, including the Basin Plan (San Diego RWQCB 1994), and regulations promulgated by the USEPA, as well as applicable state laws and regulations as described in the following section. NPDES effluent discharge standards for treated effluent discharged into the SMR Estuary are also governed by the Water Quality Control Plan, Ocean Waters of California (California Ocean Plan) (SWRCB 2009b), and the Water Quality Control Plan for Enclosed Bays and Estuaries (Bays and Estuaries Plan) (SWRCB 1998).

Stemming from the CWA, in October 2004, the DOD issued UFC on LID (UFC 3-210-10). The DOD-issued guidance on LID was later updated on 15 November 2010. This is a stormwater management strategy designed to maintain the hydrologic functions of a site and mitigate the adverse impacts of stormwater runoff from DOD construction projects. All DOD construction projects are required to be compliant with these LID criteria. Following UFC 3-210-10, Section 438 of the Energy Independence and Security Act of 2007 (42 USC § 17094) has also been implemented by the DOD. This goes further with stricter stormwater runoff requirements for federal development projects. Section 438 requires federal agencies to develop facilities having a footprint that exceeds 5,000 ft^2 (465 m^2) in a manner that maintains or restores the pre-development site hydrology to the maximum extent technically feasible. Agencies can accomplish pre-development hydrology in two ways: (1) managing on-site the total volume of rainfall from the 95th percentile storm, or (2) managing on-site the total volume of rainfall based on a site-specific hydrologic analysis through various engineering techniques (e.g., detention basin or retention pond).

Safe Drinking Water Act

The principal federal law pertaining to drinking water quality is the Safe Drinking Water Act, established in 1974 and subsequently amended, to protect the quality of drinking water in the United States. This law focuses on all waters actually or potentially designated for drinking use, whether from surface or groundwater sources. The USEPA set Primary Drinking Water Standards to protect the public health by limiting the levels of contaminants in drinking water. Contaminants regulated in the standards include a comprehensive list of microorganisms, disinfectants, inorganic and organic chemicals, and radionuclides (40 CFR § 141). Primary regulations require mandatory enforcement. Secondary drinking water standards are not federally enforceable but rather are intended as guidelines for states to control contaminants in drinking water that may affect the aesthetic qualities and, therefore, the public's acceptance of drinking water (40 CFR § 143). Also under the Safe Drinking Water Act, new water supplies sources and facilities, such as wells and treatment plants, require permitting by the state agency, in this case the DPH.

EO 11988, *Floodplain Management*

EO 11988 directs all federal agencies to refrain from conducting, supporting, or allowing any activity that would significantly encroach into a floodplain, or impact floodplain resources, unless it is the only practicable alternative. If the lead agency finds that the only practicable alternative requires siting in a floodplain, the agency shall either design or modify its action to minimize harm to or within the floodplain and circulate a notice explaining why the action is proposed to be located in a floodplain.

EO 13547, *Stewardship of the Ocean, Our Coasts, and the Great Lakes*

EO 13547 establishes a national policy to ensure the protection, maintenance, and restoration of the health of ocean, coastal, and Great Lakes ecosystems and resources; enhance the sustainability of ocean and coastal economies; preserve our maritime heritage; support sustainable uses and access; provide for adaptive management to enhance our understanding of and capacity to respond to climate change and ocean acidification; and coordinate with our national security and foreign policy interests. This order also provides for the development of regional coastal and marine spatial plans that build upon and improve existing federal, state, tribal, local, and regional decision making and planning processes.

3.2.2.2 State and Local Laws, Guidelines, and Regulations

Porter-Cologne Act

California's primary statute governing water quality and water pollution issues is the Porter-Cologne Water Quality Control Act of 1970 (Porter-Cologne Act) with numerous amendments and additions since initial adoption. The Act is contained in Division 7 Water Quality, Section 13000 *et seq.*, of the California Water Code.

The Porter-Cologne Act grants the SWRCB and nine RWQCBs broad powers to protect water quality and is the primary vehicle for implementation of California's responsibilities under the federal CWA. The Porter-Cologne Act grants the SWRCB and the RWQCBs authority and responsibility to adopt plans and policies, to regulate discharges to surface and groundwater (groundwater is not covered by the CWA), to regulate waste disposal sites, and to require cleanup of discharges of hazardous materials and other pollutants. The Porter-Cologne Act also establishes reporting requirements for unintended discharges of any hazardous substance, sewage, or oil/petroleum product.

Water Quality Control Plan for the San Diego Basin

The Water Quality Control Plan for the San Diego Basin (Basin Plan) is a water quality policy and guidance document developed by the San Diego RWQCB to set effluent discharge limitations for NPDES and other waste discharge permits. The Basin Plan, which is periodically updated, with its most recent major update in 1994, describes beneficial uses and defines water quality objectives for surface and groundwater within the San Diego region.

The Basin Plan identifies the beneficial uses surface waters and groundwater in the project area (refer to Section 3.2.3.4 for specific beneficial uses). In order to maintain these beneficial uses, the San Diego RWQCB sets quality objectives for surface waters and groundwater with in the region. These objectives are used by the San Diego RWQCB to establish and update the implementation section of the Basin Plan.

The implementation section addresses a wide range of regulatory actions the RWQCB can take (e.g., issuing discharge permits for wastewater treatment plants and other various non-permitted plants, and adopting Total Maximum Daily Loads [TMDLs]) and programs that can be implemented to maintain or restore the water quality to meet the objectives.

The project area falls within the Santa Margarita Hydrologic Unit (HU 902.00) that contains several Hydrologic Areas (HA) with the HA of interest being the Ysidora HA (2.10). The Ysidora HA is further divided into Hydrologic Sub-Areas (HSAs). The HSAs of the Ysidora HA include: Upper Ysidora HSA (2.1.3), Chappo HSA (2.1.2), and the Lower Ysidora HSA (2.1.1) (San Diego RWQCB 1994). Each of these HSAs has an underlying groundwater sub-basin (as described in Section 3.2) with the same designated name. Water quality objectives for surface water and groundwater within the project area are presented in Table 3.2-1. For compliance with the water quality objectives, the concentrations listed in Table 3.2-1 are not to be exceeded more than 10% of the time.

Table 3.2-1. Basin Plan Water Quality Objectives for Ysidora Hydrologic Area

Constituent	Surface Water[1]	Groundwater[1]
Boron	0.75 mg/L	0.75 mg/L
Chloride	300 mg/L	300 mg/L
Color	20 color units	20 color units
Fluoride	1.0 mg/L	1.0 mg/L
Iron	0.3 mg/L	0.3 mg/L
Manganese	0.05 mg/L	0.05 mg/L
Methylene blue active substances	0.5 mg/L	0.5 mg/L
Nitrate	None	10 mg/L as Nitrate
Phosphorus & Nitrogen [2]	-	None
Percent Sodium	60	60
Sulfate	300 mg/L	300 mg/L
TDS	750 mg/L	750 mg/L
Turbidity	20 NTU	20 NTU

Notes: [1] Concentrations not to be exceeded more than 10% of the time during any one year period.
[2] A discussion of nitrogen and phosphorus water quality objectives is provided above under *Water Quality Control Plan for the San Diego Basin*.
mg/L = milligrams per liter; TDS = Total Dissolved Solids; NTU = National Turbidity Unit.
Source: San Diego RWQCB 1994.

In addition, there are nitrogen and phosphorus water quality objectives established for surface waters in the Ysidora HA. The objectives stipulate that concentrations of nitrogen and phosphorus, by themselves or in combination with other nutrients, shall be maintained at levels below those which stimulate algae and emergent plant growth. Threshold phosphorus concentrations shall not exceed 0.05 mg/L in any stream at the point where it enters any standing body of water or 0.025 mg/L in any standing body of water (San Diego RWQCB 1994).

To prevent public nuisances in streams and other flowing waters, a desired total phosphorus goal is 0.1 mg/L. These values are not to be exceeded more than 10% of the time unless studies of the specific water body in question clearly show that water quality objective changes are permissible and changes are approved by the San Diego RWQCB. Analogous threshold values have not been set for nitrogen compounds; however, natural ratios of nitrogen to phosphorus are to be determined by surveillance and monitoring, and upheld. If data are lacking, a ratio of nitrogen to phosphorus equaling 10:1 shall be used (San Diego RWQCB 1994).

The Basin Plan provides an alternative method for compliance with the limits on nitrogen and phosphorus based on the discharge of recycled water (i.e., treated effluent) to watercourses downstream of lakes or reservoirs used for municipal water supply. Under this method, the San Diego RWQCB may prescribe different limits on nutrients based on Best Available Technology for nutrient removal that are economically feasible, subject to the development and implementation of a watercourse monitoring plan and other potential conditions (San Diego RWQCB 1994). If such a method of compliance was sought, the AMP/FOP would be adapted to meet the watercourse monitoring plan requirements established by the San Diego RWQCB.

State General Construction Permit

The project is required to apply for coverage under SWRCB Order No. 2009-0009-DWQ: *National Pollution Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Disturbance Activities* (General Permit) (SWRCB 2009a). As outlined in SCMs listed in Section 2.3.1.4, the ROICC/Contractor must file an NOI with the SWRCB to obtain coverage under the General Permit, pay an annual fee, and prepare and implement a site-specific SWPPP which describes the pollution prevention measures and BMPs that would be implemented to minimize pollution as well as monitoring, record-keeping, and other procedures that would be maintained. The San Diego RWQCB is the agency that inspects the site and enforces the SWPPP. For construction projects on non-federal land disturbing less than 1 acre (0.4 hectare), there are separate requirements included under the San Diego Municipal Stormwater Permit without the requirement for filing with the SWRCB or preparing a formal SWPPP.

Groundwater Dewatering NPDES Permit

Project excavations which intercept groundwater and require groundwater dewatering would comply with SWRCB Order No. R9-2008-0002: *General Waste Discharge Requirements for Discharges from Groundwater Extraction and Similar Discharges to Surface Waters within the San Diego Region except for San Diego Bay* (SWRCB 2008). As outlined in SCMs listed in Section 2.3.1.4, the ROICC/Contractor must submit a NOI, project map, and initial sampling report to the San Diego RWQCB in order to obtain permission to dewater construction excavations and discharge to a municipal storm drain, surface waters, or dry channels. Discharges must comply with discharge and receiving water limits. For small discharges, the permit may be avoided if the Facilities Maintenance Department Wastewater Supervisor allows the discharge into the sanitary sewer. A waiver may be obtained, with assistance from the MCB Camp Pendleton ES, DET Fallbrook Public Works, or FPUD, as applicable, for short-term construction dewatering operations where there is no discharge to CWA jurisdictional surface waters.

California Ocean Plan

Section 13170.2 of the California Water Code directs the SWRCB to formulate and adopt a water quality control plan for ocean waters of California. The SWRCB first adopted this plan, known as the California Ocean Plan, in 1972. The California Water Code also requires a review of the California Ocean Plan at least every 3 years to guarantee that current standards are adequate and are not allowing degradation to indigenous marine species or posing a threat to human health. The amendments to the California Ocean Plan are reviewed and approved by the USEPA under the CWA.

The SWRCB amended the California Ocean Plan in September 2009. The California Ocean Plan establishes water quality objectives for California's ocean waters and provides the basis for regulation of wastes discharged into the State's coastal waters. The plan applies to point and nonpoint source discharges. Both the SWRCB and the six coastal RWQCBs implement and interpret the California Ocean Plan.

The California Ocean Plan identifies the applicable beneficial uses of marine waters. These beneficial uses include preservation and enhancement of designated Areas of Special Biological Significance, rare and endangered species, marine habitat, fish migration, fish spawning, shellfish harvesting, recreation, commercial and sport fishing, mariculture, industrial water supply, aesthetic enjoyment, and navigation. The California Ocean Plan establishes a set of narrative and numerical water quality objectives to protect beneficial uses. These objectives are based on bacterial, physical, chemical, and biological characteristics as well as radioactivity. The water quality objectives in Table A and Table B of the California Ocean Plan apply to all receiving waters under the jurisdiction of the plan and are established for the protection of aquatic life and for the protection of human health from both carcinogens and noncarcinogens (SWRCB 2009b). Within these tables there are 21 objectives for protecting aquatic life, 20 for protecting human health from noncarcinogens, and 42 for protecting human health from exposure to carcinogens (SWRCB 2009b).

The California Ocean Plan includes an implementation program for achieving water quality objectives by setting effluent or brine discharge limitations for the protection of marine waters. When a discharge permit is written or modified, such as for the brine discharge, the water quality objectives for the receiving water are converted into effluent limitations that apply to discharges into State ocean waters. These effluent limitations are established on a discharge-specific basis depending on the initial dilution calculated for each outfall and the objectives within the plan. Implementation provisions are also established for bacterial assessment and remedial action requirements. These provisions provide a basis for determining the occurrence and extent of any impairment of beneficial uses due to bacterial contamination and for providing remedial actions necessary to minimize or eliminate any future impairment of a beneficial use.

NPDES Ocean Discharge Permit

Discharge via an existing ocean outfall (e.g., City of Oceanside Ocean Outfall) would require an amendment to the applicable existing discharge permit. As an example of permit limitations, select permit limits for the combined effluent were taken from the City of Oceanside's NPDES Ocean Discharge Permit and are presented in Table 3.2-2.

Table 3.2-2. 2005 Oceanside Permit (Order No. R9-2005-0136) Requirements for Ammonia and Metals[1]

Constituent	Units	Oceanside Permit Limits		
		6-Month Median	Daily Maximum	Instantaneous Maximum
Arsenic	mg/L	0.42	2.4	6.4
Cadmium	µg/L	83	330	830
Chromium (hexavalent)	µg/L	170	660	1,660
Copper	µg/L	85	830	2,300
Lead	µg/L	170	660	1,660
Mercury	µg/L	3.3	13	33
Nickel	mg/L	0.41	1.7	4.1
Selenium	mg/L	1.2	5.0	12
Silver	µg/L	24	140	360
Zinc	mg/L	1.0	6.0	16
Ammonia as N	mg/L	50	200	500

Note: [1] The permit also includes limitations for major constituents (carbonaceous biological oxygen demand, TSDs, oil and grease, settleable solids, turbidity, pH, toxicity) and for other toxic compounds (organics, radioactivity, cyanide, total chlorine residual).
mg/L = milligrams per liter; TSD = total dissolved solid.

Source: San Diego RWQCB 2005.

3.2.3 Region of Influence

The ROI for water resources includes those areas that contain surface water or groundwater features that may be impacted by the action alternatives. The study area includes the southern portion of MCB Camp Pendleton, DET Fallbrook, and the FPUD service area. The surface water rivers/creeks located in the ROI for the action alternatives are the SMR, Fallbrook Creek, De Luz Creek, and Sandia Creek (refer to Figure 3.2-1). The ROI also includes surface water bodies such as the SMR Estuary, Lake O'Neill, and the percolation ponds adjacent to Lake O'Neill. Because the implementation of the action alternatives would potentially affect coastal waters, the ROI also extends to coastal waters subject to the CWA. Groundwater resources that may be influenced with implementation of the action alternatives are the Upper Ysidora, Chappo, and Lower Ysidora groundwater sub-basins.

3.2.4 Existing Conditions

This section provides background information describing the existing condition of surface water resources, groundwater resources, hydrology, water quality, and floodplains in the ROI.

3.2.4.1 Surface Water Resources

<u>Santa Margarita River Watershed</u>

The SMR watershed (Figure 3.2-1) flows southwesterly to the Pacific Ocean, draining the Palomar and Santa Ana mountains. The SMR watershed encompasses 744 mi^2 (1,927 km^2) within San Diego and Riverside counties, and is divided by a coastal range of mountains. The upper portion of the watershed is located in Riverside County and drained by Temecula and Murrieta creeks. Downstream of the confluence of Temecula and Murrieta creeks, the SMR flows southwesterly to the Pacific Ocean, draining the lower portion of the watershed. The lower basin is located in lands serviced by FPUD, Rancho California Water District, or owned by DET Fallbrook and MCB Camp Pendleton. Approximately 10% of the SMR watershed is on MCB Camp Pendleton and DET Fallbrook. Major tributaries in the lower basin are De Luz, Sandia, Rainbow, and Fallbrook creeks.

<u>Santa Margarita River</u>

The SMR flows 29 mi (47 km) southwesterly from the confluence of Murrieta and Temecula creeks to the Pacific Ocean. The SMR is the least disturbed and longest free-flowing, undammed river in coastal southern California (County of San Diego 2005). Principal tributaries to the SMR lower basin include De Luz, Sandia, Rainbow, and Fallbrook creeks. Flow in the SMR is highly variable depending on the time of year and the hydrologic conditions of the preceding seasons.

<u>Santa Margarita River Estuary</u>

The SMR Estuary is a coastal lagoon at the mouth of the SMR that is typically subject to tidal influence from the Pacific Ocean but can become separated from the ocean by a sand berm. The configuration of the lower estuary near the mouth area can change from one year to another with the shifting sand berm. The area of tidal influence extends from the ocean to slightly above the Stuart Mesa Road bridge that crosses the SMR. The main riverine channel of the estuary is approximately 7,000 ft (2,134 m) long with a width ranging from 125 to 1,400 ft (38 to 427 m). The SMR Estuary extends to the upstream limit of the tidal marine circulation and occupies 190 acres (77 hectares) comprising several different types of coastal wetlands differentiated by the degree of inundation and salinity.

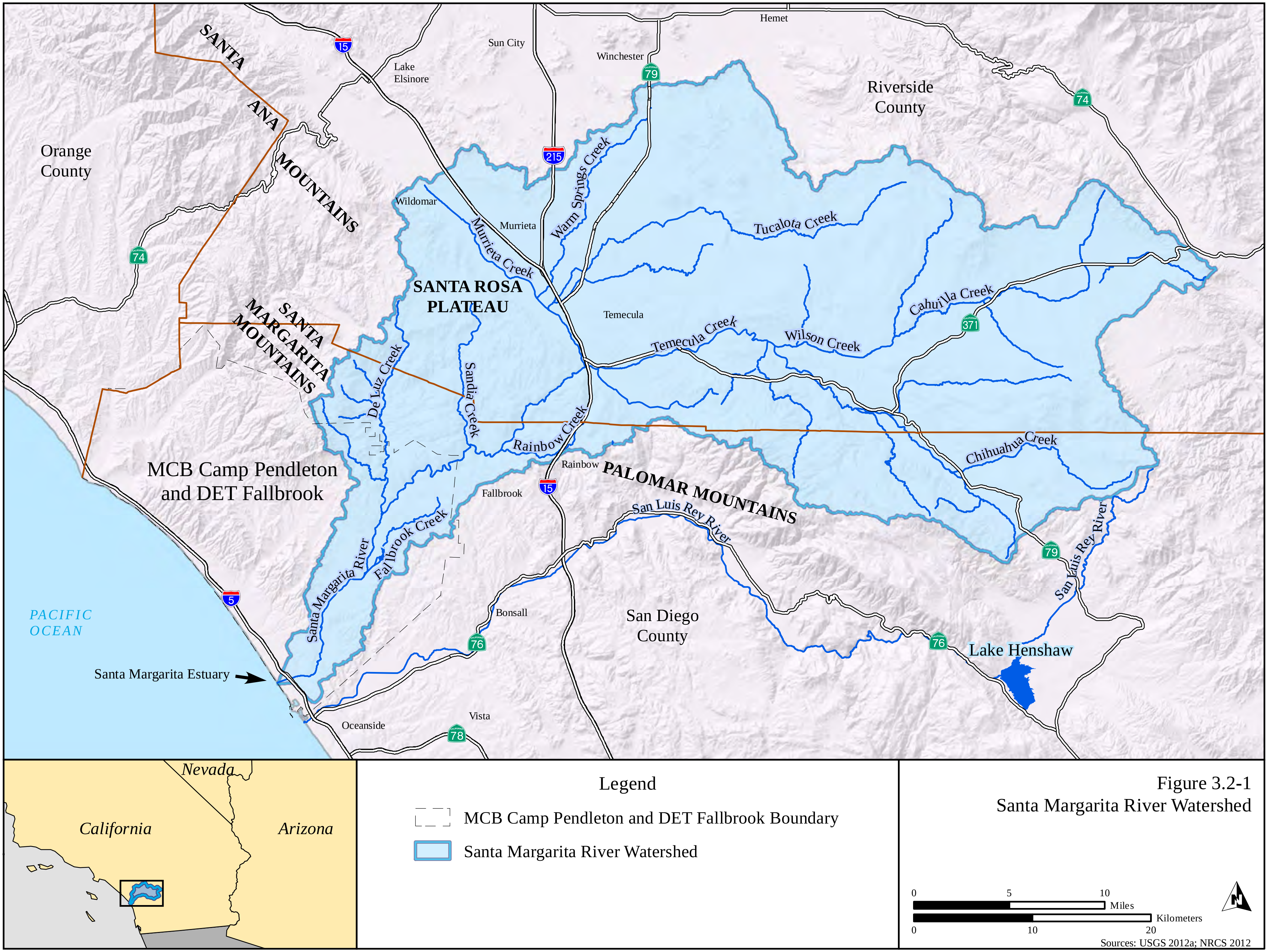


Figure 3.2-1
Santa Margarita River Watershed

Existing Diversion Facilities

Facilities currently exist on the SMR within MCB Camp Pendleton to divert surface water from the river. The existing diversion system consists of a steel sheet pile diversion weir constructed across the SMR that diverts water through O'Neill Ditch (an earthen channel) to a series of seven interconnected groundwater percolation ponds and to Lake O'Neill (Figure 3.2-2). The water that is diverted into Lake O'Neill and the percolation ponds is used to recharge the groundwater basin. A series of control structures and measuring devices allows MCB Camp Pendleton personnel to manage, control, and measure the diversion to each of the different facilities. The current maximum diversion capacity of the sheet pile weir and O'Neill ditch is 60 cfs.

Lake O'Neill

Lake O'Neill is located off of Santa Margarita Road approximately 9 mi (15 km) from the Main Gate, and is used primarily for water storage (i.e., groundwater recharge) purposes and secondarily for recreational purposes by USMC personnel and other authorized users. Lake O'Neill is a manmade reservoir formed by an earthen dam located on Fallbrook Creek, a tributary to the SMR. The lake is filled primarily from SMR diversions conveyed to the lake through O'Neill Ditch (Figure 3.2-2).

Diversions from O'Neill Ditch to the lake occur through a turnout structure and pipe located at the lower end of O'Neill Ditch. Adjacent to the turnout pipe that fills the lake is an overflow outlet that returns reservoir spills to a ditch that eventually percolates into the ground or drains back to the river. Lake water is also returned to the river through an outlet pipe located in the southern corner of the lake (Reclamation *et al.* 2005).

MCB Camp Pendleton completed dredging of the open water portion of Lake O'Neill (Phase I) in 2012. Phase II will include additional dredging and installation of maintenance facilities to improve the usable storage of the lake. This two-phase process will return Lake O'Neill to its original storage capacity of approximately 1,680 af.

Percolation ponds

Water that is diverted from the SMR via the existing diversion structure is conveyed to either Lake O'Neill or to seven interconnected groundwater percolation ponds (Figure 3.2-2). The groundwater percolation pond system was constructed between 1955 and 1962, and SMR diversions to the percolation ponds were first recorded in October 1960. The total surface area of the seven-pond system is approximately 74 acres (30 hectares), and the capacity of the ponds is estimated to be approximately 371 af (MCB Camp Pendleton 2012a). Ponds 4, 5, 6, and 7 were recently rehabilitated in late 2011 during Phase 1 dredging of Lake O'Neill.

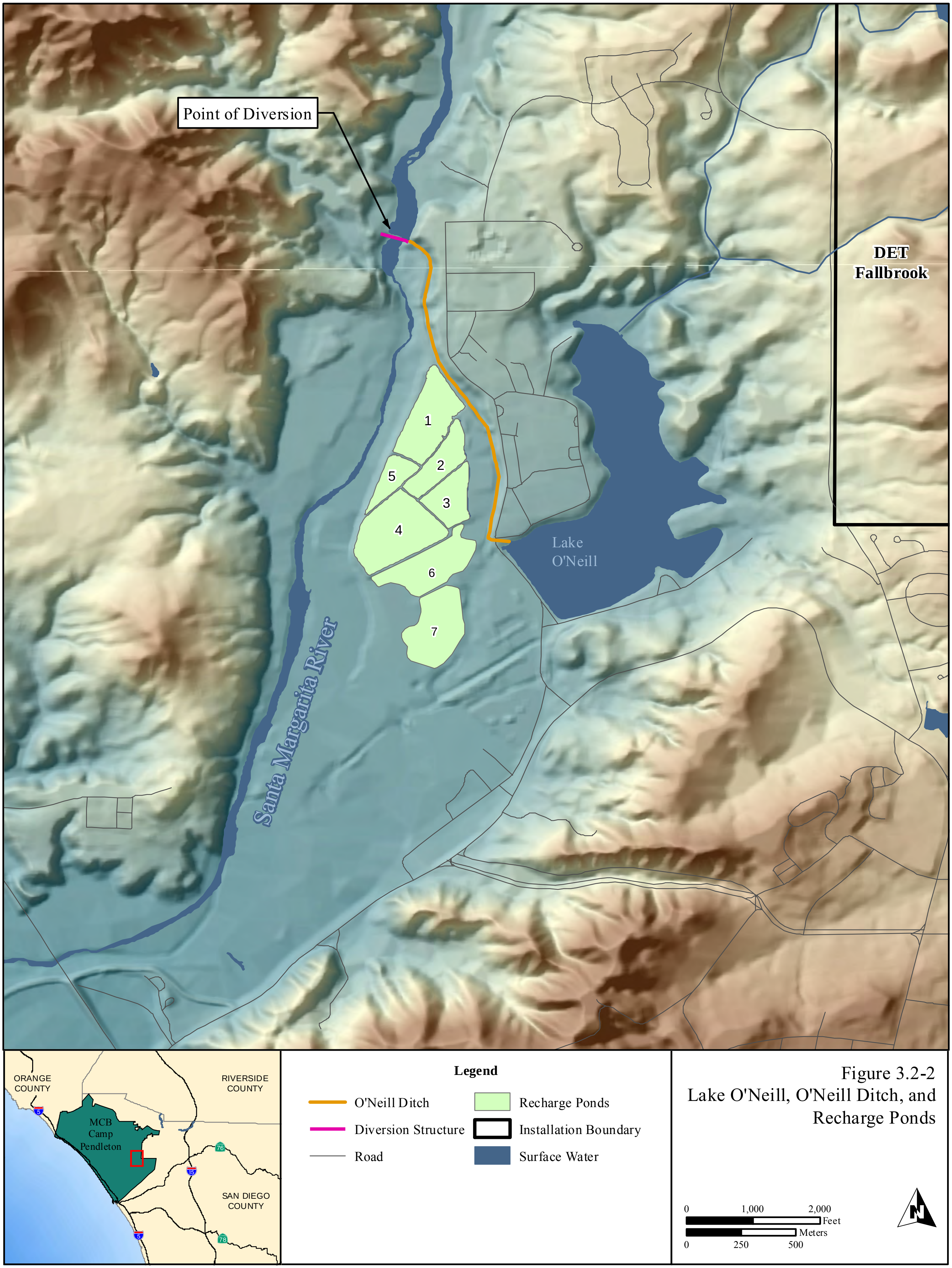


Figure 3.2-2
Lake O'Neill, O'Neill Ditch, and Recharge Ponds

Under the current recharge pond operations, water is diverted from O'Neill Ditch into the recharge pond system through a single corrugated metal pipe at the head of Pond 1. When the water level in Pond 1 rises to the pond's outlet pipe invert elevations, flow passes (i.e., spills) from Pond 1 into either Pond 2 or 5. The pipe invert elevations from Pond 1 to Pond 2 are slightly lower (12-15 in [31-38 cm]) than the pipe invert elevations from Pond 1 to Pond 5; therefore, water first spills from Pond 1 into Pond 2 before spilling into Pond 5. Water filling above the invert elevation of the outlet pipes from Pond 2 spills into Pond 3, and water filling above the outlet pipes from Pond 3 spills into Pond 4. Similarly, water filling above the invert elevation of the outlet pipes from Pond 5 spills into Pond 4. Water is also designed to spill from Pond 3 and 4 to Pond 6, then subsequently to Pond 7. At the lower end of Pond 4 (the last pond currently being used in the system), two corrugated metal pipes return overflows from Pond 4 to the floodplain. Since 1983, Pond 4 has filled four times, spilling twice to the floodplain in March of 1983 and again in February of 2005 (MCB Camp Pendleton 2008a).

Wetlands

Wetlands coverage and values are discussed in detail in Section 3.3, *Biological Resources*.

3.2.4.2 Groundwater Resources

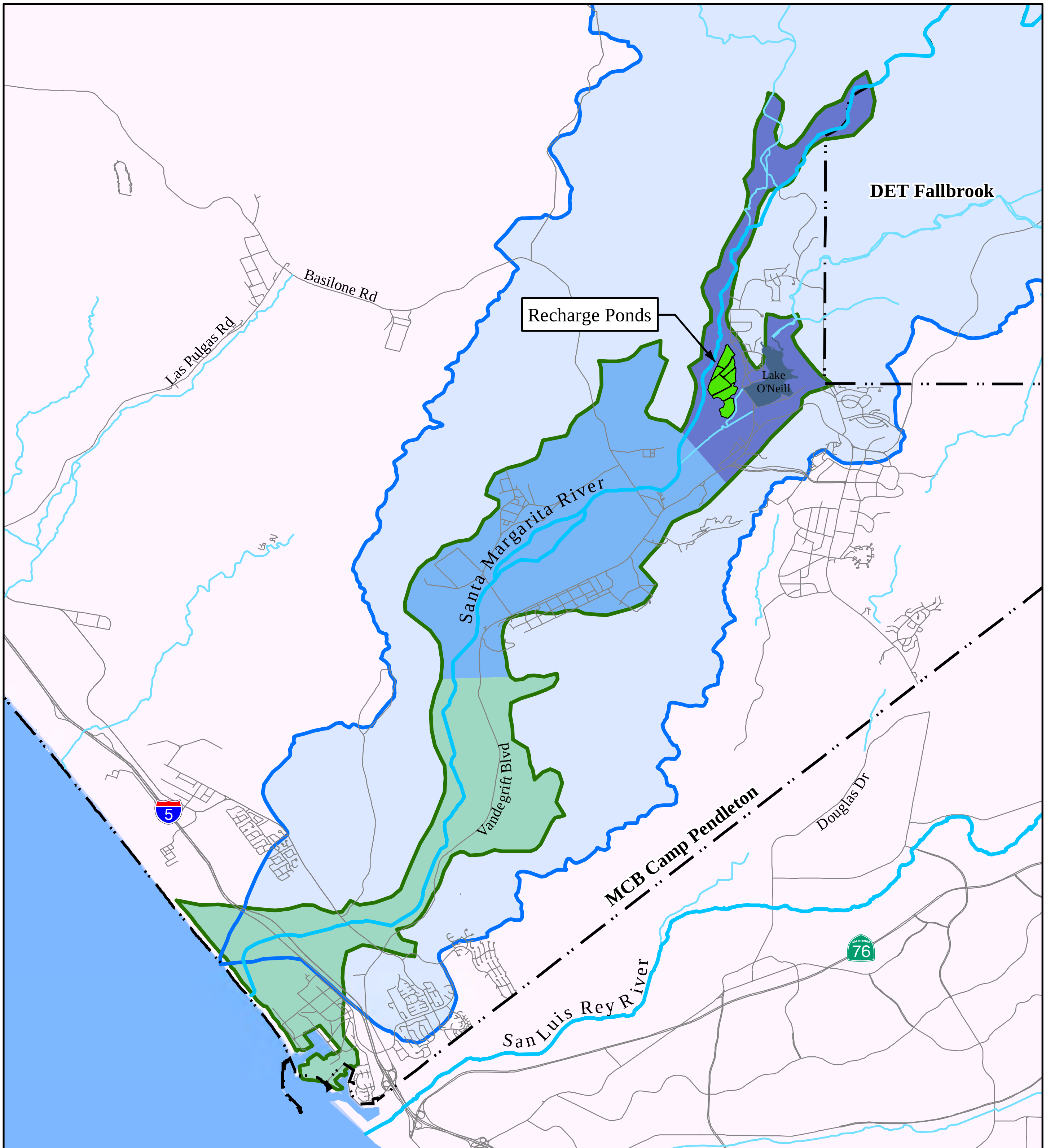
Groundwater within the ROI is found in the alluvial basin located downstream from the confluence of the SMR and De Luz Creek and, to a lesser extent, in the shallow alluvium upstream of that confluence. The alluvial basin located downstream from the confluence of the SMR and De Luz Creek is further divided into three separate sub-basins: the Upper Ysidora, Chappo, and Lower Ysidora sub-basins (Figure 3.2-3). The Upper Ysidora Sub-basin is the farthest upstream of the three sub-basins; the sub-basin's aquifer is characterized by coarse sediments, consisting mostly of sands and gravels. The Chappo Sub-basin, located down-gradient from the Upper Ysidora Sub-basin, consists of sands, gravels, and clays, and is the largest of the three sub-basins. The farthest downstream sub-basin, the Lower Ysidora, consists mostly of sands and clays, and is the least productive in terms of groundwater production of the three sub-basins. The three sub-basins range from less than 0.5 mi (0.8 km) wide (Upper and Lower Ysidora sub-basins) to more than 2 mi (3 km) wide (Chappo Sub-basin).

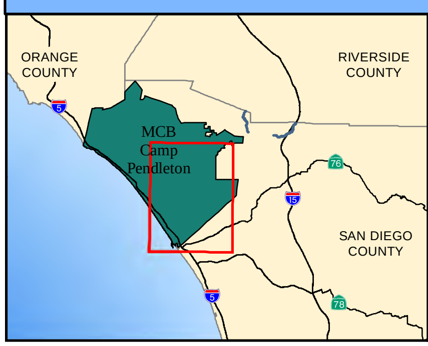
3.2.4.3 Hydrology

Santa Margarita River Watershed

The SMR watershed has a typical Mediterranean climate with hot dry summers and mild wet winters. The SMR watershed receives an average of 16 in (41 cm) of precipitation per year. Average precipitation totals vary throughout the watershed due to variations in elevation and the influence of the Pacific Ocean. Annual precipitation averages approximately 11 in (28 cm) per year near the coast, and mountainous areas located further inland receive over 40 in (102 cm) of precipitation per year. The majority of precipitation falls as rainfall; however, snowfall may occur in the higher mountain ranges located in the upper reaches of the watershed.

More than 90% of the annual precipitation occurs between November and April. From year to year, total precipitation varies greatly and the watershed has experienced both extended wet and dry periods. Annual precipitation at Lake O'Neill has ranged from approximately 4 in to 35 in (10 cm to 89 cm), averaging approximately 14 in (36 cm) (Reclamation *et al.* 2012). Figure 3.2-4 shows the long-term precipitation trends at the Lake O'Neill weather station. The cumulative departure from mean curve (red line) shows the hydrologic trend, where a downward slope indicates that the trend is to dry conditions and an upward slope indicates that the trend is to wet conditions. A severe 7-year drought occurred from WY 1959 through WY 1965 in which the average annual precipitation at Lake O'Neill was 9.3 in (23.6 cm).





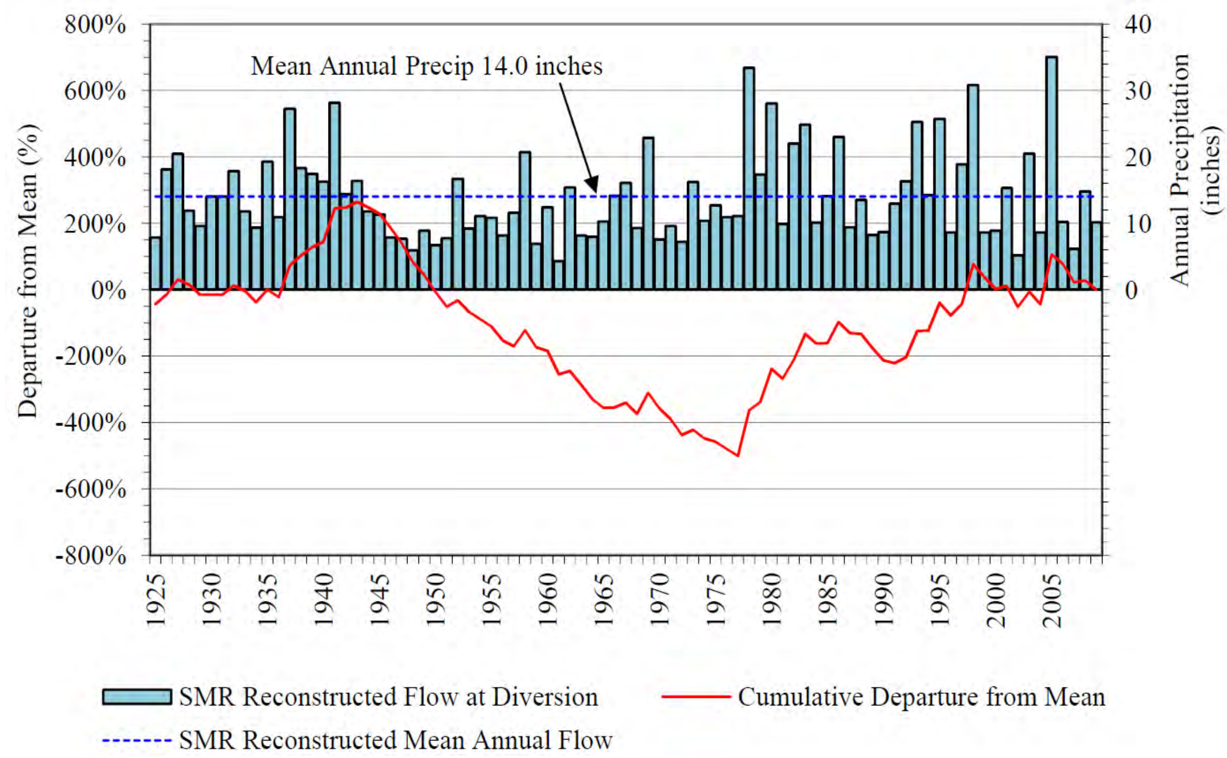
Legend

- Santa Margarita River Watershed
- Lower Santa Margarita River Ground Water Basin
- Upper Ysidora Sub-Basin
- Chappo Sub-Basin
- Lower Ysidora Sub-Basin
- Recharge Ponds
- Road

Figure 3.2-3
Lower Santa Margarita Groundwater Basin

0 1 2 Miles
0 1 2 Kilometers

Sources: California Department of Water Resources 2004; NRCS 2012; USGS 2012a



Source: Reclamation *et al.* 2012.

Figure 3.2-4 Annual Precipitation and Cumulative Departure from the Mean at Lake O'Neill

Flow in the SMR watershed is greatest during the winter months in response to winter rains, and declines during the summer months in response to minimal precipitation. Streamflow generally follows the long-term hydrologic trends of precipitation, including extended wet and dry cycles. On an annual basis, streamflow in the watershed can vary over many orders of magnitude. For example, at the USGS gage at Ysidora, streamflow during the 7-year drought of WY 1959-1965 was 0 af/y for all years; however, in very wet years, annual streamflow greater than 200,000 af/y has been recorded at that gage.

Climate change is expected to result in more extreme winter storms with flashier flood hazards and increased peak runoff resulting in greater discharges to the ocean (California Department of Water Resources 2009a). Although individual winter storms may be flashier, some studies estimate up to a 4% reduction in annual precipitation in southern California over the next 50 years (Cayan 2009).

<u>Santa Margarita River</u>

Channel Characteristics

According to 1997 aerial photography, the active SMR channel in a 1.5 mi (2.4 km) stretch of the river near the diversion structure indicates the channel width to be approximately 200 ft (61 m) (Reclamation 2004b). The active channel is approximately 280 ft (85 m) wide just upstream of the diversion structure (Reclamation 2004b).

A "bankfull channel" has also been characterized for the SMR in the vicinity of the diversion structure. This bankfull channel includes the active channel and the vegetated areas of the active floodplain between the valley walls. The majority of sediment that is transported by the river is moved in this area. Flood flows may overtop the walls of this bankfull channel and spread into the floodplain. During storm events equivalent to or greater than the 10-year storm event (as occurred in 1993, 1998, and 2005), the majority of vegetation in the bankfull channel was washed out (Reclamation 2004b).

Surface Flow

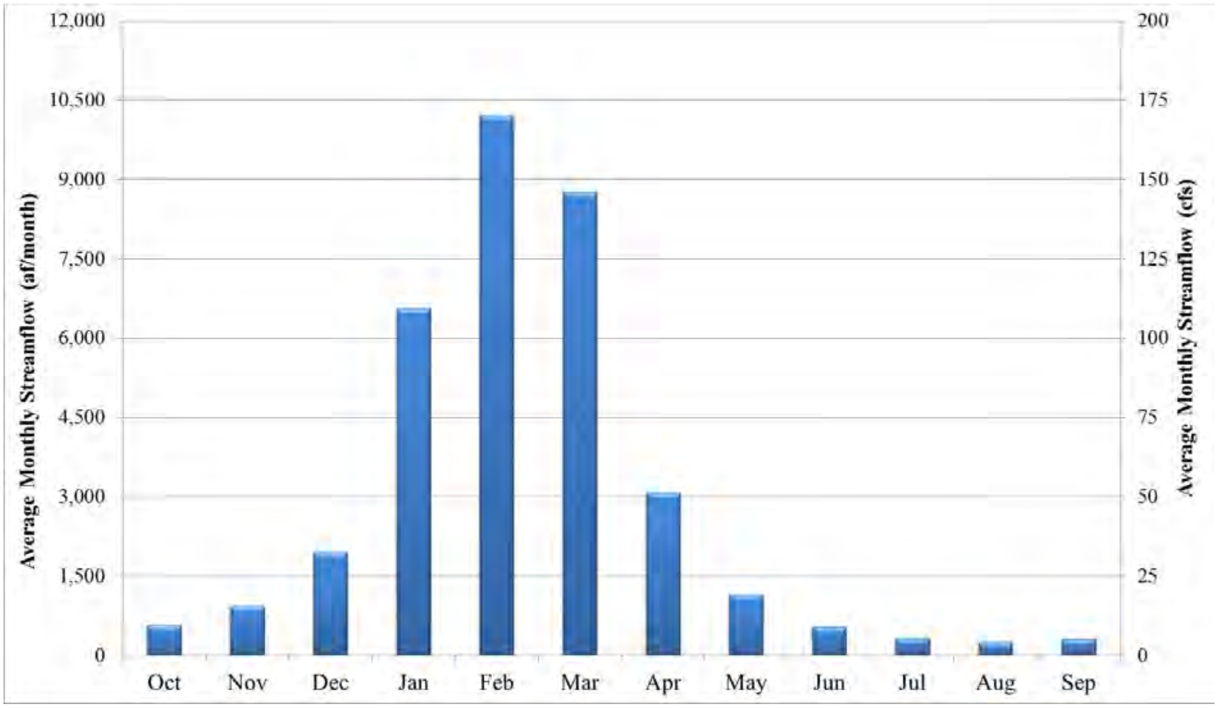
Flow in the SMR is typical of rivers located in the arid southwestern United States, where the majority of precipitation occurs during the winter. The USGS Ysidora discharge gage is located on the SMR and is the closest gage to the diversion structure. The Ysidora gage has been operated since 1923 (USGS), but this gage has been relocated several times and is currently located approximately 2.3 mi (3.7 km) downstream of the diversion structure. The locations of the current Ysidora gage and other USGS gages in the Lower SMR are shown in Figure 3.2-5. The only significant additional flow that enters the SMR between the diversion structure and the Ysidora gage is from Fallbrook Creek.

The Lower SMR flows continuously following winter-time storm events and above normal hydrologic conditions. During other conditions, the SMR flows only at natural restrictions in the groundwater basin where rising groundwater contributes to surface flow. These intermittent flow locations occur in the Lower SMR Basin at the narrows between the Upper Ysidora and Chappo sub-basins (USGS gage at Ysidora), the Chappo and Lower Ysidora sub-basins, and at the Lower Ysidora Narrows. Although the Ysidora gage typically measures flow throughout most years, large reaches of the SMR contain no streamflow during the dry season.

Flow within the SMR is subject to large seasonal and annual fluctuations, with approximately 81% of the annual flow occurring between January and April (Figure 3.2-6). Gaged data is available from WY 1980 to present for the current location of the USGS Ysidora gage. However, a longer 85-year (WY 1925-2009) record of SMR flow was reconstructed at the location of the diversion structure through a more detailed analysis based on streamflow records from multiple gages throughout the SMR watershed, including the Ysidora gage (Reclamation *et al.* 2012). Based on this analysis, the annual flow for the WY 1925 to 2009 period ranged from 1,200 af/y (in WY 1961) to 254,800 af/y (in WY 1993) and average annual flow was 34,600 af/y (Figure 3.2-7) (Reclamation *et al.* 2012).

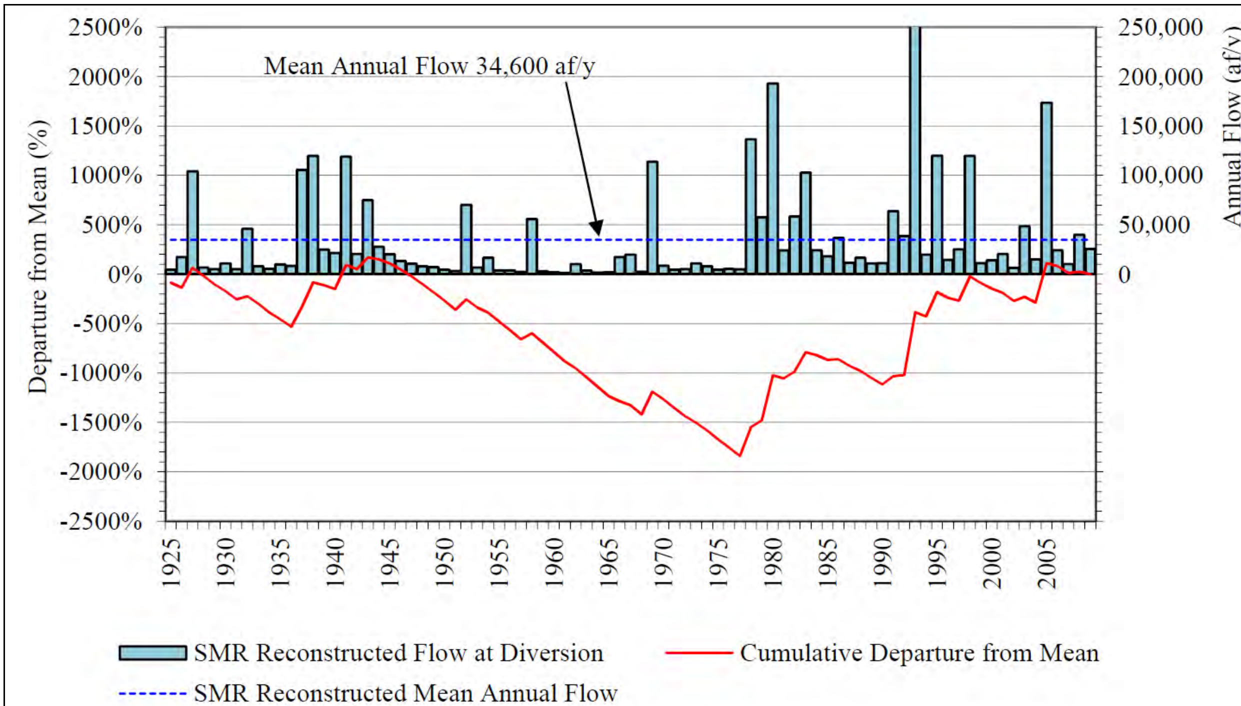
Figure 3.2-7 also shows the cumulative departure from mean curve for the reconstructed flow at the diversion structure from WY 1925-2009. The figure demonstrates similar long-term trends shown in the precipitation graph in Figure 3.2-4. The cumulative departure from mean curve (red line) shows the hydrologic trend, where a downward slope indicates that the trend is to dry conditions and an upward slope indicates that the trend is to wet conditions. The dashed blue line shows the average annual flow of 34,600 for the period. The historical record is characterized by drier conditions during the first half of the record (an average of 24,000 af/y for WY 1925-1967) and wetter conditions during the latter half (an average of 45,000 af/y for WY 1968-2009). The SMR is subject to extended periods of dry conditions; during the 7-year drought from WY 1959-1965, flow at the diversion structure averaged 3,300 af/y, only 10% of the historical average. The last three decades have been a relatively wet period, with annual flows averaging 51,000 af/y for the period from WY 1980-2009.

Figure 3.2-5
USGS Streamflow Gage Locations in the Lower Santa Margarita River Watershed



Note: Annual streamflow data reconstructed as described in Reclamation et al. 2012.
Source: Reclamation *et al.* 2012.

Figure 3.2-6 Monthly Streamflow at the SMR Diversion Structure



Note: Annual streamflow data reconstructed as described in Reclamation et al. 2012.
Source: Reclamation *et al.* 2012.

Figure 3.2-7 Annual Streamflow and Cumulative Departure from the Mean at the SMR Diversion Structure

Table 3.2-3 shows the distribution of SMR flows at the diversion structure based on hydrologic conditions during the 85-year period of record. The four categories of hydrologic condition (i.e., Very Wet, Above Normal, Below Normal, and Very Dry) were developed using statistical analysis and graphical interpretation of slope breaks; the median winter-time streamflow (12,800 af) represents the break between Above Normal and Below Normal hydrologic conditions (Reclamation *et al.* 2012). The determinations are based on winter-time streamflow during October through April.

Table 3.2-3. Delineation of Hydrologic Condition Based on Wintertime Streamflow for Water Years 1925-2009

Hydrologic Condition	Range of Wintertime Streamflow [af]	Range of Wintertime Streamflow Percent Time Exceedance [%]
Very Wet	> 55,600	1 to 19
Above Normal	12,800 to 55,600	20 to 50
Below Normal	5,000 to 12,799	51 to 75
Very Dry	< 5,000	76 to 100

Notes: Wintertime streamflow calculated as the total October through April SMR streamflow at the point of diversion. The median wintertime streamflow (12,800 af) represents the break between Above Normal and Below Normal hydrologic conditions.
Source: Reclamation *et al.* 2012.

Table 3.2-4 shows information for the exceedance intervals and percent exceedances for annual flow rates at the diversion structure along the SMR. The probability that an annual streamflow volume would be exceeded for a given year is called the exceedance interval. For example, based on Table 3.2-4, the median (50%) annual flow (14,400 af) represents a minimum volume that is expected to be exceeded 1 year out of every 2 years (1 divided by 50%). Streamflow during the other half of the years is statistically expected to be less than 14,400 af (Reclamation *et al.* 2012).

Table 3.2-4. Exceedance Intervals and Annual Streamflow in the Santa Margarita River at the Point of Diversion for Water Years 1925-2009

Percent Time Exceedance (%)	Exceedance Interval	Annual Streamflow at Point of Diversion (af/y)
4	1 in 25 years	157,200
5	1 in 20 years	131,600
7	1 in 15 years	119,800
10	1 in 10 years	116,000
11	1 in 9 years	109,300
13	1 in 8 years	104,500
14	1 in 7 years	94,900
17	1 in 6 years	68,100
20	1 in 5 years	57,100
25	1 in 4 years	39,100
33	1 in 3 years	24,200
50	1 in 2 years	14,400
75	1 in 1.3 years	5,900
100	Every year	1,200

Notes: af/y = acre-feet per year.
Source: Reclamation *et al.* 2012.

Measured average daily flow for the USGS Ysidora gage ranged from 0 cfs to just over 22,000 cfs for the period between 1981-2011 (USGS 2012b). The instantaneous peak flow rate for the 85-year period of record for the Ysidora gage is approximately 44,000 cfs in 1993 (USGS 2012b). The estimated instantaneous peak flood frequencies at the Ysidora gage are shown in Table 3.2-5.

Table 3.2-5. Instantaneous Peak Flood Frequency at Ysidora Gage

Return Period (years)	Frequency	Flow (cfs)
2	50%	1,000
5	20%	8,000
10	10%	17,000
20	5%	26,000
50	2%	37,500
100	1%	46,000

Notes: cfs = cubic feet per second.
Source: USACE 2000, Reclamation 2004b.

Sediment Transport

Approximately 95% of the sediment transport (i.e., both bedload and suspended load) in the SMR is estimated to occur during the 10-year, or greater, storm event; and over 99% of the sediment transport occurs in the 5-year, or greater, storm event (Reclamation 2004b). An average annual sediment load of 36,000 to 51,000 tons per year is estimated to pass the I-5 crossing of the SMR each year (Reclamation 2004b).

While the vast majority of sediment generated in the watershed is thought to occur and be transported downstream under these large, infrequent storm events, Reclamation (2004b) also notes that limited quantities of sediment may be routinely carried on a somewhat continuous basis by water diverted through the diversion channel to Lake O'Neill and the percolation ponds. This condition occurs because sediment from smaller storm events is deposited upstream of the weir and then a channel is scoured through this sediment down to the diversion gate opening, which is at a lower elevation than the weir. Sediment can then be mobilized in the vicinity of the diversion channel at lower flows due to the gradient created between the diversion gate and the river channel when the majority of river flow is diverted rather than released downstream.

<u>SMR Estuary</u>

Historically, the estuary has been mostly connected to the Pacific Ocean via a narrow opening and has been infrequently separated from the ocean by a sand berm (NAVFAC SW 2003). The estuary is considered closed and not subject to tidal fluctuations when a sand berm forms at its mouth to the ocean. During closure of the estuary, water levels are not influenced by ocean tides. Tidal action, wave action, coastal sand movement, and river flows contribute to the formation or absence of a sand bar at the mouth. After periods of extended closure, the blocking sand berm can be breached by ocean swells or by high river discharges (NAVFAC SW 2003).

The USGS began monitoring water levels in the estuary starting in October 1988. Prior to that, aerial photographic evidence was reviewed to show the closure status of the estuary (NAVFAC SW 2003). Notably, available photographs show the estuary was closed in February 1963, December 1976, and April 1987. Corresponding hydrologic streamflow data from the 1958 to 1965 period suggests the estuary remained closed for an extended period due to lack of high stormflow events that could breach the sand berm at the mouth. Similarly, dry hydrologic conditions in the mid-1970s and late 1980s would also suggest that the estuary remained closed for extended periods during drier than normal periods. The duration of these estuary closures is not known, but since these dates occur during extended dry periods of below-average precipitation and streamflow, it is possible that the sandbar closures persisted for years.

The water levels of the SMR Estuary along with SMR flow measured by the USGS over the last 23 years are shown in Figure 3.2-8. The estuary has been closed several times for up to several months over this recent period. The closed condition is indicated by periods when the difference between the minimum and maximum estuary water level is minimal because tidal fluctuations no longer impact water surface elevations within the estuary.

The dynamic nature of the open/closed state of the estuarine mouth closely corresponds to wave climate and the upstream hydrologic (NAVFAC SW 2003). Based on review of the historical data, the estuary has been closed more often during dry periods and less frequently during above normal hydrologic conditions.

Groundwater Hydrology

Hydrogeology

The Lower SMR Basin contains three interconnected alluvial groundwater sub-basins: the Upper Ysidora, Chappo, and Lower Ysidora (MCB Camp Pendleton and DON 2004). These sub-basins are characterized by large alluvial sand and gravel deposits overlaying an impervious rock layer. Within these three sub-basins, the primary water-bearing units are the Upper and Lower Alluvium. The Lower Alluvium (Ql) is a narrow channel that extends throughout most of the basin. It is well defined and uniform, consisting of sand and gravel, with localized boulders along the axis of a deep channel that is cut into the La Jolla formation. The Upper Alluvium (Qu) is a shallower channel that is much broader. It is highly variable in composition but consists predominantly of sandy silt with some discontinuous, thin clay layers. The overall thickness of the Upper and Lower Alluvium ranges from 150 to 200 ft (46 to 61 m) (California Department of Water Resources 2004).

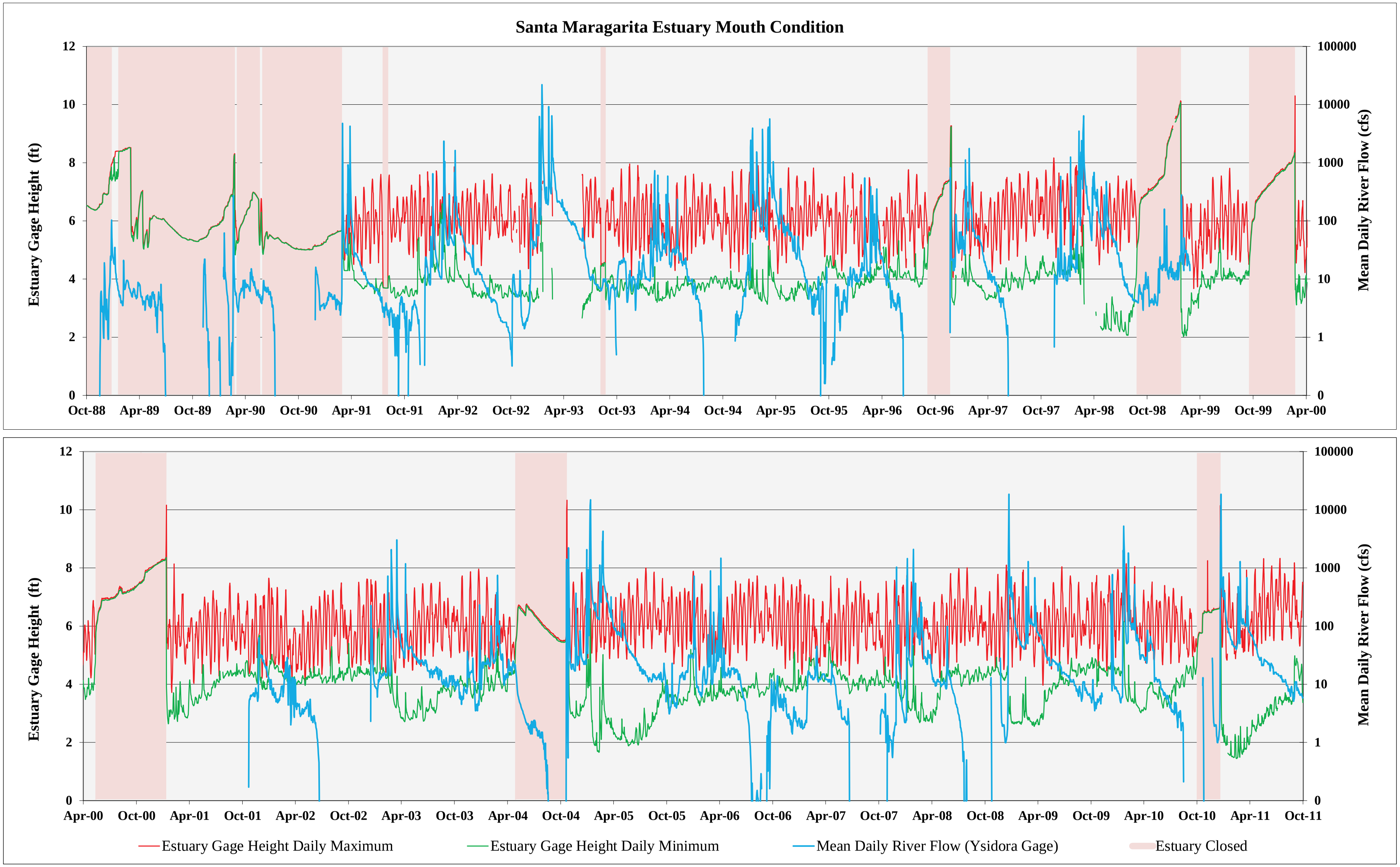
Groundwater Recharge and Production

Groundwater in the SMR Basin is recharged primarily via a combination of the direct infiltration of rainfall and SMR seepage. In addition, MCB Camp Pendleton diverts surface water from the SMR into Lake O'Neill and the percolation ponds, whereupon it infiltrates into the alluvial upper aquifer.

MCB Camp Pendleton depends almost exclusively on groundwater to meet its residential, military, and agricultural needs. Twelve wells within the SMR Basin provide MCB Camp Pendleton with an average production rate of 3,350 gallons per minute based on calendar years 2007-2010. The annual safe yield of the Lower SMR Basin is estimated at 7,640 af/y (MCB Camp Pendleton 2011). Until 2011, MCB Camp Pendleton has used approximately 1,500 af/y of groundwater from the Lower Ysidora Sub-basin to irrigate agricultural lands leased to contracting agricultural businesses. However, groundwater is no longer being pumped from the Lower Ysidora Sub-basin.

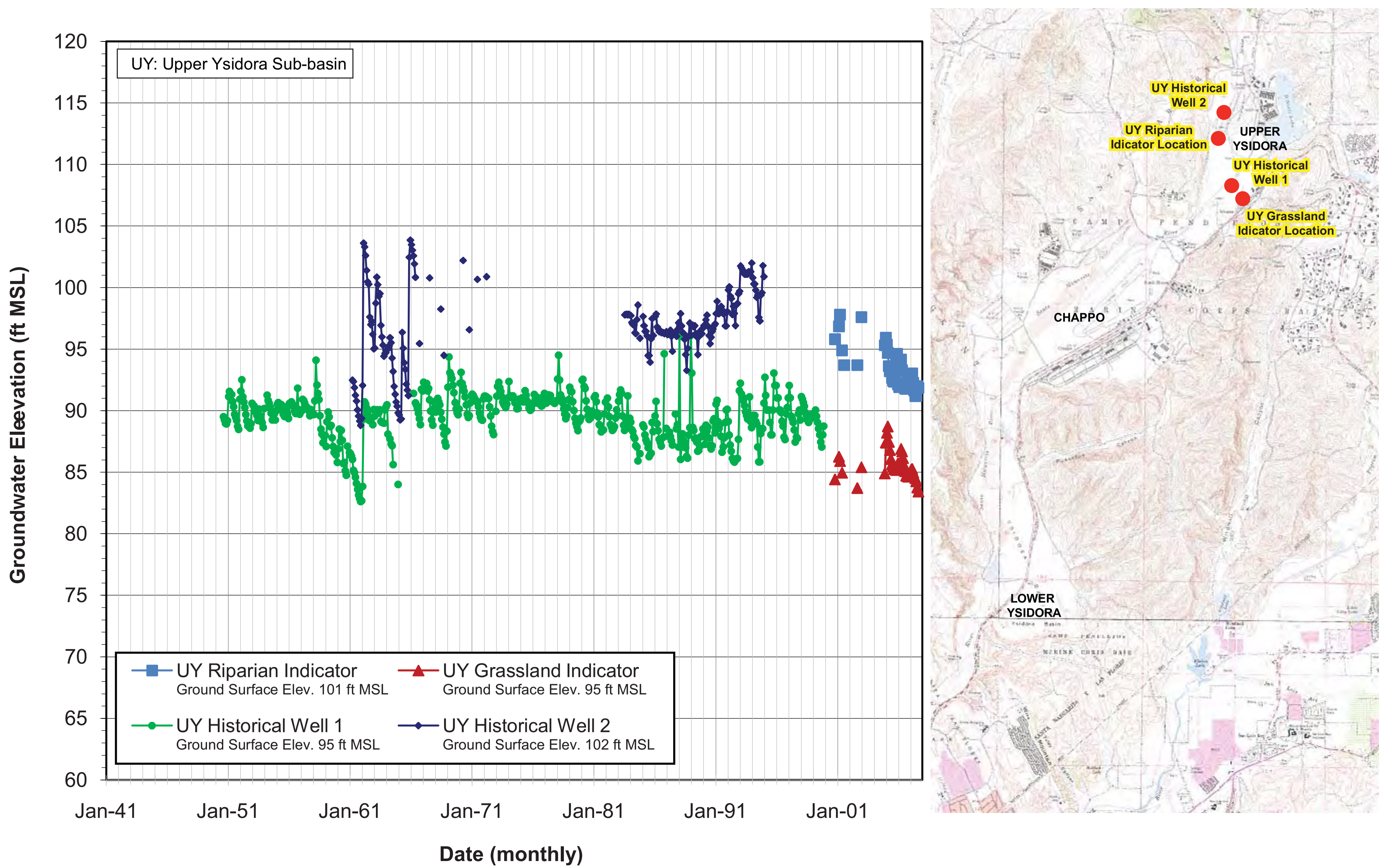
Upper Ysidora Sub-basin. There are five groundwater wells in the Upper Ysidora Sub-basin that are assumed to pump a combined annual volume of approximately 4,400 af/y (Stetson 2012a).

Depth to groundwater in the central part of the Upper Ysidora Sub-basin ranges between 4 and 10 ft (1.2 and 3 m) during wet years, and between 4 and 12 ft (1.2 and 4 m) during dry years (MCB Camp Pendleton and DON 2004). Figure 3.2-9 shows the historical water levels at four wells within the Upper Ysidora Sub-basin. The two "indicator" wells shown on the figure are the well locations utilized by the groundwater model (Reclamation 2007b; Stetson 2012a) to assess the changes in water levels due to project alternatives. The other two wells are provided to show historical water levels in the sub-basin. The use of "indicator" wells is further discussed in Appendix B.



Notes: Estuary Gage Height data from USGS gage #11046050 (USGS 2012b);
SMR flow data from USGS Ysidora gage #11046000 (data not available from 26 February 1999 to 30 September 2001 (USGS 2012b).

Figure 3.2-8
Santa Margarita River Flow and Estuary Mouth Conditions



Source: Stetson 2008b.

Vertical Datum NAVD 88

Figure 3.2-9
Groundwater Elevations in the Upper Ysidora Sub-basin

Chappo Sub-basin. There are seven groundwater wells in the Chappo Sub-basin that are assumed to pump a combined annual volume of approximately 3,000 af/y (Stetson 2012a). This production is used to meet MCB Camp Pendleton water supply requirements and agricultural needs.

Depth to groundwater in the Chappo Sub-basin ranges between 4 and 12 ft (1.2 and 4 m) in wet years, and between 8 to 25 ft (2 to 8 m) during dry years (MCB Camp Pendleton and DON 2004). Figure 3.2-10 shows the historical water levels at two "indicator" wells within the Chappo Sub-basin. The two "indicator" wells shown on the figure are the well locations utilized in the groundwater model (Reclamation 2007b; Stetson 2012a) to assess the changes in water levels due to project alternatives.

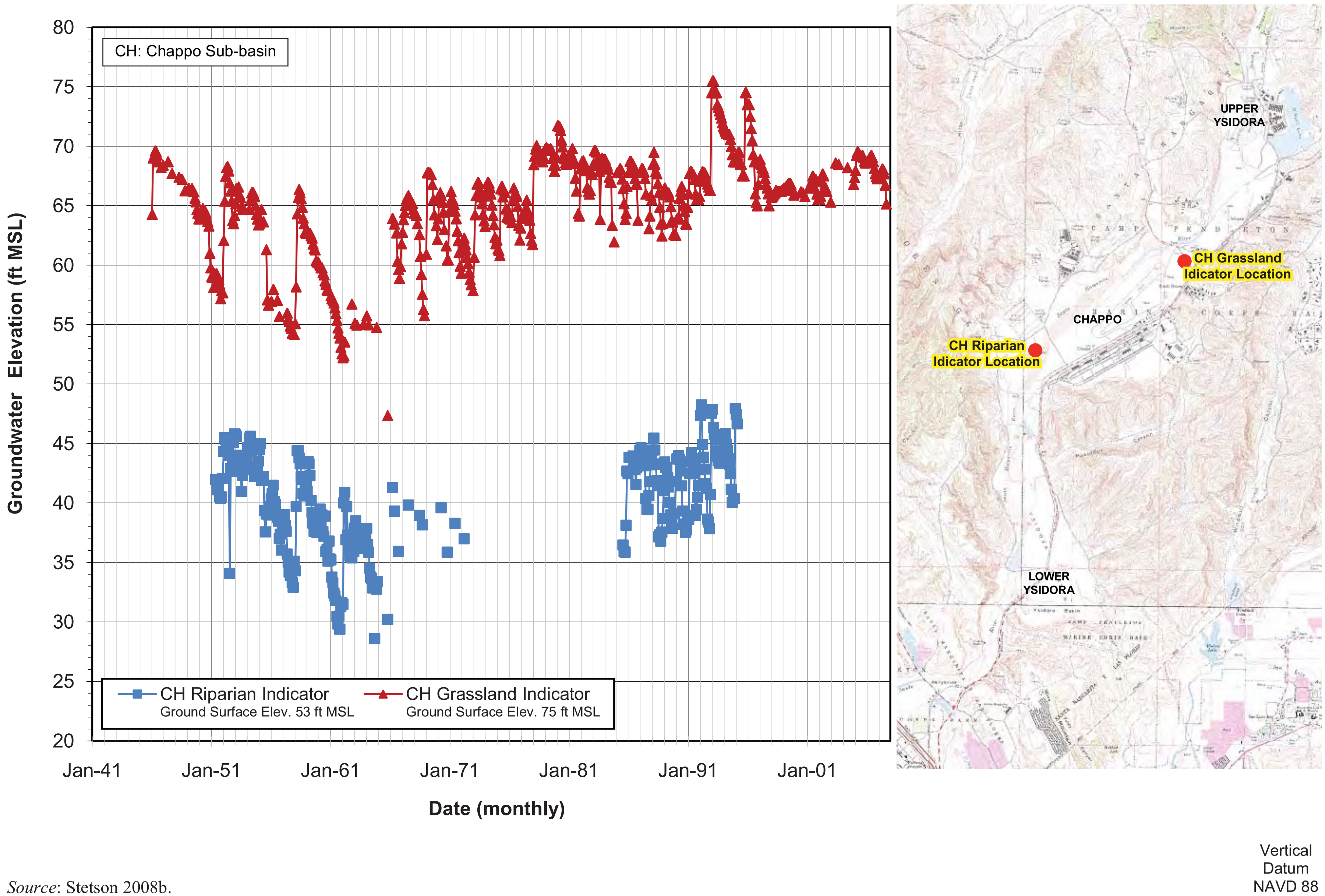
Lower Ysidora Sub-basin. At present, there are no potable groundwater wells operating in the Lower Ysidora Sub-basin. Historically (i.e., during the 1980-2004 model calibration period), four wells within this sub-basin supplied water at an average rate of 1,120 af/y with a range of 570 to 1,500 af/y.

Figure 3.2-11 shows the historical water levels at two "indicator" wells within the Lower Ysidora Sub-basin. The two "indicator" wells shown on the figure are the well locations utilized in the groundwater model (Reclamation 2007b; Stetson 2012a) to assess the changes in water levels due to project alternatives.

Surface Water and Groundwater Model

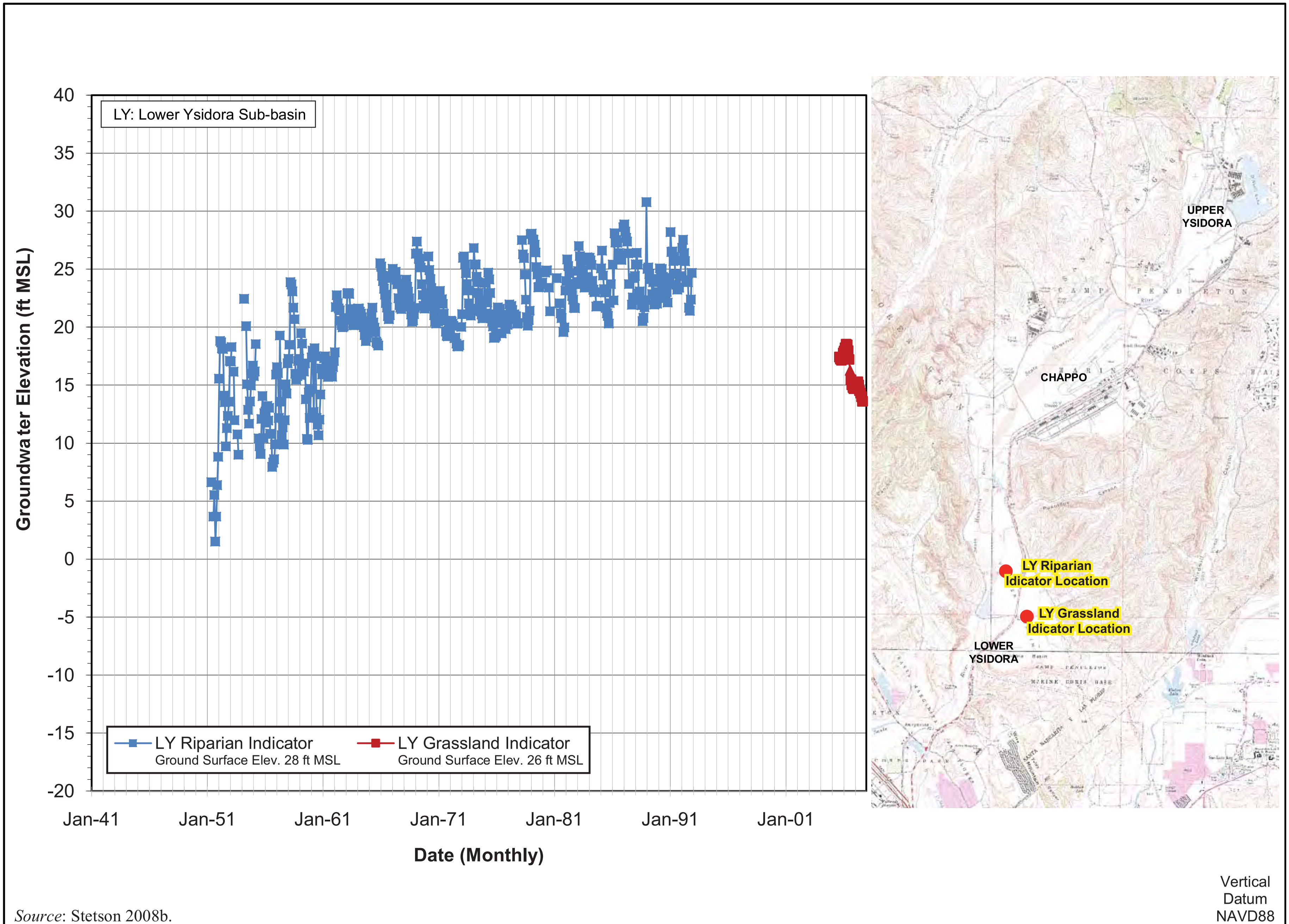
A surface water and groundwater model (Lower SMR Model) has been used to compare potential effects of the action alternatives to the existing condition. The Lower SMR Model for the SMR CUP was developed using the USGS MODFLOW surface and groundwater finite difference model, to simulate groundwater flow in the Lower SMR Basin (refer to Appendix B). A 50-year simulation period was developed for the Model to describe physical and environmental characteristics during varying hydrologic conditions that are typical in the SMR watershed. The 50-year simulation period utilizes historical hydrologic data (i.e., 1952 through 2001) that encompasses the range of varying hydrologic conditions within the watershed. This period contains water years designated as Extremely Dry/Very Dry, Below Normal, Above Normal, and Very Wet (Extremely Dry occurs during consecutive Very Dry years). During the 50-year period, Extremely Dry/Very Dry conditions occurred for 12 years (24%), Below Normal conditions for 14 years (28%), Above Normal conditions for 15 years (30%), and Very Wet conditions for 9 years (18%) (Reclamation 2007b). Comparison of physical parameters, such as groundwater levels and streamflow quantities, during each of these five different hydrologic conditions allows for assessment of potential impacts between no-project and project alternatives. A detailed description of the Model is provided in Appendix B.

A Baseline model run was prepared to provide a comparison of existing operations (Baseline) to Alternatives 1 and 2 under identical hydrologic conditions. MCB Camp Pendleton would continue to meet its future potable water demand through the operation of existing diversion, percolation, storage, and recovery facilities. Therefore, the Baseline model run relies only on existing infrastructure to meet potable groundwater requirements on MCB Camp Pendleton.



Source: Stetson 2008b.

Figure 3.2-10
Groundwater Elevations in the Chappo Sub-basin



Source: Stetson 2008b.

Figure 3.2-11
Groundwater Elevations in the Lower Ysidora Sub-basin

Santa Margarita River Flow Conditions

Table 3.2-6 presents the simulated annual water budget for Baseline conditions. While SMR Inflow to the model averaged 38,300 af/y and varied from 5,500 af/y to 132,900 af/y, SMR Outflow from the Model boundary averaged 32,000 af/y, varying from 500 af/y during Extremely Dry/Very Dry years to 130,000 af/y during Very Wet years. The Model is based on monthly stress periods and accounted for all tributary inflow and surface runoffs above the ROI. These inflow values were held constant for each model simulation so Alternative 1 and 2 operational effects could be compared to the Baseline simulation (described in greater detail in Appendix B).

Table 3.2-6. Annual Water Budget for the Baseline Model Simulation (af/y)

Average Yield for Hydrologic Condition	All Years	Extremely Dry and Very Dry	Below Normal	Above Normal	Very Wet
Inflow					
SMR Inflow	38,300	5,500	11,600	32,800	132,900
Subsurface Underflow	600	600	600	600	600
Lake O'Neill Spill and Release	1,500	700	1,400	1,700	2,100
Fallbrook Creek	1,200	100	400	1,400	3,800
Minor Tributary Drainages	2,400	1,600	1,500	2,400	4,900
Areal Precipitation	800	500	400	700	1,600
Total	**44,800**	**9,000**	**15,900**	**39,600**	**145,900**
Outflow					
SMR Outflow	32,000	500	3,800	24,800	130,000
Subsurface Underflow	100	0[1]	100	100	100
Groundwater Pumping	8,400	7,400	8,700	8,600	8,700
Evapotranspiration	2,500	1,300	2,400	3,000	3,300
Diversions to Lake O'Neill	1,900	900	1,800	2,300	2,700
Total	**44,900**	**10,100**	**16,800**	**38,800**	**144,800**

Notes: [1] Extremely Dry/Very Dry subsurface underflow is positive, but less than 50 af/y.
Values are rounded to the nearest 100 af/y, which may result in a summation rounding error; af/y = acre-feet per year; SMR = Santa Margarita River.
"Areal Precipitation" is the effective recharge to the groundwater basin after evaporative losses are subtracted from total precipitation.
Source: Stetson 2012a.

Under the Baseline model, diversions from the SMR at the diversion weir are least during Extremely Dry hydrologic conditions and are greatest during Very Wet conditions as shown in Table 3.2-7. Average annual diversions from the SMR at the diversion weir are 7,500 af/y, ranging from 2,800 af/y during Extremely Dry/Very Dry conditions to 11,600 af/y during Very Wet hydrologic conditions. Annual diversions at the diversion weir would be managed to meet MCB Camp Pendleton's future groundwater pumping demand.

The Model is used to describe streamflow at the Ysidora gage as well as streamflow out of the model boundary (Table 3.2-8). The Model simulates surface flow between the Upper Ysidora and Chappo sub-basins and provided representative surface flow at the Ysidora gage during the 50-year baseline conditions. Similarly, SMR Outflow from the Model's downstream boundary simulates surface flow at a location approximately 0.5 mi (0.8 km) upstream of the estuary. Historical records identify the original USGS Ysidora gage location to be coincident with the Model's downstream boundary between 1923 and 1927. Review of these historical streamflow data indicated that flows occurred during the winter rainy season and were zero during the summer months, which is similar to flows simulated in the baseline Model for drier than normal conditions.

Table 3.2-7. Average Annual Surface Water Diversion at the Diversion Weir for the Baseline Model Simulation (af/y)

Location/Diversion	All Years	Extremely Dry and Very Dry	Below Normal	Above Normal	Very Wet
SMR Inflow	38,300	5,500	11,600	32,800	132,900
Diversion to Percolation ponds	5,600	1,900	4,800	7,400	8,900
Diversion to Lake O'Neill	1,900	900	1,800	2,300	2,700
Total	**7,500**	**2,800**	**6,600**	**9,700**	**11,600**

Notes: af/y = acre-feet per year; SMR = Santa Margarita River.
Source: Stetson 2012a.

Table 3.2-8. Average Annual SMR Flow for the Baseline Model Simulation (af/y)

Hydrologic Condition	At the Ysidora Gage	Model Downstream Boundary[1]
All Years	34,500	32,000
Extremely Dry and Very Dry	1,100	500
Below Normal	6,700	3,800
Above Normal	28,600	24,800
Very Wet	132,000	130,000

Notes: [1] Flow out of the model's downstream boundary is approximately 0.85 mi upstream of Stuart Mesa Bridge. af/y = acre-feet per year.
Source: Stetson 2012a.

Groundwater

The average annual groundwater pumping under the Baseline model run is 8,400 af/y, ranging from 7,400 af/y during Extremely Dry/Very Dry conditions to 8,700 af/y during Very Wet hydrologic conditions (Table 3.2-9). The average annual pumping rate of 8,400 af/y is 400 af/y less than the 8,800 af/y allowed under existing water rights due to implementation of conservation measures during Extremely Dry/Very Dry hydrologic conditions. These conservation measures are mandatory 10% and 20% reductions in groundwater pumping during Very Dry and Extremely Dry hydrologic conditions, respectively. The hydrologic condition would be determined on May 1 and conservation reductions would take place through the following April during Extremely Dry and Very Dry years.

Table 3-2-9. Average Annual Groundwater Pumping for the Baseline Model Simulation (af/y)

Hydrologic Condition	Upper Ysidora Pumping	Chappo Pumping	Total Pumping
All Years	3,800	4,600	8,400
Extremely Dry and Very Dry	3,800	3,700	7,400
Below Normal	4,200	4,500	8,700
Above Normal	3,600	5,000	8,600
Very Wet	3,600	5,100	8,700

Note: These statistics are based on WY from October through September. Total pumping allocation of 8,800 af/y during Below Normal, Above Normal, and Very Wet years occurs from May through the following April. Annual pumping rates rounded to nearest 100 af/y.
Source: Stetson 2012a.

Groundwater recharge occurs at Percolation ponds 1-7, as well as through streambed infiltration in each of the sub-basins. Groundwater recharge is managed to optimize groundwater levels through the use of all seven percolation ponds. Table 3.2-10 summarizes recharge pond and streambed infiltration under each of the hydrologic conditions. Streambed infiltration to the groundwater aquifer decreases during wetter than normal hydrologic conditions due to the optimized performance of the percolation ponds and reduced winter-time demand.

Table 3.2-10. Average Annual Groundwater Recharge for the Baseline Model Simulation (af/y)

Hydrologic Condition	Groundwater Recharge at Ponds 1-7	Streambed Infiltration	Total Recharge
All Years	6,000	4,100	10,100
Extremely Dry and Very Dry	2,200	4,800	7,000
Below Normal	5,000	4,700	9,700
Above Normal	7,800	3,900	11,700
Very Wet	9,800	2,600	12,400

Note: Annual recharge rates rounded to nearest 100 af/y.
Source: Stetson 2012a.

Evapotranspiration represents the amount of groundwater used by riparian vegetation within the modeled area of the Lower SMR basin; while the water requirements of other types of vegetation are met by direct precipitation. The Model's simulated evapotranspiration reflects the natural seasonal variation (greatest riparian vegetation demand in the summer months and lowest evapotranspiration rates in the winter months). The simulated evapotranspiration is dependent upon of the SMR inflow and decreases during dry conditions when water is not available to meet the needs of vegetation and increases during wet conditions. Evapotranspiration is directly related to groundwater levels in the three sub-basins, which depends on annual recharge from the SMR and the level of groundwater pumping. For Example, decreased streamflow and recharge during Extremely Dry and Very Dry conditions shows about 60% less evapotranspiration than during Very Wet conditions (Table 3.2-6).

3.2.4.4 Water Quality

The project area lies within the jurisdiction of the State of California San Diego RWQCB. Water quality standards for surface water and groundwater within project area are contained in the Water Quality Control Plan for the San Diego Basin (Basin Plan) (San Diego RWQCB 1994). The Basin Plan designates beneficial uses for water bodies and establishes water quality objectives, prohibitions, and other implementation measures.

Santa Margarita River

The following beneficial uses have been established for surface waters of the SMR located downstream of the confluence with De Luz Creek, Fallbrook Creek, and Lake O'Neill (San Diego RWQCB 1994):

- Municipal and Domestic Supply;
- Agricultural Supply;
- Industrial Service Supply;
- Industrial Process Supply;
- Contact Water Recreation;
- Non-contact Water Recreation;
- Warm Freshwater Habitat;
- Cold Freshwater Habitat;
- Wildlife Habitat; and
- Rare, Threatened, or Endangered Species.

The water quality in the SMR varies with sampling location, season, and hydrologic conditions (i.e., baseflow vs. stormwater runoff). Water quality data for the SMR from samples collected at the mass loading station located southwest of MCAS Camp Pendleton is provided in Table 3.2-11. The data was collected from 2007 to 2011 as part of MCB Camp Pendleton's Municipal Stormwater Program and includes samples collected during dry weather (baseflow) and wet weather (stormwater runoff) (NAVFAC SW 2012).

Table 3.2-11. Surface Water Quality in the Santa Margarita River

Parameter	Units1	Dry Weather		Wet Weather	
		Min	Max	Min	Max
Total Hardness	mg/L (ppm)	340	521	86	371
Nitrate	mg/L (ppm)	ND	4.3	0.08	2.5
Ammonia	mg/L (ppm)	ND	0.077	ND	0.68
Phosphorous (dissolved)	mg/L (ppm)	ND	2.8	ND	0.33
pH	pH units	7.01	8.36	7.01	8.21
Total Dissolved Solids	mg/L (ppm)	790	977	143	820
Total Suspended Solids	mg/L (ppm)	ND	14	ND	430
Turbidity	NTU	0.71	8.8	0.84	330

Notes: parts per million (ppm); milligrams per liter (mg/L); Nephelometric Turbidity Unit (NTU); non detect (ND).
Source NAVFAC SW 2012.

The Lower SMR was included on the 2010 CWA Section 303(d) list for not supporting the Contact Water Recreation (due to enterococcus, fecal coliform, and phosphorous) and Warm Freshwater Habitat (due total Nitrogen as N) beneficial uses (SWRCB 2010). The potential sources of these pollutants have been identified as natural sources, unknown nonpoint source, and urban runoff/storm sewers. The Lower SMR is designated as "Category 5a," which means a TMDL study is required, but not yet completed. The TMDLs for these pollutants are scheduled to be completed in 2021 (SWRCB 2010).

<u>Santa Margarita River Estuary</u>

The SMR begins to subtly change from a braided river channel into the broad SMR Estuary as it nears the Pacific Ocean. The estuary serves as a mixing ground between fresh and salt water and water quality is sensitive to changes in both the level of tidal influence and influx of fresh water. The following beneficial uses have been established for SMR Estuary (San Diego RWQCB 1994; USFWS 1995a):

- Limited Seasonal Hunting;
- Preservation of Biological Habitats of Special Significance;
- Estuarine Habitat (Potential Beneficial Use);
- Marine Habitat;
- Warm Freshwater Habitat;
- Coastal Marsh Habitat;
- Salt Flats; and
- Rare, Threatened, or Endangered Species.

The water quality within the SMR Estuary depends on tidal circulation from the ocean. Tidal inflows bring in saline water with high dissolved oxygen concentrations and an abundance of nutrients; ebb tides flush out oxygen deficient water along with suspended silt, organic material, and chemical pollutants (NAVFAC SW 2003). This tidal flushing maintains a regular cyclic water exchange between the estuary and the ocean. Consequently, moderate water quality can be expected, particularly within areas where tidal influence is more discernible (NAVFAC SW 2003).

When the estuary is closed due to the formation of a sand berm and there is little inflow from the SMR, the entire estuary becomes a closed water system and acts as a pond with little or no water circulation occurring (NAVFAC SW 2003). During these closed periods there is potential for algae blooms, resulting in poor water quality due to deprived dissolved oxygen and altered pH level. Poor water quality throughout the estuary is to be expected and can be detrimental to the estuarine wetland environments. During low to moderate SMR flows when the estuary is closed, the estuary acts as a reservoir and traps all floating debris, fluvial sediment, and pollutants carried by inflows. The water quality in the estuary will not be improved until the sand bar is breached and estuary opens and is again under tidal influence (NAVFAC SW 2003).

The SMR Estuary was first included on the 1986 CWA Section 303(d) list and continues to be listed for not supporting the Estuarine Habitat beneficial use due to eutrophication (SWRCB 2010). The potential source of pollutants leading to eutrophication have been identified as nonpoint source, nurseries, point source, and urban runoff/storm sewers. The SMR Estuary is designated as “Category 5a,” which means a TMDL study is required, but not yet completed. The TMDL for eutrophication is scheduled to be completed in 2019 (SWRCB 2010).

A water quality monitoring study was conducted in the estuary between 3 February 2010 and 8 February 2011 in support of developing model for the development of a TMDL for eutrophication. Data summarized in the study is provided in Table 3.2-12. The study found that the estuary showed strong seasonal variations in water quality conditions resulting from decreasing freshwater flow, summertime heating, longer daylight hours, and a reduction in tidal flow with berm formation at the mouth (Space and Naval Warfare Systems Center Pacific [SSC Pacific] 2012). These effects were particularly strong when the mouth closed completely in October 2010, with the lagoon becoming considerably warmer and saltier due to reduced freshwater flow and generally smaller daily variations in summer/fall than observed in winter/spring. The observed seasonal changes generally were much greater than the spatial variations observed between the lower and upper lagoon (SSC Pacific 2012). The study also found that main influence of ocean water exchange was observed up to about the Railroad Bridge. The main influence of the freshwater river was observed down to about half way between the Railroad Bridge and the Stuart Mesa Bridge. In between the two locations is a transition region where mixing of fresh and saltwater is most intense (SSC Pacific 2012).

Table 3.2-12. Average Nitrogen, Phosphorous, Suspended Solids and Chlorophyll-a Concentrations in the SMR Estuary

Sample Period	Total Nitrogen (mg/L)		Total Phosphorus (mg/L)		Total Suspended Solids (mg/L)		Chlorophyll-a (µg/L)	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
March 2007	3.88	4.47	0.13	0.23	4.00	7.68	5.42	8.52
October 2007	0.52	0.43	0.03	1.06	8.35	4.14	1.21	0.96
March 2008	5.25	0.80	0.22	0.13	119.84	20.05	28.94	18.93
October 2008	1.75	0.68	0.10	0.43	6.77	3.54	3.71	3.91
March 2010	1.18	1.58	0.12	0.13	10.16	7.64	3.03	3.83
October 2010	0.70	0.68	0.26	0.35	26.45	25.84	13.14	8.37

Notes: Results are based on an average of samples during period; mg/L = milligrams per liter.
Source: SSC Pacific 2012.

Pacific Ocean

The point of discharge of brine for the action alternatives would be the coastal waters of the Pacific Ocean from the existing Oceanside Ocean Outfall. The following beneficial uses have been established for Pacific Ocean along the San Diego Basin (San Diego RWQCB 1994):

- Industrial Service Supply;
- Navigation;
- Contact Water Recreation;
- Non-contact Water Recreation;
- Commercial and Sport Fishing;
- Preservation of Biological Habitats of Special Significance;
- Wildlife Habitat; and
- Rare, Threatened, or Endangered Species
- Marine Habitat;
- Aquaculture;
- Migration of Aquatic Organisms;
- Spawning, Reproduction, and/or Early Development; and
- Shellfish Harvesting.

Water quality at the Oceanside Ocean Outfall is typical of ocean waters in the tidal zone or deeper waters of the region.

Temperature

Water temperatures in the oceanic waters near San Clemente, California measured from 1965-2006 ranged from approximately 53 to 77 degrees Fahrenheit (°F), and salinities in the same area and during the same time frame ranged from 28.0 to 34.3 practical salinity units (Scripps Institution of Oceanography 2008). Higher water temperatures and slightly higher salinities occur in summer and fall than in winter and spring, particularly due to seasonal differences in evaporation, heating, freshwater inputs to the area, and upwelling. Upwelling occurs in the area on regular and irregular bases, with regular seasonal occurrences highest in the spring months (March-June) (LaDochy and Patzel 2007).

Turbidity

Water clarity (Secchi depths) in near shore coastal areas average 12 ft (4 m) (Prasad et al. 2005), and is highly influenced by oceanographic conditions. Seasonal decreases in water clarity may accompany Pacific Decadal Oscillation events, which lead to decreased upwelling and productivity, warmer sea surface temperatures, and increased sea level heights. All of the aforementioned conditions can result in stream run-off, which increases turbidity, and are typically single-event, short-term conditions. Decreased water clarity also occurs during prolonged periods of upwelling (typically occurring in the spring months) that increase plankton biomass markedly (LaDochy and Patzel 2007). Due to protection from wave action by the jetty and the lack of freshwater inflow to the Oceanside Harbor, the main sources of turbidity in the entrance channel are fine sediments brought in by tidal circulation and stirred up by vessel traffic.

Dissolved Oxygen

Dissolved oxygen is the amount (expressed as a concentration) of oxygen present in seawater, which is important to the health of biological communities. Levels of dissolved oxygen that are too high (actual values vary depending on water temperature) can be extremely dangerous to aquatic life, and often result in fish kills or massive plankton blooms. Dissolved oxygen concentrations in offshore southern California waters typically range from 5.3 to 11.01 mg/L (Southern California Coastal Ocean Observing System 2008). Dissolved oxygen concentrations in the area decrease with depth, although differences are minimal in shallow, near shore areas.

Contaminants

Because water quality parameters have not been measured within the immediate vicinity of the project area, water quality conditions are characterized using existing information from adjacent areas. Water quality measurements for bacteria have been recorded weekly since 1999 at Camp Del Mar, which is located in the southern tip of the MCB Camp Pendleton. During 9 years of sampling, only on one occasion were levels of any of the water quality parameters measured in excess of the maximum allowable levels (< 1,000 organisms/100 milliliters [mL] for Total Coliforms, < 400 organisms/100 mL for Fecal Coliforms, and < 104 organisms/100 mL for Enterococci). Thus, water quality is generally good near the project area and complies with regulatory requirements for standard bacteria counts.

Groundwater Quality

The following beneficial uses have been established for groundwater in the Ysidora Hydrologic Area 2.10 (the Upper Ysidora, Chappo, and Lower Ysidora sub-basins lie within this area) (San Diego RWQCB 1994):

- Municipal and Domestic Supply;
- Agricultural Supply;
- Industrial Service Supply; and
- Industrial Process Supply.

Table 3.2-13 shows the range and average of groundwater quality data collected from 14 drinking water wells in the Lower SMR Basin from 2008 to 2011 with Basin Plan Objectives. Groundwater in the Ysidora HA frequently exceeds Basin Plan Objectives for iron, manganese, and TDS. Groundwater in the SMR Basin is naturally high in TDS due to naturally occurring constituents in local geologic formations (County of San Diego 2005). Prior to completion of the new Southern Region Tertiary Treatment Plant (SRTTP), wastewater discharges from MCB Camp Pendleton also contributed to high TDS concentrations in the groundwater basin (County of San Diego 2005). Recharge of surface water with high TDS also contribute to elevated TDS in groundwater. High TDS surface water results from upstream development and natural occurring constituents contributed by the geology of the watershed (County of San Diego 2005). Within the Ysidora HA, TDS concentrations tend to range from less than 600 mg/L in the upstream portion of the groundwater basin to over 1,500 mg/L in the downstream portion (County of San Diego 2005).

3.2.4.5 Floodplains

Floodplains are relatively flat areas adjacent to a river, stream, watercourse, bay, or other body of water subject to inundation during a flood event. The area comprising the 100-year delineated floodplain zone has a 1% chance of being flooded every year. To minimize the risk of damage associated with these areas, EO 11988 was issued to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practical alternative.

Table 3.2-13. Groundwater Quality Results for Production Wells from 2008 to 2011

Analyte	Basin Plan Objective[1]	Measured[2]		
		Minimum	Maximum	Average
Bicarbonate Alkalinity as $CaCO_3$ (mg/L)	NA	169	320	224
Boron (mg/L)	0.75	ND	0.24	0.13
Calcium (mg/L)	NA	71	100	92
Chloride (mg/L)	300	130	190	160
Color (color units)	20	ND	15	5
Fluoride (mg/L)	1.0	0.3	0.5	0.4
Iron (mg/L)	0.3	ND	1.0	0.097
Magnesium (mg/L)	NA	24	45	37
Manganese (mg/L)	0.05	ND	0.63	0.25
Methylene blue active substances (mg/L)	0.5	ND	0.07	0.002
Nitrate-N (mg/L)	10	ND	5.1	0.59
pH (standard units)	NA	7.5	8.0	7.8
Specific Conductance (µmhos/cm)	NA	1100	1400	1260
Sulfate (mg/L)	300	120	260	207
Total Dissolved Solids (mg/L)	750	660	908	790
Total Hardness (mg/L)	NA	280	430	384
Turbidity (NTU)	20	0	9	2

Notes: Not Applicable (NA): No Basin Plan Objective established for this parameter; non-detect (ND); Nephelometric Turbidity Unit (NTU); calcium carbonate ($CaCO_3$).
[1] Ysidora Hydrologic Area Groundwater Quality Objectives.
[2] Data is from the following wells on MCB Camp Pendleton: 2202, 2301, 2393, 2602, 2603, 2673, 3924, 23063, 23073, 26018, 26071, 26072, 330923, and 330925.
Sources: San Diego RWQCB 1994; MCB Camp Pendleton 2012b.

Over the last 50 years, several damaging floods have occurred within the boundaries of MCB Camp Pendleton. Of particular note, the storms of 1978, 1980, 1992-1993, and 1998 caused major damage to structures, roads, railroads, Sewage Treatment Plant (STP) 3, MCAS Camp Pendleton, and other facilities in the Lower SMR Basin (MCB Camp Pendleton and DON 2004). This area is now protected from physical damage due to the construction of a levee which was completed 1998.

3.3 Biological Resources

3.3.1 Definition of Resources

Biological resources include native and naturalized plants and animals, and the habitats in which they occur.

3.3.2 Regulatory Setting

3.3.2.1 Federal Statutes and Executive Orders

Bald and Golden Eagle Protection Act (16 USC § 668)

This act protects bald and golden eagles from being pursued, hunted, collected, molested, or otherwise disturbed.

P.L. 86-797, Fish and Wildlife Conservation on Military Reservations (Sikes Act), as amended by P.L. 90-465, Sikes Act Improvement Act.

These laws apply to all DON commands and personnel and cover USMC and USN installations and facilities that contain land and water areas suitable for conservation and management of fish and wildlife resources. Fish and wildlife management should be integrated with other natural resource activities into a balanced multiple-use program. The Sikes Act Improvement Act requires that an INRMP be prepared in cooperation with state and federal fish and wildlife conservation agencies and that members of the public and advocacy groups have an opportunity to review and comment on the INRMP during its preparation. During preparation of the INRMP, the USFWS and CDFW provided guidance and recommendations on structure and format of the document, regional conservation programs, and state and federal habitat and species conservation requirements. In accordance with the Sikes Act Improvement Act and with approval of the USFWS and CDFW, MCB Camp Pendleton completed a 5-year update to its previous INRMP in 2011 (MCB Camp Pendleton 2011) and Det Fallbrook is currently updating their 2006 INRMP. The USFWS and CDFW will continue to provide comments, recommendations, and input on the status of regional natural resource programs, surveys, and species during the semi-annual INRMP review process.

Migratory Bird Treaty Act of 1972 (16 USC §§ 703-719) and Executive Order 13186

MCB Camp Pendleton and Det Fallbrook conduct operations in compliance with, and support of, the Migratory Bird Treaty Act and EO 13186. This act protects all migratory birds, with the exception of the English sparrow (*Passer domesticus*), rock dove (*Columbia livia*), and European starling (*Sturnus vulgaris*). The Migratory Bird Treaty Act affirms and implements the United States' commitment to international conventions for the protection of shared migratory bird resources. EO 13186 directs federal agencies to avoid or minimize the negative impact of their actions on migratory birds, and to take active steps to protect birds and their habitat. Pursuant to EO 13186, the Secretary of the Defense and USFWS finalized an MOU on 31 July 2006 on migratory bird conservation as it relates to non-military readiness activities (which are addressed in a separate MOU) on DOD installations. Among the key provisions of the MOU are a) to encourage the incorporation of migratory bird management objectives into DOD planning documents, including INRMPs and NEPA analyses; and b) prior to starting any activity that is likely to affect populations of migratory birds: (1) Identify the migratory bird species likely to occur in the area of the Proposed Action and determine if any species of concern could be affected by the activity; (2) assess and document the effect of the proposed action on species of concern (USFWS 2008a); and (3) proactively address migratory bird conservation, and initiate appropriate actions to avoid or minimize the take of migratory birds.

CWA (33 USC §§ 1251-1387)

CWA protects the physical, chemical, and biological properties of the nation's waters (waters of the U.S.), including all navigable waters, their tributaries, and Section 404 jurisdictional wetlands. Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the U.S. by prohibiting such discharges without a permit from the USACE. Ancillary to the 404 permit, a Section 401 Water Quality Certification from the RWQCB is also required. For projects with *de minimis* effects, a Nationwide Permit can be issued as defined under the USACE's regulations (33 CFR §§ 320-330); otherwise an Individual Permit is required. For construction or the placement of structures in navigable waters, a permit under Section 10 of the Rivers and Harbors Act is also required. Where applicable, e.g., construction of a pier that requires dredge and fill, the USACE uses a combined process for authorizations under both Section 10 and 404. Section 404(b)(1) prohibits the discharge of fill material into wetlands unless there is no practicable alternative.

Section 402 of the CWA established the NPDES, under which the state of California regulates the discharge of non-point source pollution. Under the state's General Permit for Storm Water Discharges Associated with Construction Activity (99-08-DWQ), construction projects disturbing more than 1 acre (0.4 hectare) are required to implement BMPs as incorporated into a SWPPP, which must be submitted to and approved by the RWQCB.

Magnuson-Stevens Fishery Conservation and Management Act (16 USC § 1801, *et seq.*)

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act (PL 104-267), mandates that the Secretary of Commerce establish guidelines, by regulation, to assist the Fishery Management Councils in the description and identification of essential fish habitat in Fishery Management Plans, including adverse impacts on such habitat. Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to consult with NOAA Fisheries prior to undertaking any actions that may adversely affect essential fish habitat. The Magnuson-Stevens Fishery Conservation and Management Act defines essential fish habitat as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity." "Waters" includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include historic areas where appropriate. "Substrates" include sediment, hard bottom, structures underlying the waters, and associated biological communities. "Necessary" means the habitat required to support a sustainable fishery and a healthy ecosystem.

EO 11990, *Protection of Wetlands*

This EO requires that governmental agencies, in carrying out their responsibilities, provide leadership and "take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands." Each agency is to consider factors relevant to a proposed project's effect on the survival and quality of the wetlands by maintenance of natural systems, including conservation and long-term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, and wildlife. If no practical alternative can be demonstrated, agencies are required to provide for early public review of any plans or proposals for new construction in wetlands.

EO 13112, *Invasive Species*

This EO calls on federal agencies to work towards preventing and controlling the introduction and spread of invasive species. Non-native flora and fauna can cause substantial change to ecosystems, upset the ecological balance, and have the potential to cause economic harm.

ESA of 1973, as amended (16 USC §§ 1531-1544)

The ESA requires federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. The law also prohibits any action that causes an unauthorized "taking" of any listed species of endangered fish or wildlife. Likewise, import, export, interstate, and foreign commerce of listed species are all generally prohibited. Under Section 7 of the ESA, federal lead agencies are required to consult with the USFWS or NOAA Fisheries, depending on which is the responsible agency for the species in question, on any proposed action that may affect a listed species or its critical habitat. For a major construction project such as the SMR CUP, the lead agency prepares a Biological Assessment (BA) of the effects of the action and submits it to the responsible agency. If the lead agency finds that the action is not likely to adversely affect the species in question and the responsible agency concurs in writing, consultation is concluded, nominally within 30 days. If the action is likely to adversely affect the species in question, formal Section 7 consultation ensues, leading to a BO, nominally within 135 days. In the BO, the responsible agency sets forth non-discretionary (required) Reasonable and Prudent Measures and Terms and Conditions to minimize and/or compensate for take, as well as discretionary (recommended) conservation measures. For the SMR CUP, separate BAs are being submitted (1) to USFWS addressing all listed species that may be affected except the SCS; and (2) to NOAA Fisheries addressing the SCS.

The ESA applies to non-federal actions on non-federal or private lands as well, with different procedures for compliance. The non-federal entity must determine whether the action is likely to result in incidental take as defined under the ESA. If so, it must apply for a Section 10 Incidental Take Permit and consult with the responsible federal agency to develop a Habitat Conservation Plan that minimizes or effectively compensates for the action's adverse effects. For the SMR CUP, these provisions do not apply because there would be no takes of federally listed species on non-federal land, and the federal action proponents assume ESA responsibilities on federal lands.

Completion of all required ESA consultations is required prior to issuance of the ROD.

3.3.2.2 California Statutes

<u>California ESA (Fish and Game Code 2050, *et seq.*)</u>

The California ESA generally parallels the main provisions of the federal ESA and is administered by the CDFW. Federal actions on federal lands are not subject to regulation under the California ESA. Otherwise, the Act prohibits unauthorized take of a state-listed species, and a state lead agency is required to consult with CDFW to ensure that any action it undertakes is not likely to jeopardize the continued existence of any species listed endangered or threatened under the California ESA, or result in destruction or adverse modification of essential habitat. Many species are listed under both the federal and state ESA, and in such cases, the federal ESA takes precedence.

3.3.3 Region of Influence

The ROI, used synonymously with "action area," is the area within which the action alternatives are reasonably likely to have direct or indirect effects on biological resources. The ROIs for each alternative overlap in some areas, but differ in others, depending on similarities and differences with regard to proposed construction and operational actions, as summarized under existing conditions for each alternative (refer to Chapter 2 for more detail).

The ROI for Alternative 1 includes the SMR and surrounding 100-year floodplain, downstream to the estuary and river mouth, where biological resources may be affected by the proposed conjunctive use of surface water and groundwater. The ROI also includes areas affected by the construction and operation of the inflatable diversion weir, O'Neill Ditch; production wells and associated pipelines/access roads, the FPUD WTP, and the bi-directional pipeline between MCB Camp Pendleton and the community of Fallbrook.

The ROI for Alternative 2 is essentially the same as for Alternative 1, but includes the gallery wells and associated pipelines/access roads, a slightly different route for the bi-directional pipeline through MCB Camp Pendleton and DET Fallbrook, and a 1,392-acre (563-hectare) OSMZ which is intended to be established on FPUD property north of Fallbrook.

3.3.4 Existing Conditions

Separate subsections are provided for the description of vegetation and wildlife, aquatic habitats and species, and special status species, the latter including threatened and endangered species and other species of concern. Where applicable in each subsection, the differences between alternatives are identified.

3.3.4.1 Vegetation and Wildlife

<u>Vegetation</u>

Overview

A general overview of the vegetation of the combined ROI for the action alternatives is shown on Figure 3.3-1. This map was created using general vegetation data, which displays broad categories of plant communities, from the County of San Diego (2010). Most of the ROI is undeveloped land that supports significant areas of native or naturalized (non-native, but established and capable of persisting indefinitely) vegetation.

Vegetation within the ROI is predominantly grassland on open flats and valley bottoms away from water courses; CSS on dry, open coastal slopes; chaparral and oak woodland on more mesic slopes away from the immediate coast; riparian scrub/woodland and freshwater marshes along water courses; and an extensive salt marsh in the SMR Estuary. A narrow strip of coastal dune vegetation occurs on the immediate coastline. Aquatic habitats in the ROI include the SMR and other surface water bodies which are of critical importance to fish and wildlife in the region.

Plant Communities in Construction Areas

Plant communities have been mapped according to the classification developed by Holland (1986). Holland's system includes lists of dominant and characteristic species found in each community. Oberbauer (1996; Oberbauer *et al*. 2008) developed a slightly expanded version of Holland's system for use in San Diego County, and Oberbauer's additions to the basic system have been incorporated here where applicable. In addition, higher categories and/or subtypes of the Holland/Oberbauer system have been used in previous vegetation mapping on MCB Camp Pendleton, and have been used here where they provide a better fit to local conditions.

Plant communities were mapped within the potential construction areas and throughout a 50-ft to 100-ft (15-m to 31-m) corridor surrounding the project pipeline alignments, at a scale of 1:4,800 (1 in [2.5 cm] equals 400 ft [122 m]) using a relatively high-resolution digital aerial photograph from April 2010. Due to the large complexity of the project action area, separate plant community tables and detailed plant community index maps were developed for each alternative. Plant community descriptions, along with a breakdown of plant community acreages by alternative and maps of the entire project area, are included in Appendix C-1.

Plant communities found within the project area include (refer to Appendix C-2 for detailed description of each type):

- Upland Scrub Communities
    - Diegan Coastal Sage Scrub
    - Diegan Coastal Sage Scrub: Baccharis-Dominated
    - Coastal Sage-Chaparral Scrub
    - Southern Mixed Chaparral

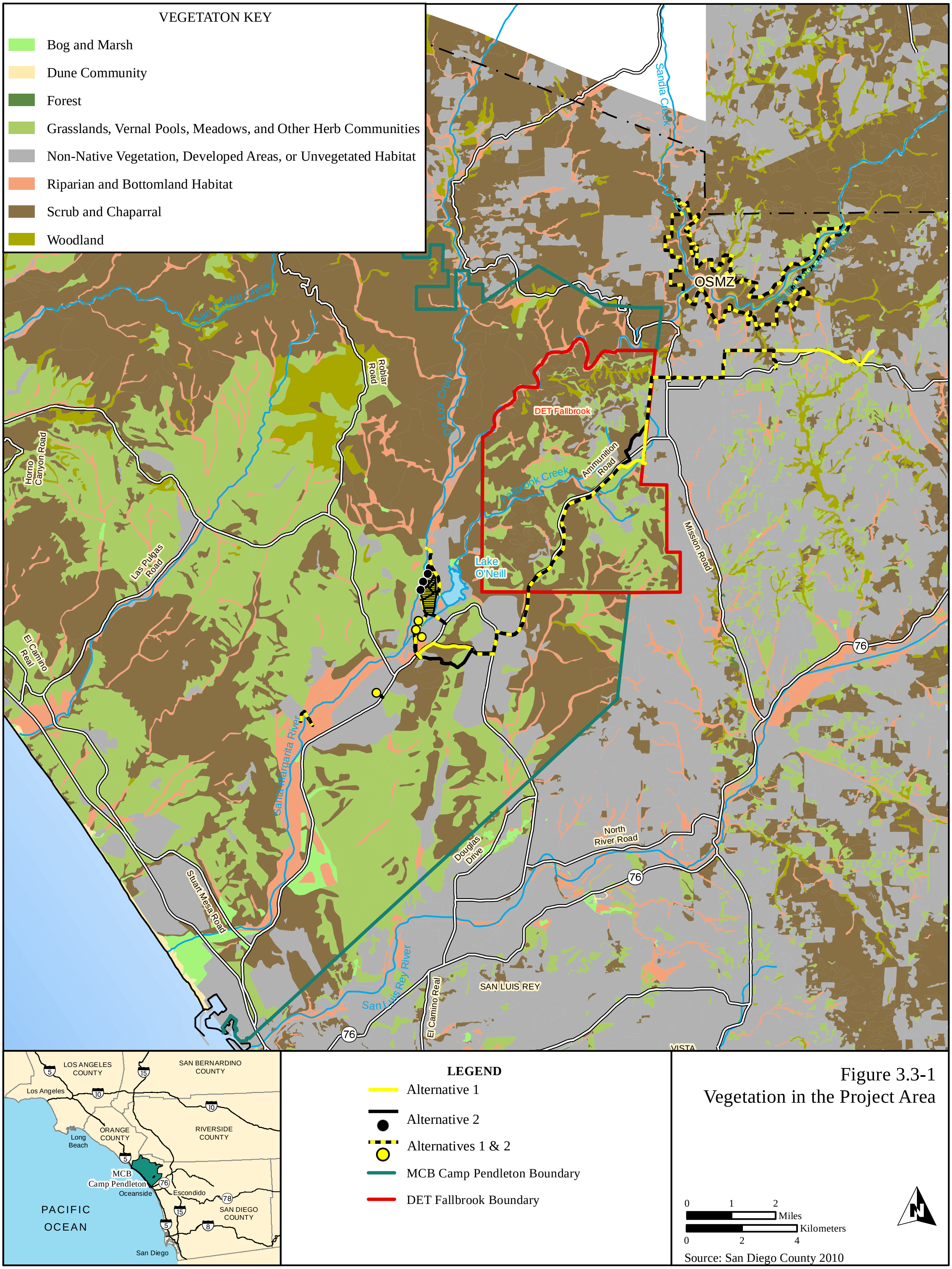


Figure 3.3-1
Vegetation in the Project Area

- Riparian Areas
  - Southern Riparian Woodland
  - Southern Coast Live Oak Riparian Forest
  - Southern Arroyo Willow Riparian Forest
  - Southern Cottonwood/Willow Riparian Forest
  - Southern Willow Scrub
  - Southern Riparian Forest
  - Southern Riparian Scrub
  - Sycamore Grassland
  - Mule-fat Scrub
  - Non-native Riparian
  - Arundo
- Grasslands and other Herb Communities
  - Valley Needlegrass Grassland
  - Non-native Grassland
  - Non-native Grassland: Broadleaf-dominated
- Bottomland Communities
  - Coastal and Valley Freshwater Marsh
  - Freshwater Marsh
  - Non-vegetated Floodplain or Channel
  - Open Water
- Upland Woodland Communities
  - Eucalyptus Woodland
  - Coast Live Oak Woodland
- Disturbed/Developed
  - Agriculture
  - Disturbed Habitat
  - Urban/Developed

Table 3.3-1 summarizes plant community types for the areas subject to construction by alternative, assuming a 50-ft to 100-ft (15-m to 31-m) wide buffer around pipeline corridors, 50-ft (15-m) perimeter around proposed permanent structures, and a 20-ft (6-m) buffer around roads. This table consolidates the information on plant communities into broader categories of vegetation (refer to Table 4.3-1 and Appendix C-1 for figures and a more detailed breakdown).

Table 3.3-1. Plant Communities Subject to Temporary and Permanent Construction Impacts

Plant Community Type		Alternative 1 (acres)			Alternative 2 (acres)		
		MCB Camp Pendleton	DET Fallbrook	Non-DOD	MCB Camp Pendleton	DET Fallbrook	Non-DOD
Upland Scrub	Coastal Sage Scrub	14.20	30.64	2.76	17.34	28.84	-
	Other	0.46	0.00	3.98	0.46	-	3.34
Riparian		16.10	2.69	4.34	23.41	2.08	0.58
Grassland/Herb		12.90	14.93	4.26	11.58	14.80	1.10
Bottomland		0.69	0.75	-	0.80	0.75	-
Upland Woodland		1.18	2.89	4.61	1.42	1.79	0.57
Disturbed/Developed		28.43	11.30	56.45	27.98	14.26	35.40
TOTAL		**73.95**	**63.20**	**72.63**	**82.98**	**62.53**	**40.99**

Notes: MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook; DOD = Department of Defense.

Vegetation in Proposed OSMZ

Plant communities were analyzed within the proposed OSMZ using GIS plant community data (County of San Diego 2010). Plant communities for the OSMZ were mapped according to the classification developed by Holland (1986). The OSMZ is owned by FPUD and is at the site of a formerly proposed dam and reservoir located north of Fallbrook. Table 3.3-2 shows the plant communities and acreages within the OSMZ portion of the action area. A botanical survey report for the OSMZ is provided in Appendix C-2.

Table 3.3-2. Vegetation Communities within the OSMZ Portion of SMR CUP Action Area

Plant Community Type	Area (Acres)
Upland Scrub	833.00
Riparian	260.22
Grassland/Herb	54.33
Bottomland	38.11
Upland Woodland	111.94
Disturbed/Developed	85.03
Total	**1,382.63**

<u>Wildlife</u>

Wildlife Species on MCB Camp Pendleton

A diverse assemblage of mammals, birds, reptiles, amphibians, fish, and invertebrates occur within MCB Camp Pendleton. In addition to hundreds of invertebrates, MCB Camp Pendleton has documented the presence of more than 50 mammalian, 30 reptilian, 10 amphibian, 300 bird, and 60 fish species (MCB Camp Pendleton 2011). Many wildlife species on MCB Camp Pendleton can be found throughout the year. Other wildlife species visit MCB Camp Pendleton seasonally, such as migratory birds. Federally-listed wildlife species are discussed in more detail in Section 3.3.4.3. Some species, especially among the special-status species, are limited in distribution to a single habitat (e.g., riparian habitat, CSS, or vernal pools). Most, however, are generalists and will utilize multiple habitats for shelter and foraging. All of the base’s reptiles and amphibians, most of the mammals, and a small percentage of the birds, are year-round residents. The remainder is seasonal residents, wide-ranging migrants, or transient visitors. Nearly all of the bird species are protected under the Migratory Bird Treaty Act and are given special consideration under EO 13186, *Migratory Bird Conservation*.

The project area overlaps a number of plant communities resulting in a diverse assemblage of wildlife species within or adjacent to the project area. The most abundant plant communities within the project area are CSS, riparian and wetland, and grassland communities (refer to Table 3.3-1).

Riparian and estuarine habitats adjacent to the project area include the portions of the SMR downstream from the proposed new diversion structure to the estuary and river mouth. Typical riparian species found throughout this portion of the SMR include LBVI (*Vireo bellii pusillus*), yellow-breasted chat (*Icteria virens*), yellow warbler (*Dendroica petechia*), common yellowthroat *(Geothlypis trichas*), lesser goldfinch (*Carduelis psaltria*), red-winged blackbird (*Agelaius phoeniceus*), spotted towhee (*Pipilo maculatus*), bushtits (*Psaltriparus minimus*), yellow-rumped warbler (*Dendroica coronata*), song sparrow (*Melospiza melodia*), egrets (*Egretta* spp.), herons (*Ardea* spp.), black-crowned night heron (*Nycticorax nycticorax*), ARTO (*Anaxyrus californicus*), California (western) toad (*Anaxyrus boreas halophilus*), Baja California treefrog (*Pseudacris hypochondriaca hypochondriaca*), dusky-footed woodrat (*Neotoma fuscipes*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), western spotted skunk (*Spilogale gracilus*), Virginia opossum (*Didelphis virginiana*), coyote (*Canis latrans*), and bobcat (*Lynx rufus*) (MCB Camp Pendleton 2011; Lynn and Kus 2011).

Programs provided for the LBVI and the SWFL as part of the base's Riparian Ecosystem Conservation Plan (MCB Camp Pendleton 2011) and the associated Riparian/Estuarine BO (USFWS 1995a) benefit other riparian wildlife species, in general. Project-specific impacts are required to be mitigated in accordance with the Conservation Plan and Riparian/Estuarine BO to maintain the overall quality of riparian habitat and the health of riparian ecosystems on the base. Base-wide management practices include conservation awareness and education programs, programmatic instructions to avoid and minimize impacts from training activity and other base operations on riparian vegetation/habitat, and exotic vegetation control (MCB Camp Pendleton 2011).

Typical estuarine species include western snowy plover (SNPL) (*Charadrius alexandrinus nivosus*), CLTE (*Sternula antillarum browni*), California brown pelican (*Pelecanus occidentalis*), light-footed clapper rail (LFCR) (*Rallus longirostris levipes*), Belding's savannah sparrow (BSSP) (*Passerculus sandwichensis beldingi*, a state-listed endangered species), egrets, herons, tidewater goby (TWG) (*Eucyclogobius newberryi*), gulls (*Larus* spp.), and terns (*Sterna* spp.). All of these species benefit from management activities and programs provided for the LFCR and other estuarine and beach species under the base's Estuarine and Beach Ecosystem Conservation Plan. Current base-wide management practices that directly or indirectly benefit estuarine species include but are not limited to restoration efforts in estuarine/beach areas that are temporarily disturbed from non-routine maintenance and construction activities, exotic vegetation removal/control, and monitoring stream water quality, flood regimes, and storm event frequency to determine and manage the potential effect on beach and estuarine habitats. Additionally, the base's management program provides programmatic instructions to users of the base that limit activities during breeding seasons and in sensitive resource areas. These programmatic instructions include the requirement for vehicles to remain on existing roads and trails in the vicinity of coastal marshes/lagoons during breeding season, prohibiting foot traffic in all coastal marshes during breeding season and prohibiting foot traffic all year long in the SMR Estuary and the mouth of Cocklebur Canyon (MCB Camp Pendleton 2011).

Most mammals with the potential to occur in the project area are not frequently observed but mammal signs, including tracks or scat, are more common. Tracks (commonly observed along dirt roads on MCB Camp Pendleton) or mammals commonly observed include mule deer (*Odocoileus hemionus*), raccoon, Virginia opossum, striped skunk, bobcat, coyote, desert cottontail (*Sylvilagus audubonii*), California ground squirrel (*Spermophilus beecheyi*), pocket gopher (*Thomomys bottae*), and deer mouse (*Peromyscus maniculatus*). Dusky-footed woodrat nests are common in native vegetation on MCB Camp Pendleton. Long-tailed weasels (*Mustela frenata*) also occur on MCB Camp Pendleton and have the potential to occur in the action area.

In a bat survey conducted by the San Diego Natural History Museum on MCB Camp Pendleton in 2010, the following 10 species were mist netted or found through echolocation along the SMR: Mexican free-tailed bat (*Tadarida brasiliensis*), big brown bat (*Epesicus fuscus*), Yuma myotis (*Myotis yumanensis*), California myotis (*Myotis californicus*), western mastiff bat (*Eumops perotis*), western red bat (*Lasiurus blossevillii*), hoary bat (*Lasiurus cinereus*), western yellow bat (*Lasiurus xanthinus*), pocketed free-tailed bats (*Nyctionmops femorrosaccus*), and canyon bat (*Parastrellus hesperus*) (Stokes 2012. Bats are removed from buildings by the base game wardens. The bat species on base all follow water courses and frequent the Lake O'Neill area (MCB Camp Pendleton 2011).

Common birds likely to occur in or near the project area in CSS include the CAGN, bushtit, wrentit (*Chamaea fasciata*), California towhee (*Pipilo crissalis*), spotted towhee, Anna's hummingbird (*Calypte anna*), California thrasher (*Aphelocoma californica*), house wren (*Troglodytes aedon*), mourning dove (*Zenaida macroura*), and black phoebe (*Sayornis nigricans*) (MCB Camp Pendleton 2011).

Common birds likely to occur in non-native grassland within the project area include the western meadowlark (*Sturnella neglecta*), house finch (*Carpodacus mexicanus*), red-tailed hawk (*Buteo jamaicensis*), turkey vulture (*Cathartes aura*), and American kestrel (*Falco sparverius*) (MCB Camp Pendleton 2011). Several birds were observed during site visits for plant community and rare plant surveys including greater roadrunner (*Geococcyx californianus*), lazuli bunting (*Passerina amoena*), and yellow-headed blackbird (*Xanthocephalus xanthocephalus*). Loggerhead shrike (*Lanius ludovicianus*) is likely to occur in the grasslands in the ROI.

Several species of terrestrial reptiles and amphibians can be found throughout the project area. Common lizards likely within the project area include the western fence lizard (*Sceloporus occidentalis*) and San Diego alligator lizard (*Elgaria multicarinata webbii*). Snakes likely within the project area include the San Diego gopher snake (*Pituophis catenifer annectens*), California kingsnake (*Lampropelitis getula californiae*), red coachwhip (red racer) (*Coluber* [*Masticophis*] *flagellum piceus*), two-striped garter snake (*Thamnophis hammondii*), and southern Pacific rattlesnake (*Crotalus oreganus helleri*). Baja California treefrog, western toad, western spadefoot toad (*Spea hammondii*), Pacific (western) pond turtle (*Actinemys marmorata*), and the non-native American bullfrog (*Lithobates catesbeianus* [*Rana catesbeiana*]) are also likely within the project area (MCB Camp Pendleton 2011; California Herps 2013). Nine species of aquatic reptiles and amphibians reside in the estuary alone. The federally-listed ARTO is found along the SMR (Section 3.3.4.3).

Reptiles observed during site visits for plant community and rare plant surveys include several lizards such as common western side-blotched lizard (*Uta stansburiana elegans*), San Diego alligator lizard, western fence lizard, coastal whiptail (*Aspidoscelis tigris stejnegeri*), and orange-throated whiptail (*Aspidoscelis hyperythra beldingi*), and Blainville's horned lizard (*Phynosoma blainvillei*), as well as several snakes including red diamond rattlesnake (*Crotalus ruber*), southern Pacific rattlesnake, and

California striped racer (*Coluber* [=*Masticophus*] *lateralis lateralis*). Amphibians observed during surveys include Baja California treefrog, western spadefoot toad, and western toad.

Wildlife Species on DET Fallbrook

The SMR forms the northwestern boundary between DET Fallbrook and MCB Camp Pendleton. The river provides continuity of habitat between the upper and lower reaches of the river and extends into the OSMZ. Typical species found in this riparian corridor are similar to those found along the riparian portions of the Lower SMR, and include LBVI, yellow warbler, common yellowthroat, red-winged blackbird, ARTO, western toad, Baja California treefrog, dusky-footed woodrat, raccoon, and striped skunk.

The DET Fallbrook portion of the project area follows Ammunition Road and an adjacent dirt road. Typical habitats along the road include grassland, CSS, riparian, and chaparral. Tracks commonly observed adjacent to this road on DET Fallbrook include mule deer, raccoon, Virginia opossum, bobcat, coyote, desert cottontail, and California ground squirrel. Other mammals known to occur are brush rabbit (*Sylvilagus bachmani*), California mouse (*Peromyscus californicus*), California pocket mouse (*Chaetodipus californicus*), deer mouse, Dulzura kangaroo rat (*Dipdomys simulans*), pocket gopher, and woodrat. Common species occurring in CSS include CAGN, California towhee, California thrasher, spotted towhee, bushtit, lesser goldfinch, and house finch. Other species likely to occur are raccoon and striped skunk (DON 2008). The endangered Stephens' kangaroo rat (SKR) (*Dipodomys stephensi*) occurs in open grassland areas on portions of DET Fallbrook, although not within the action area (DET Fallbrook 2006).

A total of 54 bird species are known to occur in the project area within DET Fallbrook. These species include Anna's hummingbird, black phoebe, Cassin's kingbird (*Tyranus vociferans*), California quail (*Callipepla californica*), California towhee, common raven (*Corvus corax*), house finch, red-tailed hawk, song sparrow, spotted towhee, turkey vulture, western meadowlark, western scrub jay, and wrentit (DON 2008).

Reptile species observed within the project area on DET Fallbrook include California kingsnake, San Diego gopher snake, and western fence lizard (DON 2008).

Fish and Wildlife Species on the OSMZ

A wildlife survey was conducted in the OSMZ from mid-June to mid-July 2008. Approximately 11 insect, 4 fish, 3 amphibian, 6 reptile, 63 bird, and 8 mammal species were observed during site visits. Federally-listed and sensitive species observed include LBVI, ARTO, yellow warbler, yellow-breasted chat, and arroyo chub (*Gila orcutti*). Additional birds were observed during the OSMZ wildlife surveys (refer to Appendix C-2 for the report and more detailed information). Several mammals were observed during wildlife surveys in the OSMZ including coyote, bobcat, desert cottontail, California ground squirrel, long-tailed weasel, western spotted skunk, pocket gopher, and big-eared woodrat (*Neotoma macrotis*). For a complete list of potential and observed fauna in the OSMZ refer to Appendix C-2.

<u>Migratory Birds</u>

Nearly all of the bird species in the ROI are migratory birds as defined and protected from unauthorized take under the Migratory Bird Treaty Act. EO 13186 (*Migratory Bird Conservation*) provided additional direction to federal agencies regarding migratory bird conservation, and on 31 July 2006, the DOD and USFWS signed an MOU outlining actions to be taken in support of migratory bird conservation on DOD installations as they relate to non-military readiness activities. Military readiness activities (e.g., training) are addressed in a separate MOU. These actions include addressing the effects of proposed actions on migratory bird populations, especially regional species of conservation or management concern as identified by USFWS (USFWS 2008a, 2011a).

Migratory bird species of regional concern that are known to occur in the ROI include, but are not limited to, the following based on review of MCB Camp Pendleton species lists (MCB Camp Pendleton 2011) and species habitat affinities.

- Shorebirds that occur in the SMR Estuary and on area beaches include long-billed curlew (*Numenius americanus*), whimbrel, marbled godwit, short-billed dowitcher (*Limnodromus griseus*), and black skimmer (*Rynchops niger*).
- Riparian species which occur along the SMR include yellow warbler and yellow-breasted chat.
- Allen's hummingbird (*Selasphorus sasin*) which is a breeding resident of CSS.
- San Diego cactus wren (*Campylorhynchus brunneicapillus sandiegensis*) is relatively uncommon and occurs in CSS where coastal cholla and/or prickly pear (*Opuntia* spp.) are abundant. On MCB Camp Pendleton and DET Fallbrook, the only occurrences are outside the project ROI.
- Loggerhead shrike which occurs in open grasslands.

<u>Wildlife Corridors</u>

The SMR and its surrounding floodplain and bordering uplands comprise the core of one of the South Coast's "Missing Linkages," providing a corridor for fish and wildlife to move between the interior Palomar Mountains and the coastal Santa Ana/Santa Margarita Mountains and surrounding lowlands on MCB Camp Pendleton (South Coast Wildlands 2008). The location of the OSMZ provides a significant continuity of natural vegetation and aquatic and upland habitats for fish and wildlife along the SMR. In a regional context, the OSMZ is part of the "Santa Ana/Palomar Mountains Linkage," one of several linkages identified as essential to sustaining a network of interconnected wildlands in the South Coast Ecoregion (South Coast Wildlands 2008). Luke *et al.* (2004) specifically identified the area of the proposed OSMZ as a key part of a 4-mi (6-km) wide, 16-mi (26-km) long linkage design that would enhance the ability of fish and wildlife to move between the interior mountainous regions of San Diego and Riverside counties and the more coastal Santa Ana/Santa Margarita mountains and lowlands of MCB Camp Pendleton.

3.3.4.2 Aquatic Habitats and Species

Aquatic habitats in the project ROI occur within the lower and middle reaches of the SMR watershed. Marine areas include the Pacific Ocean where the sea meets the SMR. These habitats support a large diversity of fishes, invertebrates, amphibians, reptiles, waterfowl, and plants. Threatened or endangered aquatic species known to currently or historically reside in the project area are discussed under Section 3.3.4.3, *Special Status Species*. The information presented was gathered from various sources, including the MCB Camp Pendleton INRMP (MCB Camp Pendleton 2011) and several reports compiled for MCB Camp Pendleton examining specific species found on the base.

<u>Santa Margarita River and Tributaries</u>

The SMR and its tributaries provide nearly continuous corridors of riparian and freshwater aquatic habitat from the interior mountains to the estuary. The middle reach of the SMR extends from upstream of where the SMR is joined by Sandia Creek to approximately the confluence with De Luz Creek. As described by White (2002), the middle reach of the river has a moderate gradient and consists of alternating straight and meandering sections with diverse substrate and flow conditions. The lower reach, from approximately the confluence with De Luz Creek to the estuary, has a broad floodplain with extensive riparian/wetland habitats, and a broad, sandy bed through which the channel meanders.

Fish known to occur in Sandia Creek include the native arroyo chub, a CDFW species of special concern, and the introduced largemouth bass (*Micropterus salmoides*), mosquitofish (*Gambusia afinis*), and green sunfish (*Lepomis cyanellus*). Sandia Creek is also potential habitat for armored three-spine stickleback (*Gasterosteus aculeatus*), a U.S. Forest Service sensitive species, and the federally endangered SCS.

Fallbrook Creek is a tributary to the lower reach of the SMR which originates in the community of Fallbrook. The creek supports a riparian scrub and woodland habitat across DET Fallbrook and onto MCB Camp Pendleton, where it flows into Lake O'Neill, approximately 8.5 mi (13.7 km) inland from the Pacific Ocean. Water levels in the lake are managed for water supply, but support incidental recreation.

Typically, streams with a mixture of coarse gravel, cobbles and boulders contain greater diversity of benthic invertebrates due to the greater variety of niche space for a range of organisms (Munn et al. 2009). However, the habitat structure of the Lower SMR is considered less than ideal, consisting of sand and fine deposits that are frequently disturbed as a result of natural bedload transport processes and a lack of extensive overhanging vegetation (NAVFAC SW 2011a). As indicated in bioassessments conducted in 2011 as part of MCB Camp Pendleton's Municipal Stormwater Program, the two sites investigated on the lower were each dominated by a single species of mayfly (*Centroptilum sp*. and *Tricorythodes sp*.) (NAVFAC SW 2012).

Surveys conducted 4 days per month during spring through summer over a 5-year period at the Lake O'Neill outflow canal provide a fairly accurate picture of species that reside in the lake itself (MCB Camp Pendleton 2007a). Over 99% of the species collected from the outfall canal were non-native. No native fish species were collected. Commonly found non-native fish include mosquitofish, common carp (*Cyprinus carpio*), and green sunfish. The one notable native animal species captured in surveys was the Pacific pond turtle. Non-native aquatic reptiles and amphibians included the spiny softshell turtle (*Apalone spinifera*), red-eared slider turtle (*Trachemys scripta*), and American bullfrog. As this lake is man-made, the presence of non-native species is not unexpected. The lake is periodically stocked with game fish, such as bluegill (*Lepomis macrochirus*), largemouth bass, and black crappie (*Pomoxis nigromaculatus*). Non-native species captured in the SMR are transferred to Lake O'Neill (MCB Camp Pendleton 2007a).

Downstream of the diversion, the dominant vegetation communities in the floodplain of the Lower SMR are southern arroyo willow riparian forest and southern willow scrub. The introduction of non-native species has caused problems for the ecosystem as a whole, and efforts to remove those which are detrimental to sensitive native species are ongoing (MCB Camp Pendleton 2007a).

<u>Santa Margarita River Estuary</u>

In addition to large expanses of tidal open water and mudflat, the SMR Estuary supports salt marsh, brackish marsh/willow swamp, salt flats, and coastal sand dunes. These habitats support approximately 148 plant, 9 reptile and amphibian, 24 fish, 184 bird, and 17 mammal species, as well as several federal and state-listed species including the California brown pelican, CLTE, SNPL, TWG, LFCR, and BSSP. This estuary is the largest on MCB Camp Pendleton and supports several different microhabitats and diverse assemblages of organisms, including freshwater and marine species. The estuary is supplied with salt water by the neighboring Pacific Ocean, and salinity varies seasonally and sometimes daily as a result of episodic rainfall.

The regularity and extent of tidal flushing, the magnitude and frequency of freshwater runoff, sedimentation rates, soil types, salinity and nutrient relations, and human disturbance all influence the structure of the coastal wetland system of the estuary. Tidal flushing occurs when the estuary mouth is open to the ocean and the incoming and outgoing tides provide a connection between the estuary and the ocean. Incoming tides bring in water of uniform salinity, moderate temperature, high dissolved oxygen content, and nutrients and small organisms such as plankton. Outgoing tides remove water of more variable temperature, salinity, dissolved oxygen and nutrient levels, as well as wastes and chemical pollutants (USFWS 1981). A strong correlation exists between the regularity of tidal flushing and the diversity and abundance of the flora and fauna present in coastal wetland habitats. Interruption of tidal flushing naturally occurs to varying degrees in southern California coastal lagoons like the SMR Estuary due to seasonal low flows in streams and littoral sand transport which results in a shallow sill or berm at the mouth (Lafferty 2005). Complete closure at the mouth can have drastic effects and reduce the overall wildlife value of these coastal wetlands (USFWS 1981). Changes to estuarine conditions due to a reduction of tidal flushing can reduce the abundance and diversity of invertebrate species (USFWS 1981). Fish, bird, and mammal populations are adversely affected by the reduced abundance and diversity of invertebrate species within an estuary or lagoon because of their importance as a food source. In addition, when mouth closures prevent tidal flushing, fish such as striped mullet (*Mugil cephalus*), anchovy, and topsmelt (*Atherinops affinis*) are prevented from entering the estuary or lagoon. These species are important prey items for CLTE and other birds. Mouth closures also prevent mudflat exposure during low tide conditions, precluding the use of these prime foraging areas for resident and migratory shorebirds, including SNPL.

Aquatic invertebrates are an integral link in the estuarine food chain. In addition to being an important food source for other animals, they help to aerate the sediments and recycle sediment bound nutrients (USFWS 1981). A variety of native and non-native marine invertebrate species inhabit the SMR and the SMR Estuary, including crabs, shrimp, snails, clams, and worms. Commonly found native invertebrate species include the California horn snail (*Cerithidea californica*), swimming crab (*Portunus xantusi*), and jack-knife clam (*Tagelus californianus*). Non-native invertebrate species include crayfish (*Procambarus clarkii*) and shrimp of the genus *Palaemon* (MCB Camp Pendleton 2007a).

Native freshwater or anadromous fish known to occur historically in the SMR and estuary include the partially armored three-spine stickleback, Pacific lamprey (*Lampetra tridentata*), SCS, TWG, and the arroyo chub. SCS and TWG are federally protected (refer to Section 3.3.4.3). Of the native fish species listed above, only the arroyo chub was documented in recent surveys conducted during non-native species removal. Other freshwater or anadromous fish species found in the SMR or estuary include non-natives such as the mosquitofish and the yellowfin goby (*Acanthogobius flavimanus*) (MCB Camp Pendleton 2007a). Fishes associated primarily with marine or estuarine conditions that occur in the SMR Estuary include California killifish (*Fundulus parvipinnis*), Pacific halibut (*Hippoglossus stenolepis*), diamond turbot (*Hypsopsetta guttulata*), topsmelt, bay pipefish (*Syngnathus leptorhynchus*), longjaw mudsucker (*Gillichthys mirabilis*), arrow goby (*Clevelandia ios*), cheekspot goby (*Ilypnus gilberti*), and staghorn sculpin (*Leptocottus armatus*) (USGS 2007; Lafferty 2012). The SMR Estuary likely provides nursery habitat for Pacific halibut and other marine species (Allen *et al.* 2006).

Management of estuarine and beach ecosystems is covered by the MCB Camp Pendleton Estuarine and Beach Conservation Plan. The introduction of non-native species has caused problems for the ecosystem as a whole, and efforts to remove those which are detrimental to sensitive native species are ongoing (MCB Camp Pendleton 2007a). The estuarine/beach conservation program is designed to sustain and enhance MCB Camp Pendleton’s natural resources along its coastline, with an emphasis on nesting areas, coastal lagoons, and the SMR Estuary. The plan designates specific management zones along the coastline. Within these established zones, management activities focus on maintaining wetland values of coastal lagoons, protecting and maintaining CLTE and SNPL nesting areas, and maximizing the probability of metapopulation persistence within the lagoon complex for TWG (MCB Camp Pendleton 2011).

CWA Jurisdictional Wetlands and Other Waters of the U.S.

Wetlands and other waters of the U.S. are subject to the regulatory jurisdiction of the USACE under Section 404 of the CWA (33 CFR §§ 320-330). Under Section 404 of the CWA, wetlands are defined as areas that are "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." Wetlands are recognized as a special aquatic site under the Section 404(b)(1) guidelines, and a "no net loss" policy continues to guide federal regulatory actions affecting wetlands under Section 404. Other CWA jurisdictional waters of the U.S. include navigable waters, relatively permanent tributaries to navigable waters, and smaller tributaries subject to a determination of "significant nexus" between tributary flows and the functions and properties of the downstream jurisdictional water.

Wetlands and other waters of the U.S. in the project area were initially delineated in 2005/2006 (Reclamation 2006b) and verified/updated in April 2012 (Reclamation *et al.* 2013) using new methodology outlined in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008). Table 3.3-3 summarizes the results of the 2012 delineation.

Table 3.3-3. Jurisdictional Wetlands and other Waters of the U.S. by Alternative

Wetland/Waters of the U.S.	Alternative 1			Alternative 2		
	MCB Camp Pendleton	DET Fallbrook	Non-DOD Lands	MCB Camp Pendleton	DET Fallbrook	Non-DOD Lands
WETLANDS (acres)						
Palustrine Emergent	0.28	0.07	-	0.28	0.07	-
Palustrine Forested	4.17	0.12	0.33	8.81	-	0.20
Palustrine Scrub-Shrub	0.46	-	-	0.46	-	-
Total Wetlands	**4.91**	**0.17**	**0.33**	**9.55**	**0.07**	**0.20**
OTHER WATERS OF THE U.S. (feet/acres)						
Riverine Lower Perennial[1]	802/ 0.50	-	-	2,716/ 2.26	-	-
Riverine Upper Perennial[2]	-	427/ 0.14	-	-	121/ 0.04	-
Riverine Intermittent	6,160/ 2.52	603/ 0.12	2,151/ 0.57	5,826/ 2.44	634/ 0.12	664/ 0.08
Total Other Waters of the U.S.	**6,962/ 3.02**	**1,030/ 0.26**	**2,151/ 0.57**	**8,542/ 4.70**	**755/ 0.16**	**664/ 0.08**

Notes: [1]Santa Margarita River.
[2]Fallbrook Creek.
MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook; DOD = Department of Defense.
Source: Reclamation *et al.* 2013.

Wetlands in areas of proposed construction belong to the palustrine system, which includes all non-tidal wetlands dominated by trees, shrubs, and persistent emergents (herbaceous plants) (Cowardin *et al.* 1979). A total of 10.07 acres (0.99 hectare) of jurisdictional palustrine wetlands were delineated and mapped within the combined project footprints of Alternatives 1 and 2, including the following types:

- Palustrine emergent wetlands comprise patches of herbaceous wetland vegetation totaling 0.35 acre (0.14 hectare).

- Palustrine scrub-shrub wetlands comprise patches of willow- and mule-fat dominated riparian scrub totaling 0.46 acre (0.19 hectare).
- Palustrine forested wetlands comprise 9.26 acres (3.75 hectare) of willow-dominated riparian forest.

Other waters of the U.S. in proposed construction areas belong to the riverine system, which includes all non-estuarine aquatic habitats contained within a channel, with the exception of vegetated wetlands (Cowardin *et al.* 1979). Subsystems of the riverine system that are represented in the project area including the following:

- The lower perennial subsystem is characterized by low gradient, slow water velocity, and a well-developed floodplain (Cowardin *et al.* 1979). A total of 2,716 linear ft, comprising approximately 2.26 acres (0.91 hectare) of riverine lower perennial habitat was mapped within the project area, all of which was the SMR.
- The upper perennial subsystem is characterized by the high gradient, fast water velocity, and very little floodplain development (Cowardin *et al.* 1979). Some water flows throughout the year. The substrate consists of rock, cobbles, or gravel with occasional patches of sand. A total of 427 linear feet, comprising approximately 0.14 acre (0.06 hectare) of riverine upper perennial habitat was mapped within the project area, all of which was Fallbrook Creek.
- The intermittent subsystem consists of channelized habitats that contain flowing water for only part of the year. When water is not flowing, it may remain in isolated pools or surface water may be absent (Cowardin *et al.* 1979). Ephemeral streams and O'Neill Ditch were included in the intermittent category for purposes of the Cowardin classification. A total of 9,018 linear feet comprising approximately 3.22 acres (1.30 hectare) of riverine intermittent habitat was mapped within the action area; O'Neill Ditch comprised 5,188 linear feet (approximately 2.33 acre [0.94 hectare]) of this riverine intermittent habitat.

3.3.4.3 Special Status Species

This section addresses federally and state-listed threatened and endangered species, as well as other species of concern recognized by the USFWS and CDFW.

<u>Federally-Listed Threatened and Endangered Species</u>

Based on the review of MCB Camp Pendleton's and DET Fallbrook's INRMPs (DET Fallbrook 2006; MCB Camp Pendleton 2011), current GIS information, site conditions, and field surveys conducted in the ROI for the CUP and other projects, the potential occurrence of federally-listed threatened and endangered species in the ROI is summarized in Table 3.3-4. Those species known or reasonably likely to occur are discussed in more detail below.

Table 3.3-4. Federally and State-Listed Threatened and Endangered Species Potentially Occurring in the Project ROI

Common Name	*Scientific Name*	Status[1]	Habitat[2]	Occurrence in Project ROI[2]
Plants				
San Diego button-celery	*Eryngium aristulatum var. parishii*	FE, SE	Vernal pools	Not known or likely to occur due to lack of habitat.
spreading navarretia	*Navarretia fossalis*	FT	Vernal pools	Not known or likely to occur due to lack of habitat.
thread-leaved brodiaea	*Brodiaea filifolia*	FT, SE	Grasslands	Not known or likely to occur due to lack of habitat.
Invertebrates				
Riverside fairy shrimp	*Streptocephalus woottoni*	FE	Vernal pools	Not known or likely to occur due to lack of habitat.
San Diego fairy shrimp	*Branchinecta sandiegonensis*	FE	Vernal pools	Not known or likely to occur due to lack of habitat.
quino checkerspot butterfly	*Euphydryas editha quino*	FE	Grassland, coastal sage scrub (CSS)	Never found on MCB Camp Pendleton despite many surveys; no known or suspected occurrence elsewhere in ROI.
Fish				
southern California steelhead	*Oncorhynchus mykiss*	FE	Large streams	Historic occurrence in SMR; presumed to occur based on the capture of juvenile trout with wild steelhead ancestry in the SMR in 2009
tidewater goby	*Eucyclogobius newberryi*	FE	Estuaries/coastal brackish lagoons	Historically occurred in the SMR Estuary, but no recent occurrence in the ROI.
Amphibians				
arroyo toad	*Anaxyrus californicus*	FE	Rivers, major streams, surrounding uplands	Occurs in SMR and Sandia Creek.
California red-legged frog	*Rana aurora draytonii*	FT	Creeks and ponds	Historic occurrence in the watershed, but presumed extirpated from San Diego County (SDNHM 2009a).
Birds				
California least tern	*Sternula antillarum browni*	FE, SE	Beaches, shorelines, open waters, salt flats, coastal dunes, and estuary sand bars	SMR Estuary, beach sections F and G, Lake O'Neill, and marine waters.
western snowy plover	*Charadrius alexandrinus nivosus*	FT	Beaches, shorelines, salt flats, coastal dunes, and estuary sand bars	SMR Estuary; beach sections F, G, and H.
light-footed clapper rail	*Rallus longirostris levipes*	FE, SE	Coastal fresh and salt water marshes	One or two pairs resident in SMR Estuary.
southwestern willow flycatcher	*Empidonax trailli extimus*	FE, SE	Willow dominated riparian	Riparian scrub and woodland habitats.
least Bell's vireo	*Vireo bellii pusillus*	FE, SE	Willow dominated riparian, some nesting occurs in upland scrub adjacent to streams	Riparian scrub and woodland habitats.

Table 3.3-4. Federally and State-Listed Threatened and Endangered Species Potentially Occurring in the Project ROI

Common Name	*Scientific Name*	Status[1]	Habitat[2]	Occurrence in Project ROI[2]
coastal California gnatcatcher	*Polioptila californica californica*	FT	Coastal Sage Scrub (CSS)	CSS on MCB Camp Pendleton and DET Fallbrook.
Belding's Savannah Sparrow	*Passerculus sandwichensis beldingi*	SE	Coastal salt marshes	SMR Estuary.
western yellow-billed cuckoo	*Coccyzus americanus*	SE	Open woodland (especially where undergrowth is thick)	No known occurrence.
willow flycatchers	*Empidonax traillii brewsteri, Empidonax traillii adastus*	ST	Willow dominated riparian	Very low likelihood of occurrence, only as non-breeding migrants.
		Mammals		
Pacific pocket mouse	*Perognathus longimembris pacificus*	FE	Coastal mesas, in sparse grassland with sandy soil	Not known or likely to occur based on lack of historic records in ROI.
Stephens' kangaroo rat	*Dipodomys stephensi*	FE, ST	Sparse CSS & open grassland	Potential habitat but no occurrence in ROI.

Notes: [1]FE = Federally Endangered, FT = Federally Threatened, SE = State Endangered, ST = State Threatened
[2]Primary sources are MCB Camp Pendleton (2011, 2012a) and DET Fallbrook (2006, 2012).

Southern California Steelhead

SCS exhibit one of the most complex suites of life history traits of any salmonid species. Individuals may exhibit anadromy (meaning they migrate as juveniles from fresh water to the ocean, and then return to spawn in fresh water) or freshwater residency (meaning they reside their entire life in fresh water). Resident forms are usually referred to as "rainbow" or "redband" trout, while anadromous life forms are termed "steelhead." Few detailed studies have been conducted regarding the relationship between resident and anadromous SCS and as a result, the relationship between these two life forms is poorly understood. SCS typically migrate to marine waters after spending two years in fresh water. They then reside in marine waters for typically 2 or 3 years prior to returning to their natal stream to spawn as 4- or 5-year-olds. Unlike other Pacific salmon, SCS are iteroparous-capable of spawning more than once before they die. However, it is rare for SCS to spawn more than twice before dying, and most that do so are female. SCS adults typically spawn between December and June (NOAA Fisheries 1997). Depending on water temperature, SCS eggs may incubate in "redds" (nesting gravels) for 1.5 to 4 months before hatching as "alevins" (a larval life stage dependent on food stored in a yolk sac). Following yolk sac absorption, young juveniles, or "fry", emerge from the gravel and begin actively feeding. Juveniles rear in fresh water from 1 to 4 years, and then migrate to the ocean as "smolts" (NOAA Fisheries 1997).

Basic habitat requirements for SCS are adequate spawning gravel and areas of perennial flow or intermittent flow associated with pools of sufficient depth to avoid lethal temperatures. Shallower pools can be kept below lethal levels if intersected by subsurface flow or if they occur in the vicinity of cold water seeps or springs. Fish in shallower pools likely have higher mortality due to predation by birds and snakes. Deep pools able to thermally stratify likely provide the best in-river rearing potential in the absence of predatory fish.

Based on a study of SCS in Santa Barbara County (Stoecker 2002), a minimum water depth of 7 in (18 cm) is considered necessary for successful migration of adult SCS; however, the distance traveled through shallow water should be considered, with long stretches potentially impeding upstream movement. The maximum jump speed of SCS has been reported as 12 ft/second. In order to jump upstream of a barrier, the pool depth at the base of the barrier would need to be at least 1.25 times the height of the barrier. For example, a 4-ft (1.2 m) barrier would need to have a minimum of a 5-ft (1.5-m) deep pool at its base to be passable (Stoecker 2002).

The southern California evolutionarily significant unit (ESU) of the SCS was federally-listed as an endangered species by the NOAA Fisheries on 18 August 1997 (NOAA Fisheries 1997) and by the USFWS on 17 June 1998 (USFWS 1998a). This ESU included streams from the Santa Maria River in San Luis Obispo County, California (inclusive) to and including Malibu Creek in Los Angeles County. On 19 December 2000, NOAA Fisheries issued a proposed rule to extend the current range of listed SCS to include the population of SCS found in San Mateo Creek located in northern San Diego County (NOAA Fisheries 2000a). To assist in the determination of a ruling, the CDFW prepared a report for NOAA Fisheries on SCS in San Mateo Creek (CDFW 2000). On 1 May 2002, the NOAA Fisheries issued a final rule to extend the southern-most range of SCS from its current southern boundary of Malibu Creek to the U.S./Mexico border (NOAA Fisheries 2002). Critical habitat was designated for the original ESU of SCS on 16 February 2000 (NOAA Fisheries 2000b). As the result of a court approved consent decree, NOAA Fisheries issued a final rule effective 30 April 2002 that removed critical habitat designations for 19 salmon and steelhead ESUs including SCS (NOAA Fisheries 2003). On 2 September 2005, the NOAA Fisheries published a final rule designation of critical habitat for the steelhead in California (NOAA Fisheries 2005a). Critical habitat was not proposed for designation on MCB Camp Pendleton because base lands are subject to a qualifying INRMP prepared under Section 101 of the Sikes Act (16 USC 670a) (NOAA Fisheries 2005a). On 5 January 2006, NOAA Fisheries concluded that the SCS distinct population segment (DPS) is in danger of extinction throughout all or a significant portion of its range, and listed the SCS DPS as an endangered species. The SCS DPS includes all naturally spawned populations of SCS below natural and manmade impassable barriers in streams from the Santa Maria River, San Luis Obispo County (inclusive) to the U.S.-Mexico Border. This DPS does not include any artificially propagated SCS stocks that reside within the historical geographic range of the DPS (NOAA Fisheries 2006).

Major factors affecting SCS populations are urbanization and other watershed disturbances, blocked access to headwater spawning and rearing areas, and partial and total dewatering of streams by water diversions and groundwater pumping (McEwan and Jackson 1996). Additionally, increased soil erosion, loss of riparian vegetation, water pollution, and introduced predators and competitors are affecting the SCS population.

SCS (those occurring south of San Francisco Bay) were formerly found in coastal drainages as far south as the Santo Domingo River in northern Baja California and were present in streams and rivers of Los Angeles, Orange, and San Diego Counties (McEwan and Jackson 1996). In 1946, Hubbs reported SCS making runs in San Mateo, San Onofre, and San Juan creeks and in the San Diego, San Luis Rey, and Tijuana rivers of Orange and San Diego Counties (McEwan and Jackson 1996). SCS presence was documented in San Onofre Creek through the early 1950s (Boughton *et al.* 2005; Lang *et al.* 1998). Presently, the species distribution extends south to at least San Mateo Creek on MCB Camp Pendleton. SCS was thought to be extirpated from much of its historic range in southern California; in fact, the San Mateo Creek population had previously been classified by some researchers as extinct (Nehlsen *et al.* 1999). In 1997, the first reoccurrence of a juvenile SCS was observed in San Mateo Creek, indicating a colonization event by a supposedly extinct population (NOAA Fisheries 2005b). The colonization persisted as of 2001, although estimated numbers appeared to be declining at that time (Boughton *et al.* 2005). Results of genetic analysis determined that the small population inhabiting the San Mateo Creek was the result of two spawning pairs (NOAA Fisheries 2005b). With the exception of the recent SCS observations in San Mateo Creek and Topanga Creek, where occurrence is sporadic and in extremely low numbers, SCS are almost completely extirpated from coastal watersheds south of Malibu Creek.

There is limited documentation regarding the population of steelhead in the SMR, with early sightings being purely anecdotal. Interviews with citizens of Orange and San Diego counties were conducted and revealed rough eyewitness accounts (in most cases unpublished) of SCS in the SMR from the 1900s (Sleeper 2002; Titus *et al.* 2003; Swift *et al.* 1993). In May 1939, the University of Michigan collected what was identified as a juvenile steelhead/rainbow trout from the lower river for its zoological museum collection (Swift *et al.* 1993). As late as 1958, there were stated observations of steelhead near the mouth of the SMR (USFWS 1998a). It is believed that adult steelhead may have ascended the SMR into the 1970s (Higgins 1991).

The CDFW has planted hatchery rainbow trout in portions of the SMR as recently as 1984, but Higgins (1991) saw no evidence of a naturalized population resulting from these plants. De Luz Creek, a tributary to the SMR, has also received CDFW plants of hatchery rainbow trout. A comprehensive survey of the SMR drainage was conducted over a 3-year period, from the fall of 1997 through the spring of 2000, with the objective of exhaustively establishing the extent of the distribution of native and exotic fish species. SCS were not reported among the eleven species of fish (two native species and nine introduced species) found within the SMR (Warburton *et al.* 2000). Surveys conducted in 2001 did not reveal any juveniles during a spot check of the best occurring habitat in the SMR or associated tributaries (Boughton *et al.* 2005). It has been theorized that flow conditions in the SMR have been sufficient to support populations since at least the 1980s, with the exception of several individual dry years, but this species has not populated the river (USFWS 1998a).

Recently, NOAA Fisheries reported that a tissue sample obtained from a trout captured in the SMR during the spring of 2009 was identified through genetic testing to be of wild steelhead ancestry with no indication of hatchery origin (NOAA Fisheries 2010). Although genetic testing of the tissue sample positively identified the captured trout to be of wild steelhead ancestry, an otolith sample was not taken which would have confirmed whether the fish was an offspring of wild native resident trout or wild steelhead which had migrated upstream (Kalish 1990; Volk *et al.* 2000).

Potential SCS habitat has been identified in several attempts to classify areas that may be appropriate for re-colonization or re-introduction, and several areas at or near MCB Camp Pendleton have been evaluated. San Mateo Creek is presumed to contain habitat for SCS passage between upstream spawning and rearing areas (off-MCB Camp Pendleton) and the ocean. Although currently unoccupied, there are areas of potential SCS habitat on MCB Camp Pendleton. The largest areas of unoccupied potential SCS habitat in MCB Camp Pendleton occur within the middle fork of San Onofre Creek and mid to upper reaches of the San Mateo Creek north-east of the fork nearest to the coastline (Lang *et al.* 1998; Boughton and Goslin 2006). The largest amount of high quality potential spawning habitat (presence of spawning gravel) on base occurs in the San Mateo Creek between Range 313A and the Telega Road crossing (Lang *et al.* 1998). Small amounts of potential habitat also occur on Roblar Creek (a SMR tributary) and the upper SMR in the reach between Fallbrook and Temecula; if occupied by SCS, these areas would potentially act as a migration corridor to habitat off base (Lang *et al.* 1998; Boughton *et al.* 2006; Warburton *et al.* 2000). All of the potential habitat on base is located in basins categorized as having unreliable migration opportunities, and therefore is not of the highest value in terms of potential long-term

SCS habitat (Boughton *et al.* 2006). Although critical habitat designations have varied though the years for the southern populations, the rivers and creeks on MCB Camp Pendleton have not been included. Regardless, staff at MCB Camp Pendleton observe practices to minimize disturbance to SCS if observed.

Considering past occurrences and the habitat present in the action area, the likelihood of occurrence of SCS in the SMR is very low. Accounts of a small population in the San Mateo Creek are limited to one small area that is not located in or near the action area. In general, potential habitat for re-colonization at sites on MCB Camp Pendleton, although identified, is patchy and changes with shifting environmental conditions.

SCS have recently been documented in the San Luis Rey River, the mouth of which is within 1 mi (1.6 km) of the mouth of the SMR. The final Recovery Plan for the SCS identifies both the SMR and the San Luis Rey River as Core 1 Areas, meaning highest priority for immediate actions to promote population recovery in those streams (NOAA Fisheries 2012).

The occurrence of SCS in close proximity to the SMR, and the apparent lack of strong fidelity by SCS to their natal streams supports the likelihood that SCS adults might attempt to enter the SMR under favorable conditions. A recent study that included site surveys and surface water modeling of the Lower SMR found that conditions supporting the potential for SCS migration occur in above average and very wet hydrologic conditions (Reclamation *et al.* 2012). This study determined that a minimum of 166 cfs was required to support upstream migration by adult SCS. However, the riprap located on the downstream side of the existing sheet pile weir does not support an adequate pool depth to allow SCS to jump over the existing weir (Reclamation e*t al.* 2012).

Tidewater Goby

The TWG was federally-listed as endangered on 4 February 1994 (USFWS 1994a). A recovery plan has been prepared describing the conservation needs of the species, including the protection of populations in the coastal lagoons of MCB Camp Pendleton (USFWS 2005a). All streams supporting TWG on MCB Camp Pendleton are recognized as essential but have been exempted from critical habitat designation due to the protection to the species which is provided through the INRMP and the Estuarine and Beach Conservation Plan and Riparian/Estuarine BO (USFWS 1995a, 2008b; MCB Camp Pendleton 2011). MCB Camp Pendleton’s conservation goal for TWG is to maintain quality habitat through conservation, silt removal, control of exotic predatory fish species, research, and monitoring.

TWG are small (usually less than 2 in [5 cm] long) fish which live and reproduce in coastal lagoons. TWG are benthic (living on the bottom substrate) and inhabit shallow waters (less than 3 ft [1 m] deep) that are slow moving to still but not stagnant (Irwin and Soltz 1984). The coastal lagoons where these fish reside are typically closed off from the ocean by sand bars during summer. The substrate is generally sand, mud, and gravel with abundant emergent and submerged vegetation (Moyle 1976). In addition to living in coastal lagoons, these fish have been documented moving upstream, in one case more than 5 mi (8 km) (Irwin and Soltz 1984). TWG regularly range up into freshwater in summer and fall as sub-adults and adults, although there is little evidence of reproduction in upper areas. Threats to this species include loss of estuarine habitat, degradation in water quality, and predation by non-native fish species.

Unlike other goby species in California, TWG do not exhibit a marine life history phase (Swift *et al.* 1989). This limits the frequency of genetic exchange between populations and lowers the potential for recolonization of a habitat once a population has been lost. Recolonization, however, has been documented to occur at distances up to 12 mi (19 km) from a source population (Lafferty *et al.* 1996).

Flood events may function as agents of dispersal by washing gobies out of lagoons into coastal current patterns (Lafferty *et al.* 1999).

This species formerly inhabited lower stream reaches and coastal lagoons from Del Norte County to San Diego County (Lee *et al.* 1980). Of the 13 historic sites in Orange and San Diego counties, only 8 populations of TWG remained as of 2000, all within MCB Camp Pendleton (USFWS 2000a). TWG populations at MCB Camp Pendleton fluctuate seasonally. Localized extirpations and recolonization events may occur between lagoons on MCB Camp Pendleton (MCB Camp Pendleton 2011). Within southern California, the San Mateo, San Onofre, and Las Flores creeks are considered by the USFWS the largest and most persistent populations of TWG in the region, potentially serving as important source populations for dispersal into ephemeral estuaries and streams in the area (MCB Camp Pendleton 2011). TWG are also found within the lower reaches of Hidden, Aliso, French, and Cocklebur creeks. All of these creeks have brackish lagoons which are infrequently breached by floods and closed to ocean tidal influence by sand berms most of the time.

TWG were last collected in the SMR in 2000 and have apparently been extirpated, not having been detected in 19 subsequent surveys conducted in the SMR Estuary from June 2002 through November 2012 (USFWS 2005a; Lafferty 2012). A plausible explanation for the elimination and continued absence of TWG from the SMR is the abundance of predatory fish species coupled with the prevailing open condition of the estuary in recent years. As a result, the brackish-estuarine zone that could otherwise be inhabited by TWG in the SMR is less subject to the extreme conditions that occur in seasonally closed, small lagoons, and thus more accessible and hospitable to marine predators than are the other MCB Camp Pendleton lagoons. Predatory marine-estuarine species have regularly been documented in surveys of potential TWG habitat in the SMR, to a much greater extent than in the lagoons inhabited by TWG (Lafferty 2010). Introduced predatory centrarchids (sunfish) that are established upstream can also move down into the estuary when conditions allow (USFWS 2005a). Hence, although recolonization of the SMR by TWG flushed downstream from nearby populations during storms is possible (USFWS 2005a), predation could still prevent the reestablishment of the species in the SMR. At present, the SMR Estuary is considered potential but unoccupied habitat for the species.

Arroyo Toad

The ARTO is a small toad, light-olive green or grey to tan on the back, with dark-spotted, warty skin. The underside is white or buff and without dark blotches or spots. A light colored, V-shaped stripe crosses the head and eyelids, and the anterior portion of the oval parotoid glands (just behind the eyes) are pale (MCB Camp Pendleton 2011). ARTOs require shallow, slow moving streams for breeding and early development, and use the surrounding riparian habitat, especially marginal zones above and between stream channels for foraging, resting, and dispersal up- and downstream. During the non-breeding season, generally late fall and winter (Sweet 1992), they disperse more widely into adjacent uplands. Reproduction is dependent on availability of shallow, still, or low flow pools in which breeding, egg laying, and larval development occur. These habitat requirements are largely determined by natural hydrological cycles and scouring events. Breeding and larval development within MCB Camp Pendleton typically occur between March and July, depending upon weather conditions. Female ARTO produce a single egg clutch each year. Following fertilization, toad larvae (tadpoles) emerge at 12 to 20 days and persist in breeding pools for the next 65 to 85 days. Newly metamorphosed toads may remain near the breeding pools for a few weeks to several months before dispersing into upland habitat for the winter months. As with most amphibians, ARTO survivorship during the development stage is reportedly very low. The ARTO currently occupies an estimated 25% of its previous habitat within the United States. Contributing factors in this decline include extensive habitat loss, human modification to water regimes, and introduction of non-native predators. Specific threats to ARTO populations include alteration of natural hydrology, increased siltation and decreased water quality due to increased upstream development in urban areas (e.g., Fallbrook) (USGS 2006b).

The ARTO was listed as federally endangered on 16 December 1994 (USFWS 1994b). Final critical habitat was designated in 2005. All lands owned or controlled by MCB Camp Pendleton are excluded from critical habitat designation under Section 4(b)(2) of the ESA for economic reasons and Section 4(a)(3) of the ESA due to the effectiveness of the INRMP in providing for the conservation of this species (USFWS 2005b; MCB Camp Pendleton 2011). A recovery plan is available for this species (USFWS 1999).

Historically, ARTO inhabited the length of streams from central California into northwestern Baja California, Mexico. On MCB Camp Pendleton, ARTO occur in the SMR and its tributaries, De Luz and Roblar creeks; in San Onofre Creek and its tributary, Jardine Canyon; and San Mateo Creek and its tributary, Talega Creek. ARTO on MCB Camp Pendleton may represent some of the largest remaining populations and the only one occurring on an undammed major river system within southern California (MCB Camp Pendleton 2011).

ARTO occur in the action area along the SMR from the vicinity of the Stuart Mesa Bridge to the upstream limits of the action area in the OSMZ, in both Sandia Creek and the mainstem of the SMR and including the DET Fallbrook border along the SMR. Areas east and west of the river on MCB Camp Pendleton are within a buffer area of suitable habitat that may be used for foraging, burrowing, and dispersal (refer to maps in Appendix C-1). Habitat for ARTO in project construction areas occurs at the location of the diversion weir, O'Neill Ditch, percolation ponds, and portions of the production and gallery wells and associated conveyance pipeline/access roads (refer to maps in Appendix C-1). ARTO were observed along Sandia Creek in the OSMZ (Appendix C-2).

In 2002, a focused ARTO survey was done along the lower portion of the SMR which revealed ARTO occurring almost continuously proceeding upstream from about 600 ft (183 m) east (inland) of the Stuart Mesa Bridge upriver to the vicinity of the MCAS Camp Pendleton (the limit of the survey), with the exception of a 1.6-mi (2.6-km) stretch of dense vegetation in the narrows downstream of Ysidora (Konecny 2002). However, ARTO historically have occurred in that area (MCB Camp Pendleton 2011). Breeding season surveys conducted annually from 1996-2000 and 2003-2011 (Turschak *et al.* 2008; Brehme *et al.* 2012) have consistently found ARTO where surface water is present along the river, from the Stuart Mesa Bridge to the community of Fallbrook limits. The downstream limit of ARTO distribution along the river is approximately at the Stuart Mesa Bridge (MCB Camp Pendleton 2011), presumably because of tidal marine influence and increasing salinity below that point.

California Least Tern

The CLTE is the smallest North American tern. They are white with gray back and wings, a black crown, white forehead, and a slightly forked tail. Habitat preferences are seacoasts, beaches, bays, estuaries, lagoons, lakes, and banks of rivers and lakes. CLTE are late winter through late summer residents in the area. On MCB Camp Pendleton, nesting area protection measures are implemented beginning 1 March and ending 15 September (MCB Camp Pendleton 2011), which overlaps but may not coincide exactly with tern presence and breeding. The terns are inshore foragers and surface-feeding fish eaters and are opportunistic in their search for prey, eating fish that are small enough to catch, including anchovies and smelt (*Atherinops* spp.). There is some indication that piers, docks, sea walls, and other artificial structures along the shoreline may attract CLTE, as these structures act as artificial reefs for juvenile schooling fish, which terns feed upon. CLTE frequently forage in the open waters of the ocean (NAVFAC SW 1999).

The USFWS designated CLTE as endangered in June 1970 (USFWS 1970). No critical habitat has been designated for this species and the recovery plan has been revised several times (USFWS 1980, 1985a).

Fewer than 700 pairs remained in 1973 along the coast from San Francisco south to San Diego (National Audubon Society 1994); however, populations have been increasing range-wide and as of 2006 there were 6,897 breeding pairs (Conkle 2006). Tern populations have increased on MCB Camp Pendleton due to focused management strategies and specific management practices for protecting CLTE and its breeding habitat. Programmatic instruction, habitat protection and enhancement measures outlined in the Estuarine and Beach Ecosystem Conservation Plan guide the management of breeding habitat and foraging areas. Threats are largely attributable to loss of nesting and foraging habitat (e.g., from construction of the Pacific Coast Highway, beach homes, and other shoreline development) and disturbance to breeding colonies, including dredging, filling, water pollution, and domestic and wild animals (MCB Camp Pendleton 2011).

CLTE were first documented nesting on the base in 1969, and has been documented continuously since then. In cooperation with the U.S. Department of the Interior (USDI), the base set aside a portion of the beach near the mouth of the SMR as a tern nesting area. On MCB Camp Pendleton, CLTE also nest on the salt flats of the SMR Estuary. There were approximately 150 total pairs of CLTE documented in all known locations on the base in 1969. There were 1,422 pairs documented in 2007, with the largest colony adjacent to the SMR. This colony had 91% of nests found on MCB Camp Pendleton (Foster 2008a). Statewide, MCB Camp Pendleton continues to have the largest nesting colony, which in 2007 represented 22% of California's nesting pairs and 14 to 16% of the season's fledglings (Foster 2008a). There were 1,526 nests documented in 2011 (the number of pairs ranged from 1,014-1,510), with the largest colony adjacent to the SMR. Statewide, MCB Camp Pendleton continues to have the largest nesting colony, which in 2011 represented 24% of California's nesting pairs and 9 to 10% of the season's fledglings (Marschalek 2012; Schuetz *et al.* 2012). In 2012, it was estimated that 1,231 pairs laid 2,153 eggs in 1,245 nests (Fournier *et al.* 2013a).

On MCB Camp Pendleton, CLTE nesting sites are located on the beaches at the mouths of the SMR (Blue Beach), French and Aliso creeks (White Beach), and at the mouth of Las Flores Creek (Red Beach), as well as on the salt flats of the SMR Estuary (MCB Camp Pendleton 2011). Protected nesting areas at the mouth of the SMR are shown on Threatened and Endangered Species figures in Appendix C-1. It should be noted that individual nest sites also occur outside of this area.

At the SMR Estuary nesting grounds, periodic floods create a somewhat unstable habitat. About 12.2 acres (4.9 hectares) are available for nesting on the north side of the beach at the mouth of the estuary. At this nest site, about 195.5 acres (79.1 hectares) of salt flats are present, but only about 38.3 acres (15.5 hectares) are suitable for nesting (Foster 2008a). There is no fencing, but passage of training vehicles and human foot traffic is tightly regulated in accordance with the Riparian/Estuarine BO (USFWS 1995a). Monitoring grids are also present, and efforts to control ice plant are ongoing. During nesting season, the nearby ocean waters and estuary are used for foraging (MCB Camp Pendleton 2011).

The exclusion fencing for least tern and snowy plover nest protection at MCB Camp Pendleton has been successful in reducing human intrusion and predator access to a portion of the nesting habitat. However, many nests occur outside of the fenced area, and predation continues to be a significant source of mortality to chicks (Foster 2008a). Tidal and storm-related flooding, which can wash over nests that are too close to the water, also influence nesting success. CLTE may shift nesting locations in response to changes in flooding or substrate, but from the time the eggs have been laid until fledging occurs, the eggs and nestlings are vulnerable to such events.

Snowy Plover

The SNPL is a small shorebird (length 6 in [15 cm]), pale in color, with a thin dark bill, dark or grayish legs, partial breast band and a dark ear patch. Females and juveniles may be confused with piping plover (*Charadrius melodus*) but have a much thinner bill and darker legs. They typically forage above the water line of coastal beaches and lagoons, gathering invertebrates (flies, beach hoppers, etc.) from the sand surface, stranded vegetation, marine-mammal carcasses, or low foredune vegetation (USFWS 2005c). SNPL regularly run back and forth short distances between nesting sites in the foredunes, where they are well camouflaged, and foraging areas along the high-tide line or at the water's edge. The SNPL breeding season occurs from 1 March through 15 September. SNPL nest in foredunes and salt-flat habitats, and foraging occurs from the foredunes and flats down to the water's edge.

On MCB Camp Pendleton, SNPL nesting has been documented in many locations along approximately 9 mi (15 km) of coastline, from the southern part of Beach Section B (Gold Beach - south of San Onofre State Beach), to the south end of Beach Section H (Blue Beach - which spans the mouth of the SMR) (MCB Camp Pendleton 2011; Foster 2008b). The SMR Estuary, including the beach immediately north and south of the river mouth and the salt flats inside the river mouth, has supported the largest number of nests on the base (MCB Camp Pendleton 2011; Foster 2008b). Wintering and migratory SNPL also occur on MCB Camp Pendleton beaches prior to the start of breeding. Primary factors contributing to the decline and listing of the SNPL are predation, loss of habitat, and anthropogenic disturbance.

The SNPL was listed by the USFWS as threatened on 5 March 1993 (USFWS 1993a). A revised final rule designating critical habitat was published in 2012 (USFWS 2012). Citing the effectiveness of protective and conservation measures implemented by MCB Camp Pendleton as part of its INRMP, including the Beach and Estuarine Conservation Plan and related Riparian/Estuarine BO (USFWS 1995a; MCB Camp Pendleton 2011), USFWS exempted all lands on MCB Camp Pendleton from critical habitat designation (USFWS 2012). The recovery plan for the SNPL was finalized in 2007 (USFWS 2007a).

Programmatic instructions for avoidance and minimization of impacts to the species and its habitat, especially during breeding season, are provided in the Estuarine and Beach Conservation Plan and Base Order P3500.1M (*Range and Training Regulations*). SNPL nesting on MCB Camp Pendleton beaches is monitored every year. Detected nest locations are marked for avoidance with orange carsonite "off limits" markers. Undetected/unmarked nests are still protected and would be avoided under the ESA. Additional management details and survey information for SNPL are contained in the MCB Camp Pendleton INRMP (MCB Camp Pendleton 2011).

Two main breeding sites exist for SNPL in San Diego County: MCB Camp Pendleton and the Silver Strand (MCB Camp Pendleton 2011). Other breeding sites include Batiquitos Lagoon, San Elijo Lagoon, Mariner's Point (Mission Bay), Sweetwater River Estuary, Chula Vista Wildlife Reserve, and the Tijuana River mouth (MCB Camp Pendleton 2011). Within San Diego County from 1994 to 1997, 72 to 87% of SNPL nests were located on federal properties (MCB Camp Pendleton 2011).

MCB Camp Pendleton is one of the most important SNPL breeding sites in southern California. Since 1994, MCB Camp Pendleton has been performing yearly surveys on the base for SNPL. Nesting locations occur from the SMR salt flats and foredune habitat and are widely dispersed northward as far as San Onofre State Beach (MCB Camp Pendleton 2011). The nesting population on MCB Camp Pendleton rose dramatically from 43 nests in 1994 to 212 nests in 2004; the nesting population has since declined to 124 nests in 2007 (Foster 2006, 2008b; MCB Camp Pendleton 2011). The number of fledgling per nest increased from 0.4 during 1994-1998 (Collier and Powell 2000) to more than 0.6 in 2003 and 2004 (Foster 2006), although there has been a decrease since 2004, with 0.3-0.4 fledgling per nest in 2007 (Foster 2008b). In 2012, it was estimated that a minimum of 94 pairs laid 931 eggs in 396 nests (Fournier *et al.* 2013b).

Most beaches on MCB Camp Pendleton are utilized by wintering and migratory SNPL. As described by MCB Camp Pendleton wildlife biologists (MCB Camp Pendleton 2007b), during the winter, SNPL aggregate in large groups at the north end of Del Mar beach, at the mouth of the SMR, at Cocklebur pond, and small groups have been seen at Red Beach. They also utilize areas between the crest of the beach and the foredunes for foraging at low tide. SNPL start marking out territories and making nest scrapes in January and has laid eggs as early as February 22. If their scrapes are disturbed they will move to another location and try again.

Light Footed Clapper Rail

The LFCR was federally-listed as endangered in October 1970 and the first final revision of the recovery plan was approved in 1985 (USFWS 1985b). There is no designated critical habitat for the LFCR. The favored habitat for this non-migratory species is cordgrass (*Spartinia foliosa*) (USFWS 1985b). Habitat can also include vegetation varying from salt marshes with cordgrass and pickleweed (*Salicornia virginica*) to freshwater marshes dominated by cattails (*Typha* spp.) and bulrushes with occasional intermixed willows (*Salix* spp.) (MCB Camp Pendleton 2011).

The LFCR was extirpated from most of the coastal salt marsh habitats it formerly occupied owing to the destruction and degradation of its habitats. Annual surveys have been conducted in potential LFCR habitat in California since 1980 and these provide the best data on population size, habitat occupancy, and long-term trends (Zembal *et al.* 2011). Its population in California reached an apparent minimum of 163 pairs, with LFCRs found in only eight marshes, in 1989 (Zembal *et al.* 2011). Since then, the population has generally increased, although with marked fluctuations, with 441 pairs in 21 marshes detected during the most recent census in 2011. This is attributed to the successful protection and management of the state's remaining coastal salt marshes (Zembal *et al.* 2011).

The SMR Estuary has been surveyed almost every year since 1980, and other potential locations on MCB Camp Pendleton, including San Mateo Creek, Las Flores Creek, and Cocklebur Lagoon, have also been surveyed in most years (Zembal *et al.* 2011). An independent survey of additional areas covering all potentially suitable habitat on MCB Camp Pendleton was conducted in 2011 by HDR and Konecny Biological Services (2011). The SMR Estuary is the only location on MCB Camp Pendleton where LFCR have been documented. Annual surveys show at least one pair of birds present in the estuary near the SMR mouth during most years, with a second pair of birds documented in brackish or freshwater marsh areas further upstream between the railroad tracks and Stuart Mesa Road (Zembal *et al.* 2011; HDR and Konecny Biological Services 2011). During July 2009, a female LFCR with three chicks was observed in the estuary (MCB Camp Pendleton 2009b).

MCB Camp Pendleton protects the LFCR and its habitat through the Estuarine and Beach Conservation Plan and other measures implemented as a result of the Riparian/Estuarine BO (MCB Camp Pendleton 2011).

Southwestern Willow Flycatcher

The SWFL is one of three subspecies of willow flycatcher, and the only one which nests on MCB Camp Pendleton. Other subspecies of willow flycatcher are listed as endangered by the state of California and can occur as transients on MCB Camp Pendleton (Howell and Kus 2009). The SWFL is a neotropical migrant which nests in riparian scrub and woodland habitats. It arrives at MCB Camp Pendleton for the breeding season as early as 15 March and may be present through 31 August (MCB Camp Pendleton 2011). Its breeding range extends from southern California, east to western Texas, north to extreme southern Utah and Nevada, and south to extreme northern Baja California, Mexico. This flycatcher inhabits riparian areas along rivers, streams, and other wetlands. It nests in native, mixed and non-native vegetation (i.e., tamarisk) depending on the site. Low elevation to mid-elevation sites vary widely in structure, with average canopy ranging from 13 ft to 98 ft (4 m to 30 m). Patch structure is generally characterized by trees of different size classes, although some sites are dominated by monotypic willow stands (Finch and Stoleson 2000).

Nesting SWFLs prefer willow and mulefat thickets and invariably nest near surface water or saturated soil, which increases the production of flying insects, the primary food for SWFL. Threats to the species are habitat loss, human disturbance, and nest parasitism by cowbirds (MCB Camp Pendleton 2011). The species is also threatened by random fluctuations and inbreeding effects in small, localized breeding populations (USFWS 2011b).

The SWFL was federally-listed as an endangered species by the USFWS on 27 February 1995 (USFWS 1995b). A final rule designating critical habitat was issued on 3 January 2013 (USFWS 2013). In the final rule, lands owned by MCB Camp Pendleton and DET Fallbrook were exempted from the designation because these areas are managed through each base's INRMP and the MCB Camp Pendleton Riparian Conservation Plan (DET Fallbrook 2006, MCB Camp Pendleton 2011, USFWS 1995a). However, critical habitat is still designated along the SMR floodplain upstream from the DET Fallbrook boundary to the county line, including approximately 223 acres (90 hectares) within the proposed OSMZ. As described by USFWS in the Final Rule designating critical habitat this segment upstream from MCB Camp Pendleton maintains a diversity of riparian vegetation used by dispersing and migrating SWFL and the ability to develop breeding habitat for population growth or discovery of undetected territories. A recovery plan is available for this species (USFWS 2002).

The total population of SWFL is relatively small, consisting of approximately 70 pairs at the time the species was listed, and numbers have not appreciably increased since that time (USFWS 2005e; Howell and Kus 2009).

Within the action area, habitat suitable for SWFL is found along the riparian corridor of the SMR from the upstream boundary of the OSMZ, downstream across the common boundary of DET Fallbrook and MCB Camp Pendleton, and continuing downstream to approximately the Stuart Mesa Road bridge. Riparian habitat surrounding Lake O'Neill and continuing up Fallbrook Creek to the boundary with DET Fallbrook is also suitable and has been included in breeding season surveys.

Survey data for SWFL reveal SWFL individual and nest locations in riparian habitat along the middle part of the SMR, including the river floodplain from the airfield to Pueblitos Canyon and adjacent riparian habitat which is more than 300 ft (90 m) from the project area (Appendices C-1) (MCB Camp Pendleton 2012c; Howell and Kus 2009, 2011). These are the only areas known to have supported breeding by SWFL anywhere on MCB Camp Pendleton, although a single territorial male was observed at San Mateo Creek in 2011 (Howell and Kus 2011). SWFL immigration/emigration between MCB Camp Pendleton and locations on the San Luis Rey River, has been documented (Howell and Kus 2011), suggesting the mixing and interdependence of these two populations. Transient willow flycatchers have been observed in previous years, though not in 2011, along several other creeks on MCB Camp

Pendleton, but these birds have been considered members of the other non-federally-listed subspecies (Howell and Kus 2009).

During 2011, the SWFL population on MCB Camp Pendleton had declined to the smallest number of birds detected since systematic surveys began in 2000, and consisted of only six breeding male and female SWFLs and one bird of unknown sex. The reduction in numbers is attributed to a statewide decline which has affected other breeding locations as well (Howell and Kus 2009, 2011).

Although the SWFL was not observed in the OSMZ during 2008 surveys, the SMR floodplain is designated critical habitat and Sandia Creek appears to support suitable habitat as well (Appendix C-2). This segment maintains a diversity of riparian vegetation used by dispersing and migrating SWFL and has the ability to develop breeding habitat for population growth or discovery of undetected territories (USFWS 2013).

Least Bell's Vireo

The LBVI is a small migratory songbird that arrives at MCB Camp Pendleton as early as mid-March and leaves for its wintering grounds in Baja California in August. The breeding season is from 15 March through 31 August. LBVI primarily inhabits dense willow-dominated riparian habitats with lush understory vegetation. LBVI forage and nest primarily in willows. The decline of LBVI was mainly due to loss of riparian habitat and nest parasitism by cowbirds (USFWS 1998b).

The USFWS listed the LBVI as an endangered species on 2 May 1986 (USFWS 1986). A draft recovery plan is available for this species (USFWS 1998b). Critical habitat for LBVI was designated in six southern California counties on 2 February 1994 (USFWS 1994c). MCB Camp Pendleton was excluded from this designation due to a MOU with the USFWS in response to the ongoing management of LBVI and riparian habitat on base. Management for LBVI is currently addressed in the INRMP (MCB Camp Pendleton 2011), including the Riparian Habitat Conservation Plan and Riparian BO (USFWS 1995a). A significant portion of critical habitat Location E (SMR) is located within the OSMZ (USFWS 1994c).

Survey data from 1978 to 2011 indicate that LBVI dramatically increased in abundance across MCB Camp Pendleton through 1998, after which numbers have trended up or down from year to year without a consistent long-term pattern. As of 2011, the base population comprised 784 territorial males, 57% of which were confirmed as paired, and 19 transients. This represents a fairly sharp decrease from the total of 1,068 territorial males observed in 2010, but is still larger than the numbers observed from 2006 through 2008 (Lynn and Kus 2011). Lynn and Kus (2011) note that the MCB Camp Pendleton LBVI population benefitted greatly from the base's management practices, especially the protection and restoration of riparian habitat and cowbird control, but in recent years has tended to increase or decrease in parallel with statewide trends.

Base-wide survey data for LBVI show the abundance of LBVI in riparian habitat along the SMR (Appendix C-1) (MCB Camp Pendleton 2012c). Up to 65 LBVI territories (64 on MCB Camp Pendleton [2010] and 1 on DET Fallbrook [2011]) (possibly include a small number of transients) were located within the action area and up to 399 LBVI territories were located within the 100-year floodplain downstream of the diversion weir (MCB Camp Pendleton 2011; Lynn and Kus 2011). The SMR has consistently supported more than half of the total LBVI population on MCB Camp Pendleton over the years (Lynn and Kus 2011).

On DET Fallbrook, 2010 surveys indicate 2 LBVI territories within the action area along Fallbrook Creek on DET Fallbrook (DET Fallbrook 2012). Seven nesting pairs of LBVI were found in surveys of the OSMZ during 2008 (Appendix C-2). The OSMZ also contains a productive riparian habitat surrounding

Sandia Creek. As noted previously, the 100-year floodplain of the river encompasses 223 acres (90 hectares) of riparian habitat that is considered suitable for SWFL, and also appears to be suitable for LBVI breeding, foraging, and dispersal. Another 37 acres (15 hectares) of riparian habitat occurs along Sandia Creek within the OSMZ (Table 3.3-2; Appendix C-2).

California Gnatcatcher

CAGN are small gray songbirds that are obligate, permanent residents of CSS vegetation, but they will make limited use of adjacent habitats outside of the breeding season. The breeding season extends from 15 February through 31 August, with peak nesting activities occurring from mid-March through May, as identified by the USFWS Carlsbad office. CAGN usually begin to molt into breeding plumage in early February. Males select the site for nesting, and nest building begins 2 to 4 weeks after the molt. Eggs are incubated for 12 days, and nestlings fledge at 13 days. Young remain with their parents for 3 to 5 weeks after fledging. If there is persistent predation of eggs and young, up to 10 nests can be constructed during the breeding season.

The USFWS designated CAGN as threatened in March 1993 (USFWS 1993b). Currently there is no recovery plan for CAGN. Since the time of listing, MCB Camp Pendleton has developed several conservation management programs and policies to protect CAGN.

Critical habitat was designated in 2000 (USFWS 2000b), but was remanded for reconsideration based on litigation. The USFWS re-proposed critical habitat on 24 April 2003 (USFWS 2003). On 19 December 2007, the USFWS designated revised final critical habitat for CAGN. All lands on MCB Camp Pendleton and DET Fallbrook were exempted from final critical habitat (USFWS 2007b). MCB Camp Pendleton and DET Fallbrook are currently working cooperatively with USFWS to provided conservation and protection for uplands habitat throughout both bases.

The population of CAGN on MCB Camp Pendleton has expanded greatly with protective management of the species and its habitat under the INRMP (MCB Camp Pendleton 2011). Surveys in 2010 detected approximately 652 nesting pairs of the species on MCB Camp Pendleton, a substantial increase from 2003 but similar to 1998. Under the base’s INRMP and Range and Training Regulations, the removal of, or damage to, CSS is prohibited, and training activities in the vicinity of occupied habitat are required to remain on existing roads during the breeding season.

The CSS vegetation in the vicinity of the diversion weir and O’Neill Ditch and along the bi-directional pipeline provide habitat for CAGN. Previous survey records from 2010 indicate the majority of CAGN presence within the project area occurs along Vandegrift Boulevard and Ammunition Road (Appendix C-1). These figures apply a standard radius (“buffer”) of 500 ft (150 m) from each siting location to conservatively estimate the extent of CAGN territories used by breeding pairs on both MCB Camp Pendleton and DET Fallbrook (MCB Camp Pendleton 2012c; DET Fallbrook 2012).

Data on CAGN distribution indicate that there were 9 CAGN territories located within the action area, with 2 territories on MCB Camp Pendleton (2010 surveys) and 7 territories on DET Fallbrook (2011 surveys) (Appendix C-1) (*Note*: The CAGN territory calculation is modeled after the CAGN effects analysis in the Basewide Utilities Infrastructure BO [USFWS 2010] using a territory size of 5.7 acres, which is the gnatcatcher territory size documented in a similar habitat and environmental conditions). Although CAGN were not observed in the OSMZ during 2008 surveys, apparently suitable CSS habitat exists within the OSMZ (Appendix C-2).

Stephens' Kangaroo Rat

The SKR is a member of a family of burrowing rodents characterized by cheek pouches, long tails, and comparatively long rear legs. SKR occur in three distinct geographic regions: western Riverside County, western San Diego County, and central San Diego County (USFWS 1997b). The western San Diego County distribution extends into lands of MCB Camp Pendleton. SKR inhabit grassland, CSS, and chaparral habitats where vegetative cover is less than 30% and bare ground is abundant (Thomas 1975; O'Farrell and Uptain 1987, 1989; O'Farrell 1997; USFWS 1993c). The species prefers open habitats with patches of bare ground, habitats that are not typically inhabited by other kangaroo rat species. Dense grasses, herbaceous cover, and some non-native species (*Bromus diandrus*) can exclude SKR. SKR has been documented across a variety of soil types, but it is generally less common in clay or rocky soils due to difficulty burrowing through those substrates (USFWS 1997b). The USFWS listed SKR as endangered in 1988 (USFWS 1988). Critical habitat has not been designated.

The largest groups of SKR at MCB Camp Pendleton occur within the vicinity of the 25 Area Combat Town, Range 407 (adjacent to the Zulu Impact Area), and within the 409 Impact Area. Habitat conditions within portions of these areas appear to be maintained through frequent training exercises that keep the habitat open and prevent the establishment of large stands of exotic grasses (*Bromus* spp., *Avena* spp.), and exotic perennials such as sweet fennel (*Foeniculum vulgare*).

SKR has been documented in and around DET Fallbrook. As of 2001 to 2002, occupied SKR habitat was found approximately 0.4 mi (0.6 km) from Ammunition Road, on either side of the road. Previous (1990-1992) field studies had indicated a broader distribution of SKR on DET Fallbrook, including occupied habitat along Ammunition Road in the southern portion of the action area. These earlier studies were conducted after a drought cycle when grasses and ground cover were sparse and conditions favorable to SKR were more prevalent (DON 2008a). A trapping survey conducted in all areas of potentially suitable habitat bordering Ammunition Road in 2004 did not find SKR (DON 2008a).

Based on review of MCB Camp Pendleton and DET Fallbrook data, there is no occupied SKR habitat in any area affected by construction or operations. However, grassland habitat along Ammunition Road is considered potential (unoccupied) habitat as shown in Figure C1-30. Therefore, this species may be affected.

<u>State-Listed Threatened and Endangered Species</u>

The aforementioned federally-listed species are also listed as threatened or endangered, or recognized as species of special concern by the CDFW. One state-listed endangered species which is not federally listed occurs in the action area and is discussed below.

Belding's Savannah Sparrow

The BSSP is a non-migratory subspecies of the savannah sparrow that is endemic to the coast of southern California and northern Baja California. It is a 5.5 in- (14 cm-) long bird, similar to other subspecies of savannah sparrows but it is darker and heavily streaked on the back, breast, and sides. BSSP were listed by the State of California as endangered on 10 January 1974 (MCB Camp Pendleton 2011). No recovery plan or goals have been established for BSSP (Zembal and Hoffman 2002).

The primary habitat of BSSP is tidal marsh, but they are also found in diked, non-tidal marsh areas (USFWS 1998c). BSSP reside year-round in coastal salt marshes from Goleta Slough in Santa Barbara County to northern Baja California. Nesting occurs primarily in dense pickleweed (*Salicornia pacifica*) at the higher elevations of the salt marshes, above the reach of the highest spring tide. BSSP nest from January to August. Statewide, the greatest numbers of BSSP occur in marshes with full tidal flushing as this promotes vigorous growth of pickleweed and prevents habitat from being flooded for prolonged periods – as can occur in non-tidal marshes (Zembal and Hoffman 2010).

A partial statewide survey was conducted in 1973, and the first statewide survey was made in 1977. Since 1986, statewide surveys have been undertaken at 5-year intervals. The latest statewide count was coordinated by CDFW in 2010. The 2010 census resulted in a population estimate of 3,372 pairs of BSSP in 29 marshes. This reflects an increase in the total state population in each 5-year survey since 1991 (Zembal and Hoffman 2010).

The SMR Estuary currently supports the only BSSP population on MCB Camp Pendleton (Zembal and Hoffman 2010). The BSSP population on MCB Camp Pendleton can be quite variable from year to year (MCB Camp Pendleton 2011). The number of territories in the 5-year surveys has ranged from a low of 100 in 2010 which, due to limited access, was estimated by observation from the edge of I-5, to a high of 185 counted in 1996 (Zembal and Hoffman 2010). A deterioration of habitat quality and reduction in numbers of BSSP has been correlated with periods of estuary closure leading to the submergence and destruction of what used to be lush BSSP habitat along the estuary edge (Zembal *et al.* 2006). May 2010 observations suggested that sedimentation had caused a loss of deep water habitat in the estuary, and that 30% of BSSP habitat had been degraded by upland weeds (Zembal and Hoffman 2010).

While BSSP as a state listed species is not covered by NEPA, it does benefit from management activities and programs provided for the LFCR and other estuarine and beach species under MCB Camp Pendleton's Estuarine and Beach Ecosystem Conservation Plan. Current base-wide management practices that directly or indirectly benefit BSSP include, but are not limited to, restoration efforts in estuarine/beach areas that are temporarily disturbed from non-routine maintenance and construction activities, exotic vegetation removal/control, and monitoring stream water quality, flood regimes, and storm event frequency to determine and manage the potential effect on beach and estuarine habitats. Additionally, MCB Camp Pendleton's management program provides programmatic instructions to users of MCB Camp Pendleton that limit activities during breeding seasons and in sensitive resource areas. These programmatic instructions include the requirement for vehicles to remain on existing roads and trails in the vicinity of coastal marshes/lagoons during breeding season, prohibiting foot traffic in all coastal marshes during breeding season and prohibiting foot traffic all year long in the SMR Estuary and the mouth of Cocklebur Canyon. MCB Camp Pendleton grants access to statewide surveyors for BSSP surveys (MCB Camp Pendleton 2011).

<u>Other Special Status Species: Plants</u>

Other special concern plant species, while not state or federally-listed as threatened or endangered, are species that are recognized by the California Native Plant Society (CNPS) as rare or sensitive in California. Six special status plant species potentially occur in the ROI, many of which are found within the OSMZ. Table 3.3-5 summarizes data on the occurrence of these species in the ROI, based on previous data and surveys (see Figure 3.3-2 and Appendices C).

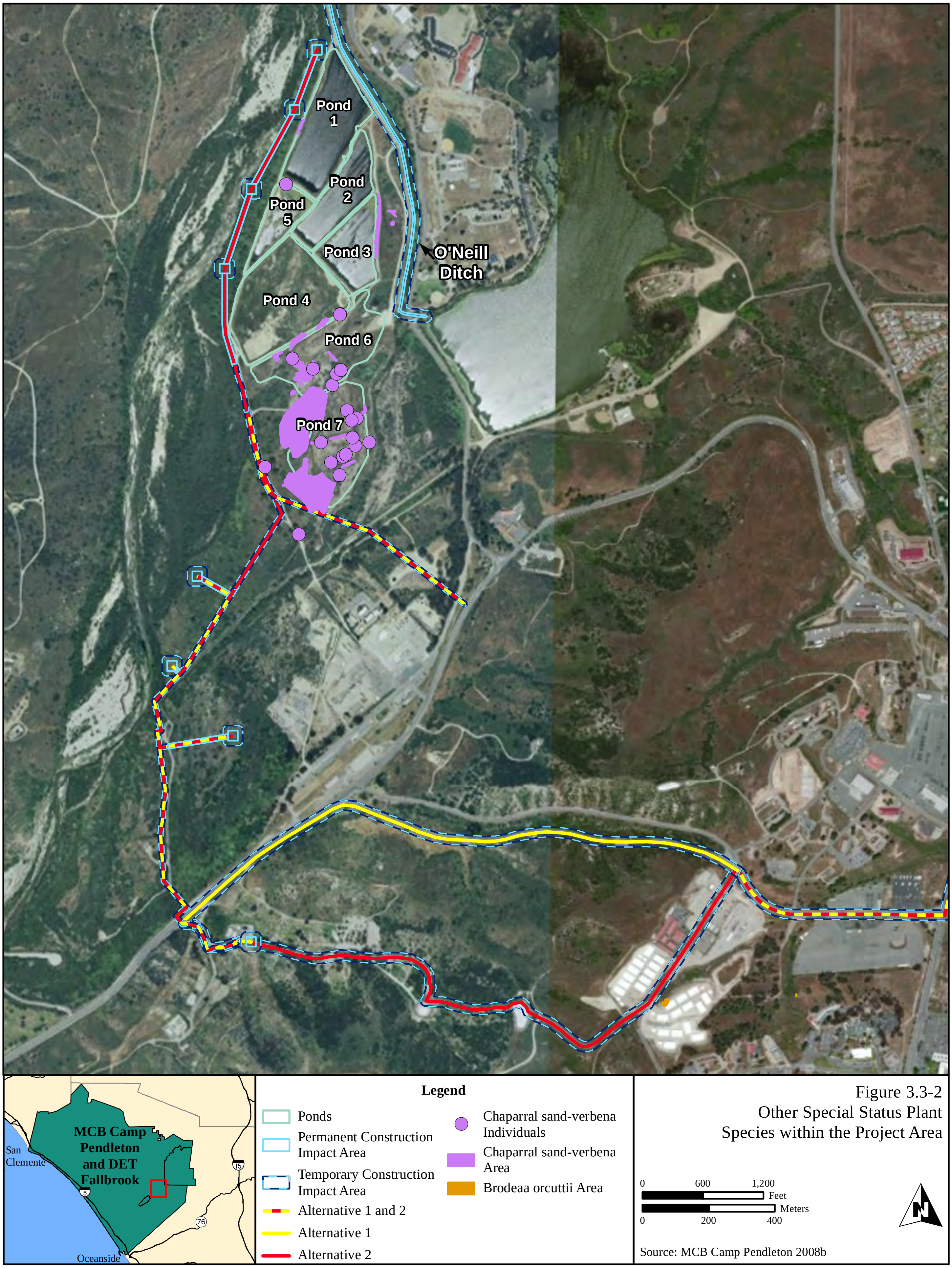


Figure 3.3-2
Other Special Status Plant Species within the Project Area

Table 3.3-5. Special Status Plant Species Known or Likely to Occur in the Project ROI

Common Name	Scientific Name	CRPR[1]	Occurrence
Known to Occur			**Occurrence in ROI**
Chaparral sand-verbena	*Abronia villosa* var. *aurita*	1B.1	Conveyance pipeline[2], OSMZ[3]
Engelmann oak	*Quercus engelmannii*	4.2	OSMZ[3]
Fish's milkwort	*Polygala cornuta* var. *fishiae*	4.3	OSMZ[3]
Ocellated Humboldt lily	*Lilium humboldtii* var. *ocellatum*	4.2	OSMZ[3]
Orcutt's brodiaea	*Brodiaea orcuttii*	1B.1	Bi-directional pipeline[2]
Rainbow manzanita	*Arctostaphylos rainbowensis*	1B.1	Bi-directional pipeline[4], OSMZ[3]
San Miguel savory	*Clinopodium mimuloides*	4.2	Previously documented in OSMZ[3]
Potential to Occur			**Habitat**
South coast saltscale	*Atriplex pacifica*	1B.2	Sandy riparian
Lewis' evening-primrose	*Camissoniopsis lewisii*	3	CSS, grasslands, sandy or clay soil
Payson's jewel-flower	*Caulanthus simulans*	4.2	CSS, chaparral
Smooth tarplant	*Centromadia pungens* ssp. *laevis*	1B.1	Riparian, grasslands
Orcutt's pincushion	*Chaenactis glabriuscula* var. *orcuttiana*	1B.1	Sandy riparian
Paniculate tarplant	*Deinandra paniculata*	4.2	CSS, grassland
Southern California black walnut	*Juglans californica*	4.2	Riparian, CSS, chaparral
Robinson's pepper-grass	*Lepidium virginicum* var. *robinsonii*	4.3	CSS, chaparral
White rabbit-tobacco	*Pseudognaphalium leucocephalum*	2B.2	Riparian, CSS, chaparral
Nuttall's scrub oak	*Quercus dumosa*	1B.1	CSS, chaparral
Parry's tetracoccus	*Tetracoccus dioicus*	1B.2	CSS, chaparral

Notes: [1] California Rare Plant Ranks (CRPR) created by the California Native Plant Society (CNPS):
1B - Plants rare, threatened, or endangered in California and elsewhere
2B - Plants rare, threatened, or endangered in California, but more common elsewhere
3 - Plants about which more information is needed – a review list
4 - Plants of limited distribution – a watch list
CNPS Threat Ranks
.1 - Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 - Moderately threatened in California (20-80% occurrences threatened)
.3 - Not very threatened in California (<20% of occurrences threatened or no current threats known)
[2]See Figure 3.3-2 for location
[3]Refer to Appendix C-2 for locations.
[4]Potential habitat in SMC adjacent to pipeline route in Fallbrook, see Appendix C-1, Figure C1-5.

Source: CDFW 2013, CNPS 2013.

Occurrences of special status plants in the OSMZ are discussed in the corresponding report in Appendix C-2. Chaparral sand verbena occurs on open sandy soils, mostly inland, and was discovered on MCB Camp Pendleton for the first time in 2008 during project surveys of the recharge pond areas; it is mapped in Figure 3.3-2. Orcutt's brodiaea was also found in project surveys in 2008, above Haybarn Canyon approaching Rattlesnake Canyon Road along the Alternative 2 pipeline alignment; most of that area was subsequently developed (Figure 3.3-2), and the current status of Orcutt's brodiaea is unknown. Potential habitat for Rainbow manzanita was observed in southern mixed chaparral along the bi-directional pipeline alignment in Fallbrook (Figure C1-5). The California Rare Plant Rank (CRPR) 1B.1 listing indicates that CNPS considers these three species to be seriously endangered in California.

<u>Other Special Status Species: Wildlife</u>

Other special concern wildlife species, while not state or federally-listed as threatened or endangered, are species that are recognized as rare or sensitive in California. Twenty-six special status wildlife species potentially occur in the ROI. Table 3.3-6 summarizes data on the occurrence of these species in the ROI, based on previous data and surveys (see Appendices C-2).

Table 3.3-6. Non-Listed Special Status Wildlife Species Known or Likely to Occur in the Project ROI

Common Name	Scientific Name	Status	Occurrence
Invertebrate			
Hermes copper	*Lycaena hermes*	SSC	Chaparral, coastal sage scrub and woodland
Fish			
Arroyo chub	*Gila orcutti*	SSC	SMR
Amphibian			
Coast range newt	*Taricha torosa torosa*	SSC	Streams and adjacent riparian
Western spadefoot toad	*Spea hammondii*	SSC	Temporary ponds
Reptile			
Belding's orange-throated whiptail	*Aspidoscelis hyperythrus beldingi*	SSC	Coastal sage scrub
Coast patch-nosed snake	*Salvadora hexalepis virgultea*	SSC	Coastal sage scrub and chaparral
Red diamond rattlesnake	*Crotalus ruber*	SSC	Coastal sage scrub
Blainville's horned lizard	*Phrynosoma blainvillei*	SSC	Sandy wash and coastal sage scrub
Silvery legless lizard	*Anniella pulchra pulchra*	SSC	Unknown but possible in upland areas
Two-striped garter snake	*Thamnophis hammondii*	SSC	SMR and other streams in ROI
Pacific (western) pond turtle	*Actinemys marmorata*	SSC	SMR and other streams in ROI

Continued on next page

Table 3.3-6. Non-Listed Special Status Wildlife Species Known or Likely to Occur in the Project ROI (cont.)

Common Name	Scientific Name	Status	Occurrence
Bird			
San Diego cactus wren	*Campylorhynchus brunneicapillus sandiegensis*	SSC	Cactus-dominated sage scrub on MCB Camp Pendleton and DET Fallbrook (occurrences mostly outside of ROI)
Cooper's hawk	*Accipiter cooperi*	WL	Riparian and oak woodland
Loggerhead shrike	*Lanius ludovicianus*	SSC	Open scrub and grassland
Bell's sage sparrow	*Amphispiza belli belli*	WL	Coastal sage scrub and chaparral
Burrowing owl	*Athene cunicularia*	SSC	Grassland and other open areas
Southern California rufous-crowned sparrow	*Aimophila ruficeps canescens*	WL	Chaparral
Yellow-breasted Chat	*Icteria virens*	SSC	Fallbrook Creek
Yellow-headed blackbird	*Xanthocephalus anthocephalus*	SSC	Marshes, observed on MCB Camp Pendleton
Yellow warbler	*Dendroica petechia brewsteri*	SSC	SMR and Fallbrook Creek
Yellow-breasted chat	*Icteria virens*	SSC	Dense riparian habitats
Mammal			
Northwestern San Diego pocket mouse	*Chaetodipus fallax fallax*	SSC	Coastal sage scrub
Dulzura pocket mouse	*Chaetodipus californicus femoralis*	SSC	Grassland, coastal sage scrub
Ramona grasshopper mouse	*Onochomys torridus ramona*	SSC	Possible in OSMZ
San Diego desert woodrat	*Neotoma lepida intermedia*	SSC	Coastal sage scrub with cactus
Pallid bat	*Antrozous pallidus*	SSC	Riparian
Spotted bat	*Euderma maculatum*	SSC	Riparian and grassland
Western mastiff bat	*Eumops perotis californicus*	SSC	Riparian
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	SSC	Riparian
Big free-tailed bat	*Nyctinomops macrotis*	SSC	Rugged and rocky habitats
American badger	*Taxidea taxus*	SSC	Grassland

Notes: SSC = CDFW Species of Special Concern, WL = CDFW Watch List.
Sources: Unitt 2004; County of San Diego 2009; Riverside County 2009; San Diego Natural History Museum 2009; CDFW 2011; MCB Camp Pendleton 2011; CDFW 2013; Survey Reports (Appendix C).

3.4 CULTURAL RESOURCES

3.4.1 Definition of Resources

Cultural resources include prehistoric and historic resources. Prehistoric resources are physical properties or Traditional Cultural Properties (TCP) associated with human activities that predate written records and are generally identified as archaeological sites; however, they may continue to have significance to tribes and other cultures. Prehistoric resources can include village sites, specialized camps, lithic scatters, shell scatters, milling features, petroglyphs, rock features, and burials. Historic resources include those that postdate the advent of written records in a region.

Other common terms with distinct archaeological connotations are used throughout this section. For example, a "complex" is defined as a consistently recurring assemblage of artifacts or traits that may be indicative of a specific set of activities or common cultural tradition. A "stage" is a complex development unit encompassing a broad span of time and widespread cultural unity. A "tradition" is defined as the temporal range of a specific culture.

3.4.2 Regulatory Setting

Cultural resources are subject to review under both federal and state laws and regulations. Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, empowers the Advisory Council on Historic Preservation to comment on federally initiated, licensed, or permitted projects affecting historic properties or cultural resources listed or eligible for inclusion on the NRHP. Only those cultural resources determined to be significant (i.e., eligible for the NRHP) or those that remain undetermined for significance (if unevaluated) are protected under the NHPA. Under the NHPA ineligible cultural resources are not considered when assessing the possible effects of a federal action.

The significance of archaeological and architectural resources is usually determined by using specific criteria (listed in 36 CFR § 60.4) including: association with an important event, association with a famous individual, embodiment of the characteristics of a period, or the ability to contribute to scientific research. Significant archaeological, architectural, and traditional cultural resources include those that are eligible or recommended as eligible for inclusion in the NRHP. Under most circumstances, cultural resources must be at least 50 years old to be considered eligible for listing. However, more recently built structures, such as Cold War-era resources, may warrant protection if they manifest “exceptional significance.” Traditional cultural resources can be evaluated for NRHP eligibility as well. However, even if a traditional cultural resource is determined to be ineligible for the NRHP, it may still be significant to any Native American tribe. In this case, such resources may be protected under the Native American Graves Protection and Repatriation Act, and EO 13007 addressing sacred Indian sites. The significance of a Native American traditional cultural resource is determined by consulting with the appropriate Native American tribes.

3.4.3 Region of Influence

The cultural resources ROI (hereinafter referred to in this section as Area of Potential Effect [APE], for compliance with SHPO standards) encompasses all areas that may be subject to direct physical disturbance from project implementation, including construction of conveyance pipeline corridors and facility sites or indirect effects from the construction that may inadvertently spillover to adjacent areas. For conveyance pipelines, a 100-ft (31-m) wide corridor along the pipeline route is included in the APE. For facility sites, the APE is the footprint of the project component.

3.4.4 Existing Conditions

3.4.4.1 Regional Setting

Archaeologists, beginning with Malcolm Rogers in the 1930s and 1940s, have applied several chronological schemes to the coast of southern California, particularly San Diego County, partly based on perceived changes in chipped stone artifact techno-typology. It is suggested that many of the defined assemblages are probably part of outdated and inaccurately assigned typologies that need to be reevaluated and tested from multiple perspectives, especially through advances in rigorous functional studies. Such a reevaluation is important, because many of the current typologies that help define archaeological assemblages are both obscuring important behavioral patterning and creating some where none may exist. Hence, a description of the major chipped stone artifacts associated with each of the three traditional chronological periods for coastal San Diego County is given below, and include the San Dieguito, La Jolla, and Late Prehistoric periods. While it is recognized that distinct nomenclatures and subdivisions are used by different archaeologists for these time periods, and various subdivisions are utilized within each specific period, researchers tend to focus on the three major periods rather than their subdivisions, since they are interested in illuminating the general pattern.

San Dieguito/Paleoindian Period (11,500 Before Present [B.P.] – 8500/7500 B.P.)

The San Dieguito Period encompasses human occupation of the San Diego area prior to 7500 B.P. Defining characteristics of the San Dieguito artifact assemblage include distinct scrapers, bifacial knives, and crescent shaped eccentrics. The artifact assemblage is thought to represent a heavy emphasis on hunting of game. The San Dieguito time frame is equivalent to the Paleoindian Period (11,500 B.P.-8500/7500 B.P.) as defined by Byrd (1996).

La Jolla/Archaic Period (8500/7500 B.P. – 1300/800 B.P.)

The La Jolla Period, followed by a hiatus/transition, encompasses a time frame of approximately 7500 B.P.-1300 B.P., equating roughly with the Archaic Period, which ranges between 8500/7500 B.P.-1300/800 B.P. (Byrd 1996). The La Jolla period is thought to represent an emphasis on littoral resources, as indicated by dense shell midden sites. The tool assemblage is defined by simple stone cobble tools and an increased emphasis on ground stone implements. Meighan (1954) and True (1958, 1966, 1970) label the inland manifestation of the La Jolla time period as the Pauma Complex of the Milling Stone Substratum, while Warren (1968) refers to the entire complex as the Encinitas Period. Chipped stone artifacts associated with the La Jolla Period are similar in many ways to San Dieguito type tools, but are considered less sophisticated.

Late Prehistoric (1300/800 B.P. - 200 B.P.)

The time period from the end of the La Jolla to the beginning of the historic period is typically assigned a range of dates from 1300/800-200 B.P., which Byrd (1996) refers to as the Late Prehistoric Period. The Prehistoric Period is often broken down into various subdivisions: Yuman Culture I-III for the San Diego County coast (Rogers 1939, 1945); San Luis Rey-Luiseno for the north interior; Cuyamaca-Diegueno for the south interior (Meighan 1954); and Yuman and Shoshonean periods (Warren 1968). The Late Prehistoric Period is thought to include the introduction of the bow and arrow, use of pottery, and a theorized emphasis on inland plant resources. Although there is ample evidence of large coastal sites dating to the Late Prehistoric Period, the majority of the sites used to define this period have come from inland contexts.

Historical Chronology, Contexts, and Cultural Landscapes at Camp Pendleton and Beyond

The first words written about the Camp Pendleton area were by members of the Portolá expedition, which marched from San Diego to Monterey in 1769 as they secured Alta California for the Spanish empire. Since that time, this region of closely spaced coastal plain, river valleys, and mountains has seen remarkable changes brought about by people of Native American, Spanish, Mexican, and Euro-American heritage. From Spanish mission rancho and *estáncia*; to the Mexican and then American rancho; and finally to American Marine Base, each has resulted in human activities that left unmistakable traces on the cultural landscape of Camp Pendleton (Table 3.4-1). Agricultural and ranching pursuits have been foremost in the activities of the last two centuries, but the Camp Pendleton area has also been an important coastal transportation corridor and, lastly, one of the most important military bases in the western United States. Camp Pendleton has been the scene of some of the most dramatic events and historical processes to occur in southern California, often typifying state and region-wide patterns. These have included:

- Early Spanish exploration.
- The efforts of Spanish colonial mission institutions to extend their control over the Luiseño and Juaneño Indian inhabitants and develop an economic base for the mission.

- The first ranching and farming enterprises in the region.
- The efforts of the local Luiseño and Juaneño Indians to cope with the Spanish intrusion through accommodation, resistance, and persistence.
- The transformation of a mission property into the largest Mexican period rancho in California.
- The scene of the struggle for political and military control during the final days of Mexico's hold on California.

Table 3.4-1. MCB Camp Pendleton Historical Chronology

Period	Dates (A.D.)	Major Events
Spanish	1769-1820	• July 20-22, 1769: Portolá Expedition • Nov. 1, 1776: Mission San Juan Capistrano founded • Sept. 1, 1779: First baptisms recorded from *Huisme* at Mission San Juan Capistrano • June 13, 1798: Mission San Luis Rey founded
Mexican	1821-1847	• 1823: Las Flores *estancia* founded • Aug. 17, 1833: Mexican Secularization Act • ca. 1833-1834: Las Flores Pueblo granted • April 21-23, 1838: "Battle" of Las Flores • May 10, 1841: Rancho Santa Margarita granted • Oct. 8, 1844: Las Flores Pueblo purchased by Pico
American	1848-1941	• Jan. 3, 1848: Kearny's Army of the West visit • Feb. 25, 1864: Juan Forster receives rancho title • 1872-1873: Pico vs. Foster claims case • Feb. 22, 1882: Forster Family sells rancho to James Flood and Richard O'Neill • 1941: Rancho divided into Santa Margarita (Floods) and San Onofre/San Mateo (O'Neill's)
USMC	1942-Present	• 1942: Camp Pendleton established

Notes: A.D. = Anno Domini; USMC = U.S. Marine Corps.
Source: Becker *et al.* 2012.

- The object of a legal battle for control of rancho lands following the American conquest of California, exemplifying the decline of the Californio culture.
- The continuation and changes of California's ranching tradition into the twentieth century.
- The development of transportation corridors along the California coast.
- The establishment and operation of one of the most important military bases in the western United States.

<u>MCB Camp Pendleton</u>

Over 85 years of archaeological investigations along the southern California coast have yielded evidence for a long sequence of prehistoric occupation (Moratto 1984). This sequence is well-documented both north and south of the project area, and extends from the early Holocene into the ethnohistoric period (Hines and Rivers 1991; Meighan 1954; True 1958; Vanderpot *et al.* 1993; Warren 1964). Concerning the project area, there was little systematic research conducted until the 1960s. Since then around 700 sites, spanning prehistoric, ethnohistoric, and historic time periods have been documented within the project area.

The majority of the field investigations performed were cultural resource surveys. As of 2012, over 100 surveys have been conducted beginning in 1948 with McCown's (1964) survey of the De Luz area. In addition, Malcolm Rogers recorded at least one site, SDI-1074, as part of his wide-ranging "surveys" in southern California (Singer *et al.* 1993). Recent surveys of significantly large size include Apple and Cleland (1994), Byrd (1999), Byrd and Andrews (2004), Cheever and Collett (2000, 2001), Doolittle *et al.* (2002), Harvey (2003), Reddy (1998a, 1998b, 1999), Reddy and Pallette (2003), and Schroth (1995).

A series of Phase II projects (i.e., test excavations) have also been carried out in the project APE, particularly on MCB Camp Pendleton, since the 1970s with a majority of projects completed in recent years. Archaeological excavation on MCB Camp Pendleton reveals a long and complex sequence of occupation that includes use of the valley floors, ridge tops, coastal terraces, and inland highlands. Data recovery projects (i.e., mitigation) in the project APE have been more limited, with around 13 extensive excavations. These sites represent occupations spanning from the late Paleoindian/early Archaic (ca. 8500 B.P.) to the historic period.

3.4.4.2 Project Setting

Cultural resources within the APE were identified through records searches and cultural resource surveys and presented in a technical report prepared by Becker *et al.* (2012). The cultural resource surveys were conducted from 21-30 January 2009 and on 21 March 2012 and included portions of the APE within MCB Camp Pendleton and the community of Fallbrook. A cultural resources survey report was prepared and submitted to the California SHPO. The California SHPO provided a letter to the USMC (refer to Appendix E) concurring that a finding of no adverse effect is appropriate pursuant to 36 CFR Part 800.5(b) (California Office of Historic Preservation 2013).

The following areas were surveyed: (1) O'Neill Ditch and Headgate; (2) 1,200 acres (486 hectares) of the production well basin; (3) portions of the bi-directional pipeline from MCB Camp Pendleton to Fallbrook; and (4) the Gheen Zone within the community of Fallbrook. The rest of the project APE was identified as having adequate previous survey coverage (e.g., the portion of the bi-directional pipeline located within DET Fallbrook).

<u>MCB Camp Pendleton</u>

The following cultural resources have been identified within the project APE for both action alternatives at MCB Camp Pendleton.

O'Neill Ditch

The northern section of the present-day O'Neill Ditch maintains a similar alignment as the original main ditch, but the original irrigation system is no longer intact. It is likely that the 1883 main ditch has been modified over time, especially when considering the impacts of the 1916 Flood and the utilization of the area by the Marine Corps at Camp Pendleton in the early 1940s. The Percolation Basin was constructed by the military as part of Camp Pendleton between 1949 and 1968, significantly altering the natural landscape (USGS 1949, 1968). Originally, Richard O'Neill derived water from the SMR through an undocumented headgate, and the main ditch conveyed water to the reservoir behind the dam. A secondary diversion ditch transported the water from the reservoir to the Santa Margarita Ranch and beyond for irrigating agriculture. The existing O'Neill Ditch delivers water from the diversion structure on the SMR to five existing groundwater percolation (recharge) ponds or Lake O'Neill, depending on the time of year, available water supply, and required demand.

The period of significance for the 1883 O'Neill Ditch is between 1883 and 1938, when the Flood family acquired the Santa Margarita Ranch from the O'Neill's. After 1937, there appears to have been substantial changes to the ditch system. The USMC became responsible for the area in the early 1940s. The addition of the Percolation Basin between 1949 and 1968 has impacted the area and altered the function of the main ditch. While a similar alignment may remain, it is not definitively the work of Richard O'Neill. It is more likely a ditch has been reconstructed in a similar alignment by the military in support of the Percolation Basin. During the 2009 survey, three historic culverts were identified and recorded in the ditch (SMR-CUP 1 through 3), along with the ditch itself (SMR-CUP 4) (Table 3.4-2); these sites were determined to be NRHP ineligible.

Table 3.4-2. Archaeological Sites within the O'Neill Ditch APE

Site (SDI-)	In or Out of the APE	Survey Results	Description	NRHP Eligibility Status
SMR-CUP 1	In	Newly Identified	Historic Culvert	Ineligible
SMR-CUP 2	In	Newly Identified	Historic Culvert	Ineligible
SMR-CUP 3	In	Newly Identified	Historic Culvert	Ineligible
SMR-CUP 4	In	Newly Identified	Historic Ditch	Ineligible

Notes: APE = area of potential effect; NRHP = National Register of Historic Places.
Source: Becker *et al.* 2012; California Office of Historic Preservation 2013.

Production Wells Basin

Table 3.4-3 provides a description of the survey results and relocation efforts for each of the sites identified within 1,200 acres (486 hectares) of the greater production wells basin. One historic site, SDI-13941H, was determined to be ineligible for listing on the NRHP, and appears to be destroyed, and as such does not technically require further action. One site, SDI-13982, was tested in 1996 and determined to not be a site. Ten of the sites could not be resurveyed due to access constraints or poor ground visibility. The APE associated with proposed project components encompasses only a small portion of the greater production well basin. As indicated in Table 3.4-3, none of the sites (except for SDI-13982, which was determined not to be a site) are located within the project APE.

DET Fallbrook

The following cultural resources have been identified within the project APE for both action alternatives at DET Fallbrook.

Ammunition Road

A record search provided by Naval Weapons Station Seal Beach shows that the APE on DET Fallbrook (which is 100 ft [31 m] wide along or near Ammunition Road) crosses through three known sites and is within 164 ft (50 m) of one additional site (Table 3.4-4). SDI-10158, a bedrock milling site with eight loci is an NRHP eligible site, but the portion that the APE passes through was recorded as disturbed through grading activities (Becker *et al.* 2012). SDI-14005H, Segment C was part of the old Southern California Railroad, but this segment was determined to be ineligible for the NRHP (Becker *et al.* 2012). SDI-14381, a prehistoric artifact scatter, was also determined as an NRHP ineligible site (Becker *et al.* 2012).

Table 3.4-3. Archaeological Sites within the Greater Production Wells Basin APE

Site (SDI-)	In or Out of the APE	Survey Results	Description	NRHP Eligibility Status
4421	Out	Not Surveyed	Bedrock Milling Site	Eligible
10157	Out	Not Surveyed	Shell Scatter	Ineligible
10156/ 12599H	Out	Same as Original Recording	Village of *Topomai* and Historic Ranch House	Eligible
12570	Out	Not Surveyed	Lithic Scatter	Ineligible
12571	Out	Not Relocated	Artifact Scatter	Ineligible
12577	Out	Not Surveyed	Artifact Scatter	Eligible
12628	Out	Not Surveyed	Artifact Scatter	Eligible
13938	Out	Artifacts Not Relocated	Artifact Scatter	Eligible
13941H	Out	Not Relocated; Site Potentially Destroyed or Displaced	Historic Water Trough	Ineligible
13942H	Out	Not Relocated	Historic Scatter	Ineligible
13981H	Out	Same as Original Recording	Historic Lake O'Neill Dam	Ineligible
13984	Out	Associated Artifacts Not Relocated	Bedrock Milling Site	Ineligible
13985	Out	Same as Original Recording	Bedrock Milling Site	Eligible
13982	In	N/A	Tested in 1996; Determined not a Site	N/A
13987	Out	Not Surveyed	Artifact Scatter	Ineligible
13990	Out	Not Surveyed	Artifact Scatter	Ineligible
13991	Out	Not Surveyed	Artifact Scatter	Eligible
13996H	Out	Same as Original Recording	Historic Scatter	Ineligible
14060	Out	Not Surveyed	Artifact Scatter	Ineligible
15126	Out	Not Surveyed	Artifact Scatter	Ineligible

Notes: APE = area of potential effect; NRHP = National Register of Historic Places; N/A = Not Applicable.
Source: Becker *et al.* 2012; California Office of Historic Preservation 2013.

Table 3.4-4. Archaeological Sites Within or Near the APE on DET Fallbrook

Site (SDI-)	Size (m)	In or Out of APE	Description	NRHP Eligibility Status
10158	1,000 x 275	In	Prehistoric Bedrock milling site with 8 loci and artifacts	Disturbed portion of eligible site
14005H	linear	In	Segment C of the Southern California Railroad	Ineligible
14381	150 x 60	In	Prehistoric artifact scatter	Ineligible
14375	20 x 10	Out	Prehistoric artifact scatter	Indeterminate

Notes: APE = area of potential effect; NRHP = National Register of Historic Places.
Source: Becker *et al.* 2012; California Office of Historic Preservation 2013.

Community of Fallbrook

The following cultural resources have been identified within the project APE for both action alternatives in the community of Fallbrook.

Knoll Park-Gheen Zone Tank Site

The Martin Reservoir is a Depression-era reservoir located within the Knoll Park-Gheen Zone tank site. The Martin Reservoir was constructed with Public Works Administration (PWA) funding as part of the FPUD San Luis Rey River Development Project. The Martin Reservoir is a poured-concrete structure with an approximate height of 13 ft (4 m) and a diameter of 120 ft (37 m). The reservoir has a cover supported by wooden truss framing, and was constructed for the FPUD between February and June 1939.

The reservoir was first recorded as a cultural resource in March 2001, and mistakenly referred to as the Gheen Reservoir. The reservoir was reevaluated for its possible eligibility to the NRHP in 2009 (Becker *et al.* 2012). Although the Martin Reservoir was constructed as a part of a national program through the PWA, an association with the PWA is not enough to make the structure eligible. California SHPO concurred with the determination that the Martin Reservoir is ineligible under Criterion A, B, C, and D of the NRHP (Becker *et al.* 2012; California Office of Historic Preservation 2013). The Martin Reservoir was also evaluated for its possible eligibility to the California Register of Historic Resources (CRHR) under the four criteria and is recommended not eligible on a state or local level to the CRHR based on the following:

- As a PWA constructed structure, it is less likely to be architecturally significant;
- The reservoir is not associated with an important historical person, and is neither the best example of a PWA project nor an example of an important engineering structure designed by a master architect; and
- There is not significant potential for data recovery.

Although the construction of the San Luis River Water Development Project was an important development in the history of Fallbrook, it was not the first reservoir for the area. While the San Luis Rey River Development Project was historically significant, it does not rise to the level of significance necessary for inclusion on either the NRHP or the CRHR. Therefore, it is recommended that the Martin Reservoir be considered as ineligible for the NRHP and the CRHR.

3.5 AIR QUALITY

3.5.1 Definition of Resources

Air quality in a given location is defined by pollutant concentrations in the atmosphere and is generally expressed in units of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). One aspect of significance is a pollutant's concentration in comparison to a national and/or state ambient air quality standard. These standards represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare with a reasonable margin of safety. The national standards, established by the USEPA, are termed the National Ambient Air Quality Standards (NAAQS). The NAAQS represent maximum acceptable concentrations that generally may not be exceeded more than once per year, except the annual standards, which may never be exceeded. State standards, established by the California Air Resources Board (CARB), are termed the California Ambient Air Quality Standards (CAAQS). The CAAQS are equal to or more stringent than the NAAQS and include pollutants for which national standards do not exist (CARB 2012a). Table 3.5-1 presents the applicable NAAQS and CAAQS for the project area.

The main pollutants of concern considered in this air quality analysis include volatile organic compounds (VOCs), ozone (O_3), carbon monoxide (CO), nitrogen oxides (NO_x), PM_{10}, and $PM_{2.5}$. Although VOCs and NO_x (other than nitrogen dioxide [NO_2]) have no established ambient standards, they are important as precursors to O_3 formation.

3.5.2 Regulatory Setting

The Federal Clean Air Act (CAA) of 1969 and its subsequent amendments establish air quality regulations and the NAAQS and delegate the enforcement of these standards to the states. The CARB enforces air pollution regulations and sets guidelines to attain and maintain the NAAQS and CAAQS within the state of California. These guidelines are found in the California State Implementation Plan (SIP). The CAA Amendments of 1990 established new federal non-attainment classifications, new emission control requirements, and new compliance dates for nonattainment areas. The requirements and compliance dates are based on the severity of the non-attainment classification. The following section provides a summary of the federal, state, and local air quality rules and regulations that apply to the project area.

Table 3.5-1. California and National Ambient Air Quality Standards

Pollutant	Averaging Time	CAAQS	NAAQS[a]	
			Primary[b, c]	Secondary[b, d]
O_3	1-hour	0.09 ppm (180 µg/m³)	—	Same as primary
	8-hour	0.070 ppm (137 µg/m³)	0.075 ppm (147 µg/m³)	Same as primary
CO	1-hour	20 ppm (23 mg/m³)	35 ppm (40 mg/m³)	—
	8-hour	9 ppm (10 mg/m³)	9 ppm (10 mg/m³)	—
NO_2	1-hour	0.18 ppm (339 µg/m³)	0.10 ppm (188 µg/m³)	—
	Annual	0.030 ppm (57 µg/m³)	0.053 ppm (100 µg/m³)	Same as primary
SO_2	1-hour	0.25 ppm (655 µg/m³)	0.075 ppm (196 µg/m³)	—
	3-hour	—	—	0.5 ppm (1,300 µg/m³)
	24-hour	0.04 ppm (105 µg/m³)	0.14 ppm (365 µg/m³)	
PM_{10}	24-hour	50 µg/m³	150 µg/m³	Same as primary
	Annual	20 µg/m³	—	Same as primary
$PM_{2.5}$	24-hour	—	35 µg/m³	Same as primary
	Annual	12 µg/m³	12 µg/m³	15 µg/m³
Lead	30-day average	1.5 µg/m³	—	—
	Rolling 3-month average	—	0.15 µg/m³	Same as primary
	Calendar Quarter	—	1.5 µg/m³	Same as primary
Sulfates	24-hour	25 µg/m³	No National Standards	
Hydrogen Sulfide	1-hour	0.03 ppm (42 µg/m³)		
Vinyl Chloride	24-hour	0.01 ppm (26 µg/m³)		
Visibility Reducing Particles	8-hour	See footnote [e]		

Notes: [a] Standards other than the 1-hour O_3, 24-hour PM_{10}, 24-hour $PM_{2.5}$, and those based on annual averages are not to be exceeded more than once a year.
[b] Concentrations are expressed first in units in which they were promulgated. Equivalent units are given in parenthesis.
[c] Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. They must be attained no later than 3 years after a state's implementation plan is approved by the USEPA.
[d] Secondary Standards: The levels necessary to protect the public from any known or anticipated adverse effects of a pollutant.
[e] In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70 %. Measurement in accordance with CARB Method V.
ppm = parts per million; mg/m³ = milligrams per cubic meter; µg/m³ = micrograms per cubic meter.
Source: CARB 2013

3.5.2.1 Federal Requirements

Section 176(c) of the 1990 CAA Amendments contains the General Conformity Rule (40 CFR §§ 51.850-860 and 40 CFR §§ 93.150-160). The General Conformity Rule requires any federal agency responsible for an action in a non-attainment or maintenance area to determine that the action conforms to the applicable SIP. This means that federally supported or funded activities will not (1) cause or contribute to any new air quality standard violation, (2) increase the frequency or severity of any existing standard violation, or (3) delay the timely attainment of any standard, interim emission reduction, or other milestone. The rule allows for approximately 30 exemptions that are assumed to conform to an applicable SIP. Emissions of attainment pollutants are exempt from conformity analyses. Actions would conform to a SIP if their annual direct and indirect emissions remain less than the applicable *de minimis* thresholds. Formal conformity determinations are required for any actions that exceed these thresholds. Based on the present attainment status of the San Diego Air Basin (SDAB) (see Section 3.5.4), the project would conform to the most recent USEPA-approved SIP if its annual construction or operational emissions do not exceed 100 tons of NO_x, VOCs, or CO.

3.5.2.2 State Requirements

The California CAA of 1988, as amended in 1992, outlines a program to attain the CAAQS for O_3, NO_2, sulfur dioxide (SO_2), particulate matter, and CO by the earliest practical date. Since the CAAQS are more stringent than the NAAQS, emissions reductions beyond what would be required to show attainment for the NAAQS would be needed to show compliance with the CAAQS. CARB delegates the authority to regulate stationary source emissions to local air quality management districts. The CARB requires these agencies to develop their own strategies for achieving compliance with the NAAQS and CAAQS, but maintains regulatory authority over these strategies, as well as all mobile source emissions throughout the state. As discussed below, the San Diego County Air Pollution Control District (SDCAPCD) is the local agency responsible for enforcement of air quality regulations in the project region.

3.5.2.3 Local Regulations

The SDCAPCD is responsible for regulating stationary sources of air emissions in the SDAB. The SDCAPCD Rules and Regulations (SDCAPCD 2012) establish emission limitations and control requirements for stationary sources, based on their source type and magnitude.

The SDCAPCD and the San Diego Association of Governments are responsible for developing and implementing the clean air plan for attainment and maintenance of the ambient air quality standards in the SDAB. The San Diego County Regional Air Quality Strategy (RAQS) was initially adopted in 1991, and is updated on a triennial basis. This plan includes all feasible control measures that can be implemented for the reduction of O_3 precursor emissions. To be consistent with the RAQS, a project must conform to emission growth factors outlined in this plan. Control measures for stationary sources proposed in the RAQS and adopted by the SDCAPCD are incorporated into the SDCAPCD Rules and Regulations.

The SDCAPCD has also developed the air basin's input to the SIP, which is required under the federal CAA for areas that are out of attainment of air quality standards. The SIP includes the SDCAPCD's plans and control measures for attaining the O_3 NAAQS. The SIP is also updated on a triennial basis. The CARB adopted its 2007 *State Strategy for California's 2007 State Implementation Plan* on 27 September 2007. The State Strategy was submitted to the USEPA on 16 November 2007 for their review and approval, and was approved in 2011. As part of that State Strategy, the SDCAPCD developed its *Eight-Hour Ozone Attainment Plan for San Diego County* (SDCAPCD 2007), which provides plans for attaining and maintaining the 8-hour O_3 NAAQS.

3.5.3 Region of Influence

Identifying the ROI for air quality requires knowledge of the types of pollutants being emitted, pollutant emission rates, topography, and meteorological conditions. The ROI for inert pollutants (pollutants other than O_3 and its precursors) is generally limited to a few miles downwind from a source. The ROI for photochemical pollutants, such as O_3, can extend much farther downwind than for inert pollutants. O_3 is a secondary pollutant formed in the atmosphere by photochemical reactions of previously emitted pollutants, or precursors. Ozone precursors are mainly VOCs and NO_x. In the presence of solar radiation, the maximum effect of VOCs and NO_x emissions on O_3 levels usually occurs several hours after they are emitted and many miles from the source. Therefore, the ROI for air quality analysis is defined as the entire SDAB, which encompasses all of San Diego County.

3.5.4 Existing Conditions

3.5.4.1 Climate and Meteorology

The climate of the project region is classified as Mediterranean, characterized by dry summers and wet winters. The major influences on the regional climate are the Eastern Pacific high-pressure system, topography, and the moderating effects of the Pacific Ocean. Seasonal variations in the position and strength of the high-pressure system are a key factor in area weather changes.

The Eastern Pacific High is a persistent anticyclone that attains its greatest strength and most northerly position during summer, when it is centered west of northern California. In this position, the High effectively shelters southern California from the effects of polar storm systems. As winter approaches, the Eastern Pacific High weakens and shifts to the south, allowing polar storm systems to pass through the region. Subsiding air associated with the High warms the upper levels of the atmosphere and produces an elevated temperature inversion (temperature increases with height) along the west coast. The base of this temperature inversion is generally from 1,000 to 3,000 ft (305 to 914 m) above msl during the summer. The subsidence inversion acts like a lid on the lower atmosphere and traps air pollutants near the surface of the earth by limiting vertical dispersion. Mountain ranges in eastern San Diego County constrain the horizontal movement of air and also inhibit the ventilation of air pollutants out of the region. These two factors, combined with the emission sources of over three million people, help to create the high pollutant conditions sometimes experienced in San Diego County.

<u>Precipitation</u>

Precipitation within the project area occurs as rainfall. However, snowfalls do occur on rare occasions in the highest elevations of the Santa Margarita Mountains in the interior regions of MCB Camp Pendleton. Over 90% of the total annual precipitation in the project area occurs from November through April. Annual average precipitation increases from about 10 in (25 cm) per year along the coast to as much as 25 in (64 cm) in the highest mountain peaks of MCB Camp Pendleton. The annual average rainfall at Camp Pendleton is 11.8 in (30.0 cm). Although most of the regional precipitation in the project area is produced by winter storm systems from the North Pacific, summer rainfall can occur in the area. This precipitation usually occurs from tropical moisture that moves into the region from Mexico. Thunderstorms and rain showers from these tropical air masses are infrequent and usually occur in the interior mountain and desert regions of southern California.

<u>Temperature</u>

Due to the moderating effect of the Pacific Ocean and lower elevation, temperatures are less extreme along the coastal sections of MCB Camp Pendleton compared to more inland locations. Maximum temperatures during the summer months average in the mid-70s (ºF) along the coast to the low 90s in the interior regions of MCB Camp Pendleton. Minimum summer temperatures average in the low 60s over most of the project area. Maximum temperatures during winter months average in the mid-60s across most of MCB Camp Pendleton. Minimum winter temperatures range from the mid-40s along the coast to the low 30s in the interior regions of MCB Camp Pendleton.

Prevailing Winds

Concurrent with the presence of the Eastern Pacific High west of California, a thermal low pressure system persists in the interior desert region due to intense insolation. The resulting pressure gradient between these two systems produces a southwest to west onshore air flow at MCB Camp Pendleton for most of the year. Sea breezes usually occur during the daytime and disperse air pollutants toward the interior regions. During the evening hours and colder months of the year, sea breezes are often replaced by land breezes that blow in the opposite direction towards the offshore areas. These weak offshore flows may continue until daytime heating reverses the flow back onshore.

During the colder months, the Eastern Pacific High can combine with high pressure over the continent to produce extended periods of light winds and low-level inversion conditions in the region. These atmospheric conditions can produce adverse air quality. Excessive build-up of high pressure over the continent can produce a “Santa Ana” condition, characterized by warm, dry, northeast winds. Santa Ana winds help to ventilate the air basin of locally generated emissions. However, Santa Ana conditions can also transport air pollutants from the Los Angeles metropolitan area into the project region. When stagnant atmospheric conditions occur during a weak Santa Ana, local emissions combined with pollutants transported from the Los Angeles area can lead to significant O_3 impacts in the project region.

Marine air trapped below the base of the subsidence inversion is often condensed into fog and stratus clouds by the cool Pacific Ocean. This is a typical weather condition of coastal San Diego County during the warmer months of the year. Marine stratus usually forms offshore and moves into the coastal plains and valleys during the evening hour; when the land heats up the following morning, the clouds burn off to the immediate coastline and reform the following evening.

3.5.4.2 Regional and Local Air Pollutant Sources

An emission rate represents the mass of a pollutant released into the atmosphere by a given source over a specified period of time. Emission rates can vary considerably depending on type of source, time of day, and schedule of operation. The SDCAPCD periodically updates emissions for the entire SDAB for purposes of forecasting future emissions, analyzing emission control measures, and for use in regional air quality modeling. The largest regional sources of air emissions are on-road vehicles. The year 2010 inventory estimated that on-road vehicles emitted 30% of the VOCs, 57% of the NO_x, and 61% of the CO emissions within the SDAB (CARB 2012b). Other large sources of VOCs are use of surface coatings and solvents. Combustion sources produce both primary fine particulate matter and fine particulate precursor pollutants, such as NO_x, which react in the atmosphere to produce secondary fine particulates. Coarser particles mainly occur from soil-disturbing activities, such as construction, mining, agriculture, and vehicular road dust.

3.5.4.3 Baseline Air Quality

Representative air quality data for MCB Camp Pendleton for the period 2007-2011 are shown in Table 3.5-2. The USEPA designates all areas of the U.S. as having air quality better than or equal to (attainment) or worse than (nonattainment) the NAAQS. The criteria for nonattainment designations vary by pollutant. An area is in nonattainment for O_3 if its NAAQS has been exceeded more than three discontinuous times in 3 years and an area is generally in nonattainment for any other pollutant if its

NAAQS has been exceeded more than once per year. Former nonattainment areas that have attained the NAAQS are designated as maintenance areas. The SDAB is in basic nonattainment for the federal O_3 standard, is considered a maintenance area for the CO standard, and is in attainment of the federal NO_x, sulfur oxides (SO_x), PM_{10} and $PM_{2.5}$ standards. The SDAB is in nonattainment of the O_3, PM_{10}, and $PM_{2.5}$ CAAQS (CARB 2012c, USEPA 2012a).

Table 3.5-2. Representative Air Quality Data for MCB Camp Pendleton (2007-2011)

Air Quality Indicator	2007	2008	2009	2010	2011
Ozone (O_3)[(1)]					
Peak 1-hour value (ppm)	0.083	0.104	0.090	0.092	0.085
Days above state standard (0.09 ppm)[(3)]	0	1	0	0	0
Peak 8-hour value (ppm)	0.074	0.076	0.076	0.078	0.071
Days above federal standard (0.08 ppm)[(2, 7)]	0	2	1	1	0
Days above state standard (0.070 ppm) [(3)]	4	3	5	1	2
Carbon monoxide (CO)[(4)]					
Peak 8-hour value (ppm)	3.01	2.60	2.77	2.14	2.44
Days above federal standard (9 ppm)	0	0	0	0	0
Days above state standard (9.0 ppm)	0	0	0	0	0
Particulate matter less than or equal to 10 microns in diameter (PM_{10})[(4)]					
Peak 24-hour value (μg/m^3) [(6)]	111	59	60	40	49
Days above state standard (50 μg/m^3)[(3)]	4	4	0	0	0
Annual Average value (ppm)	31.2	29.3	29.4	23.4	24.0
Particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$)[(1,4)]					
Peak 24-hour value (μg/m^3) [(6)]	69.6	34.2	29.5	27.3	27.4
Days above federal standard (65 μg/m^3) [(5)]	1	0	0	0	0
Annual Average value (ppm)	12.7	13.7	11.7	10.4	10.8
Sulfur Dioxide (SO_2)[(4)]					
Peak 24-hour value (ppm)	0.006	0.007	0.006	0.002	0.003
Days above federal standard (0.14 ppm)	0	0	0	0	0
Days above state standard (0.04 ppm)	0	0	0	0	0
Annual Average value (ppm)	0.002	0.003	0.001	0.000	0.000
Nitrogen Dioxide (NO_2)[(1)]					
Peak 1-hour value (ppm)	0.068	0.089	0.068	0.081	0.066
Days above state standard (0.18 ppm)	0	0	0	0	0
Annual Average value (ppm)	0.010	0.010	0.010	0.008	0.007

Notes: [(1)] Data from the MCB Camp Pendleton Monitoring Station.
[(2)] The federal O_3 standard was revised downward in 2008 from 0.08 to 0.075 ppm.
[(3)] SDAB is in nonattainment for the state PM_{10}, $PM_{2.5}$, and O_3 standards.
[(4)] Data from the downtown San Diego Monitoring Station.
[(5)] The federal $PM_{2.5}$ standard was revised downward in 2007 from 65 to 35 μg/m^3.
[(6)] High measured value occurred during southern California fire event in 2007.
[(7)] The federal eight-hour ozone standard was previously defined as 0.08 ppm (1 significant digit). Measurements are rounded up or down to determine compliance with the standard; therefore a measurement of 0.084 ppm is rounded to 0.08 ppm. The 8-hour ozone ambient air quality standards are met at an ambient air quality monitoring site when the average of the annual fourth-highest daily maximum 8-hour average ozone concentration is less than or equal to the standard.
ppm = parts per million; μg/m^3 = micrograms per cubic meter.
Source: CARB 2012d.

O_3 concentrations are generally the highest during the summer months and coincide with the period of maximum insolation. Maximum O_3 concentrations tend to be regionally distributed, since precursor emissions become homogeneously dispersed in the atmosphere. Inert pollutants, such as CO, tend to have the highest concentrations during the colder months of the year, when light winds and nighttime/early morning surface-based temperature inversions inhibit atmospheric dispersion. Maximum inert pollutant concentrations are usually found near an emission source.

3.5.4.4 Existing Emission Sources

Emission sources associated with the existing use of MCB Camp Pendleton include civilian and military personal vehicles, commercial and military vehicles, aircraft engines, tactical support equipment, small stationary sources, and ongoing construction activities. Existing sources of emissions associated with potable water conveyance include indirect emissions associated with pumping required to provide water to MCB Camp Pendleton from the SDCWA.

3.5.4.5 Greenhouse Gas Emissions

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere by absorbing infrared radiation. Without this natural greenhouse effect, the average surface temperature of the Earth would be about 60°F colder (U.S. Global Change Research Program 2009). Scientific evidence indicates a trend of increasing global temperature over the past century due to an increase in GHG emissions from human activities. The climate change associated with this global warming is predicted to produce environmental, economic, and social consequences across the globe.

GHG emissions occur from natural processes and human activities. Water vapor is the most important and abundant GHG in the atmosphere. However, human activities produce only a very small amount of the total atmospheric water vapor. The most common GHGs emitted from natural processes and human activities include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). The main source of GHGs from human activities is the combustion of fossil fuels, including crude oil and coal. Examples of GHGs created and emitted primarily through human activities include fluorinated gases (hydrofluorocarbons and perfluorocarbons) and sulfur hexafluoride. The six GHGs mentioned above are regulated by the State of California.

Each GHG is assigned a global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. The GWP rating system is standardized to CO_2, which has a value of one. For example, CH_4 has a GWP of 21, which means that it has a global warming effect 21 times greater than CO_2 on an equal-mass basis (Intergovernmental Panel on Climate Change 2007). To simplify GHG analyses, total GHG emissions from a source are often expressed as a CO_2 equivalent (CO_2e). The CO_2e is calculated by multiplying the emissions of each GHG by its GWP and adding the results together to produce a single, combined emission rate representing all GHGs. While CH_4 and N_2O have much higher GWPs than CO_2, CO_2 is emitted in such higher quantities that it is the overwhelming contributor to CO_2e from both natural processes and human activities.

Recent observed changes due to global warming include rising temperatures, shrinking glaciers and sea ice, thawing permafrost, a lengthened growing season, and shifts in plant and animal ranges. International, national, and state organizations independently confirm these findings (Intergovernmental Panel on Climate Change 2007, U.S. Global Change Research Program 2009, California Energy Commission 2009).

The most recent *California Climate Change Scenarios Assessment* predicts that temperatures in California will increase between 3° to 10.5° Fahrenheit by 2100, based upon low and high GHG emission scenarios (California Energy Commission 2009). Predictions of long-term negative environmental impacts due to global warming include sea level rise, changing weather patterns with increases in the severity of storms and droughts, changes to local and regional ecosystems including the potential loss of species, and a substantial reduction in winter snow pack. In California, predictions of these effects include exacerbation of air quality problems, a reduction in municipal water supply from the Sierra snowpack, a rise in sea level that would displace coastal businesses and residences, an increase in wild fires, damage to marine and terrestrial ecosystems, and an increase in the incidence of infectious diseases, asthma, and other human health problems (California Energy Commission 2009).

Federal agencies on a national scale address emissions of GHGs by reporting and meeting reductions mandated in federal laws, EOs, and agency policies. The most recent of these are EOs 13423 and 13514 and the *USEPA Final Mandatory Reporting of Greenhouse Gases Rule*. Several states have promulgated laws as a means of reducing statewide levels of GHG emissions. In particular, the California Global Warming Solutions Act of 2006 (AB32) directs the State of California to reduce statewide GHG emissions to 1990 levels by the year 2020. Groups of states also have formed regionally-based collectives (such as the Western Climate Initiative) to jointly address GHG pollutants.

In an effort to reduce energy consumption, reduce dependence on petroleum, and increase the use of renewable energy resources in accordance with the goals set by EOs and the Energy Policy Act of 2005, the USMC and DOD have implemented a number of renewable energy projects. The types of projects currently in operation within the southwest region include thermal and photovoltaic solar systems, geothermal power plants, and wind generators. The military also purchases one-half of the biodiesel fuel sold in California and continues to promote and install new renewable energy projects within the southwest region.

On 18 February 2010, the CEQ initially proposed draft guidance on how federal agencies should evaluate the effects of climate change and GHG emissions for NEPA documentation (CEQ 2010). The CEQ does not propose a reference point as an indicator of a level of GHG emissions that may significantly affect the quality of the human environment. In the analysis of the direct effects of an action alternative, the CEQ proposes that it would be appropriate to (1) quantify cumulative emissions over the life of the project; (2) discuss measures to reduce GHG emissions, including consideration of reasonable alternatives; and (3) qualitatively discuss the link between such GHG emissions and climate change.

On 10 November 2010, the DOD issued a desk reference for implementation of the USEPA's Final Rule for Mandatory Reporting of GHG's. This guide is designed to assist installations in GHG reporting and compliance (DOD 2010). MCB Camp Pendleton is not subject to the reporting requirements under the *USEPA's Final Rule for Mandatory Reporting of GHG's* or the *CARB*'s *Regulation for the Mandatory Reporting of GHG Emissions* since there are no stationary source emissions that exceed the applicable reporting thresholds.

The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, the impact of project-induced GHG emissions to global climate change is discussed in the context of cumulative impacts in Section 5.4.5 of this EIS/EIR.

3.6 HAZARDOUS MATERIALS AND WASTES

3.6.1 Definition of Resources

Hazardous materials addressed in this EIS/EIR are chemical substances that pose a substantial hazard to human health or the environment. For purposes of this EIS/EIR, a hazardous material is any item or agent (biological, chemical, or physical) which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. In general, these materials pose hazards because of their quantity, concentration, physical, chemical, or infectious characteristics. Hazardous materials are characterized by their ignitability, corrosiveness, reactivity, and toxicity.

A hazardous waste may be a solid, liquid, semi-solid, or contained gaseous material that alone or in combination may: (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; or (2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed. The USMC and DON are required to comply with all federal, state, County of San Diego, and DOD requirements for hazardous waste management. FPUD is required to comply with federal, state, and County of San Diego requirements.

3.6.2 Regulatory Setting

Hazardous materials and waste management in the ROI are regulated by the federal government, the state of California, and the County of San Diego. The RCRA of 1976, CFR Title 40, §§ 260-265 and CFR Title 49, §§ 172, 173, and 178 regulate the current handling and disposal of hazardous wastes. The CWA of 1977 restores and maintains the chemical, physical, and biological integrity of water resources. California Health and Safety Code Division 20, Chapter 5 *et seq.* establishes hazardous waste management laws for the protection of human health and the environment. Title 22 of the CCR (Division 4.5 Health Standards for the Management of Hazardous Waste) regulates the management of hazardous waste and the transfer, treatment, storage and disposal of hazardous waste. County of San Diego Ordinance Title 6, Division 8, Chapter 11 also regulates the management of hazardous materials by requiring the preparation of a Hazardous Materials Business Plan for facilities where hazardous materials and wastes are stored and handled (County of San Diego Code of Regulatory Ordinances 2007). Businesses in the County of San Diego must apply to the County of San Diego Department of Environmental Health for a Unified Program Facility Permit if they generate hazardous waste, and also undergo regular inspection by the Department of Environmental Health (County of San Diego 2009).

At DET Fallbrook, hazardous materials and hazardous wastes are managed in accordance with applicable federal, state and County of San Diego regulations, and with the requirements of Naval Operations Instruction (OPNAVINST) 5090.1C, *Navy Environmental and Natural Resources Program Manual* (30 October 2007). The Naval Weapons Station Seal Beach EPSO also must review and approve all new project construction and operational plans in the design phase (DET Fallbrook 2009b). Any recommendations or requirements made by the EPSO are incorporated into the plans and implemented to ensure there are no hazardous materials or hazardous materials impacts at DET Fallbrook.

The CERCLA (1980) Superfund and Amendments and Reorganization Act (1986) regulate the "Superfund" program for investigation and cleanup of past hazardous materials spills, releases and disposal, including those at military facilities. The National Oil and Hazardous Substances Pollution Contingency Plan, codified in 40 CFR, implements CERCLA. The Defense Environmental Restoration Program, codified in 10 USC 2701-2709 and 2810, gave the DOD IR Program a statutory basis. The Navy/Marine Corps implements the Defense Environmental Restoration Program subject to and in a manner consistent with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NAVFAC 1997). Site investigation and cleanup, both on and off military property, are also regulated by the DTSC and the San Diego RWQCB. The laws and specifications referenced above have been established to protect human health and the environment from potential impacts.

3.6.3 Region of Influence

The ROI for hazardous materials and wastes includes the portions of MCB Camp Pendleton, DET Fallbrook, and FPUD where hazardous materials, hazardous wastes, or areas of known contamination exist at or in the vicinity of the action alternative sites.

3.6.4 Existing Conditions

3.6.4.1 Hazardous Materials and Waste Management

MCB Camp Pendleton

MCB Camp Pendleton has an Integrated Contingency Plan that addresses storage of hazardous materials and hazardous wastes within base facilities; additionally, all base facilities have facility-specific Business Site Plans that identify hazardous waste and materials storage areas (MCB Camp Pendleton 2003b). All hazardous wastes generated at MCB Camp Pendleton are packaged and stored according to federal, state and MCB Camp Pendleton requirements. Hazardous waste management at MCB Camp Pendleton adheres to RCRA regulations and is guided by MCO P5090.2, *Environmental Compliance Manual and Protection Plan* and the 5090.7 *Hazardous Waste Management Base Order*.

Hazardous waste is placed in proper containers, appropriately labeled by the generating unit, and then disposed within the limits of the allowable accumulation period of 60 days. A Uniform Hazardous Waste Manifest is prepared and the manifest and waste are brought to Building 22165, Hazardous Waste Branch, for signature on the way out of MCB Camp Pendleton for disposal. Hazardous wastes are then transported off base to an appropriate hazardous waste disposal facility.

DET Fallbrook

DET Fallbrook manages hazardous materials and hazardous wastes in accordance with applicable federal, state, and County of San Diego regulations, and with the requirements of OPNAVINST 5090.1C, *Navy Environmental and Natural Resources Program Manual* (30 October 2007).

FPUD

No hazardous materials or hazardous wastes are present within FPUD in the project footprint for the action alternatives; however, some hazardous materials are used in the wastewater treatment plant adjacent to the proposed FPUD WTP.

3.6.4.2 Installation Restoration Sites

MCB Camp Pendleton

The purpose of the DON/USMC IR Program is to identify, investigate, assess, characterize, and cleanup or control releases of hazardous substances; and to reduce the risk to human health and the environment from past waste disposal operations and hazardous material spills associated with DON/USMC activities in a cost-effective manner. The goal of the IR Program is to move all sites in the IR Program to the "No Further Action" category. To ensure that construction activities do not interfere with the cleanup process, proposed project requirements and actions in the vicinity of IR program sites require coordination and approval of MCB Camp Pendleton's FFA Team, which consists of MCB Camp Pendleton, DON, USEPA, DTSC, and San Diego RWQCB.

The IR Program at MCB Camp Pendleton includes 80 sites grouped into five Operable Units (OUs) based on similarities, such as types of environmental issues, selected cleanup methods, and/or physical location. As of 2010, RODs have been signed for OU-1 through -4, and for three of the sites in OU-5. IR Program activities are ongoing for two OU-3, two OU-4 sites, and eight OU-5 IR Sites, as well as six other sites that are being addressed individually, without incorporation into an OU (MCB Camp Pendleton 2010a). IR Sites 1111 (closed), 1119, and the 22/23 Area Groundwater Site are in the groundwater production basin in the vicinity of project components (Figure 3.6-1).

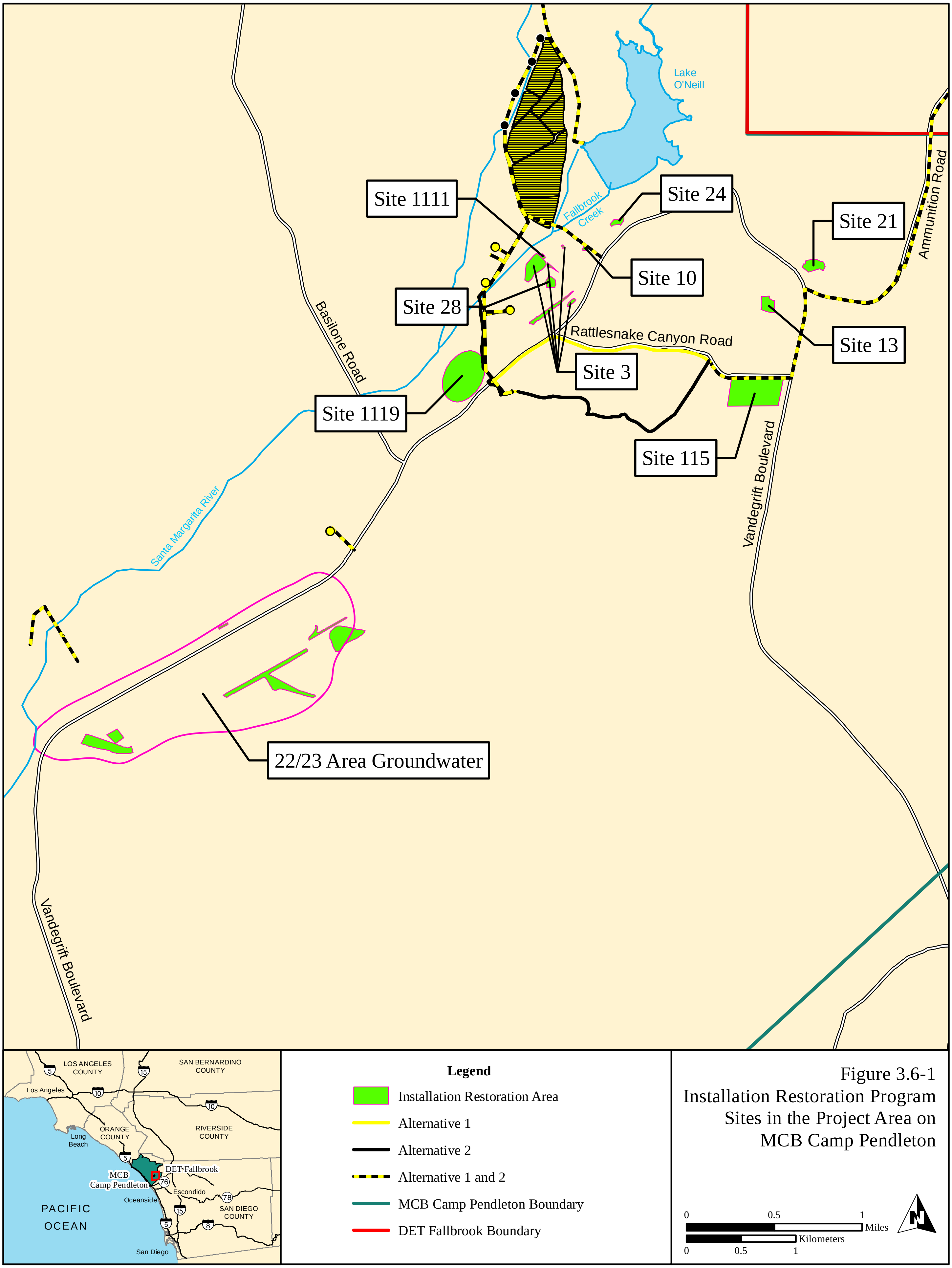


Figure 3.6-1
Installation Restoration Program Sites in the Project Area on MCB Camp Pendleton

IR Site 1111 is located in the 26 Area, about 500 ft (150 m) northwest of Building 2636 (SWRCB 2012). Several proposed new production wells would be located in the down-gradient or cross gradient direction from Site 1111 (Figure 3.6-1). Contaminants in the soil included VOCs, semi-VOCs, pesticides, and metals; groundwater was impacted by VOCs and metals. Between 2006 and 2008, soil with contaminant concentrations above screening levels; various solid and liquid wastes; and contaminated were removed and transported to an off-site location for appropriate disposal (NAVFAC SW 2011b). Groundwater monitoring wells were installed and a quarterly groundwater monitoring program began in June 2008 to assess whether contaminants (VOCs and metals) were migrating down-gradient (NAVFAC SW 2011b, SWRCB 2012). Based on the results, the remediation achieved all of the criteria established for soil and protection of groundwater at IR Site 1111. The site has been closed (ROD dated April 2013) because the concentrations of chemicals of concern in soil and burn ash were no longer a potential risk to human health and the environment, and the potential for a continuing source of groundwater contamination was eliminated (NAVFAC SW 2011b).

Active IR Site 1119 is located in the 26 Area of MCB Camp Pendleton and consists of the groundwater impacted by VOCs (SWRCB 2012). VOCs concentrations above the maximum contaminant level (MCL) were detected during the development process of well 26016, resulting in its abandonment as a water supply well. Well 26018 was constructed and tested negative for VOCs before its completion in 2008. After limited production in 2008 and 2009, VOCs were detected in the groundwater at levels below the MCL in early 2009. The VOCs detected in the wells 26016 and 26018 were trichloroethylene, cis-1,2-dichloroethene, and trichloropropane (NAVFAC SW 2010). Well 26018 is available as a production well, but it is presently not in use. Site 1119 is currently under investigation to determine source location and extent of contaminate groundwater by NAVFAC.

The active IR site known as the 22/23 Area Groundwater site consists of contaminated groundwater near the southern boundary of the base, along both sides of Vandegrift Boulevard (Figure 3.6-1). Facilities within this area include various industrial warehouses, office buildings, an airfield, and air station complex. The term "22/23 Area Groundwater" is used to denote the groundwater underlying this industrial operations area, which includes approximately 425 acres (172 hectares) (NAVFAC SW 2011c). This site consists only of the contaminated groundwater, not the overlying soils. The 22/23 Area site soils were analyzed and evaluated previously. The remedial actions and No Further Action decisions for the soil are documented in the RODs for OUs 1, 2, 3, and 5 (NAVFAC SW 2011c). There are five areas, or plumes, of groundwater contamination in the 22/23 Area Groundwater. The groundwater contamination consists of the following VOCs: trichloroethene, cis-1,2-dichloroethene, 1,1-DCE, and vinyl chloride above Federal and California MCLs, and 1,2,3-trichloropropane and 1,4-dioxane above California Notification Levels and Response Levels (NAVFAC SW 2011c). The source of these VOCs is from past releases of solvents to the ground during industrial operations. The DON provided several alternatives for proposed cleanup for contaminated groundwater at as the 22/23 Area Groundwater site in 2011 (NAVFAC SW 2011c). The DON recommended a combination of alternatives that include an alternative water supply (new well), source area treatment via in situ technologies, land use control, and long-term monitoring; the ROD is pending (NAVFAC SW 2011c). The 22/23 Area Groundwater site is located outside, and down-gradient of, the boundary of the aquifer that would be influenced by groundwater pumping from either existing or proposed new wells.

<u>DET Fallbrook</u>

There are eight active IR sites at DET Fallbrook. Most of the IR sites at DET Fallbrook are ranked as low risk and are scheduled for further study and (if necessary) cleanup in the coming years. In 2006, a Military Munitions Response Program Preliminary Assessment was completed for DET Fallbrook that recommended seven sites for further study. Four of the Military Munitions Response Program sites overlay IR sites that were already identified. DET Fallbrook IR Site 29, *Incinerator Landfill*, and IR Site 32, *Paint Shop Disposal Area*, are located on the east side of Ammunition Road, in the vicinity of the bi-directional pipeline route that is a component of Alternative 1 (Commander Navy Installations Command [CNIC] 2012).

IR Site 29, located near Building 316, is the site of an incinerator that was used to burn refuse from the mid-1940s to 1970. When the incinerator operation ceased, refuse was put into a landfill located adjacent to the incinerator. The landfill, approximately 4,500 ft^2 (420 m^2) in size and 7 ft (2 m) in depth, was used to dispose of approximate 1,000 cy of refuse, including empty paint cans and used rags that contained solvents. The landfill was covered with soil following its closure. A Site Inspection began in January 2012 (CNIC 2012).

IR Site 32, *Paint Shop Disposal Area*, is comprised of approximately 0.5 acre (0.2 hectare) located in the extreme eastern portion of DET Fallbrook, south of the Ammunition Road entrance gate in a developed portion of the base. A Site Inspection was completed in May 2010. Some metals concentrations exceed screening values; however, these levels may be naturally occurring in the Fallbrook area. A background study is underway to determine naturally occurring metals concentrations in the local area (CNIC 2012).

3.6.4.3 CERCLA Sites and Cal EPA GeoTracker Database Sites

There are no federal Superfund cleanup (i.e., CERCLA) sites in the community of Fallbrook (USEPA 2012b). GeoTracker is a database and GIS developed by the SWRCB that provides online access to environmental data. The database contains regulatory data about leaking underground fuel tanks, DOD, Spills-Leaks-Investigations-Cleanups, and Landfill sites. GeoTracker also includes data for non-underground storage tank cleanup cases, in addition to leaking underground fuel tank cases (SWRCB 2012). There are 2 sites listed by GeoTracker within, or adjacent to, the ROI of the bi-directional pipeline in the community of Fallbrook (SWRCB 2012). The bi-directional pipeline route for both alternatives runs adjacent to the active site “Circle K#777” located at 1005 East Mission Road on the southeast corner of the intersection of East Mission Road and Santa Margarita Drive in Fallbrook. This site is currently undergoing remediation for a gasoline leak (SWRCB 2012). The other site in the community of Fallbrook is not active or open (SWRCB 2012).

3.7 UTILITIES

3.7.1 Definition of Resource

This section discusses the utilities available in the project area, including potable water supply, solid waste collection and disposal, electrical power, and natural gas system.

3.7.2 Regulatory Setting

There are no federal or state laws or regulations that are applicable to utilities on MCB Camp Pendleton or DET Fallbrook. The California Public Utilities Commission regulates privately owned electric, natural gas, telecommunications, and water companies in the state of California. The California Public Utilities Commission serves the public interest by protecting consumers and ensuring the provision of safe, reliable utility service and infrastructure at reasonable rates, with a commitment to environmental enhancement and a healthy California economy.

3.7.3 Region of Influence

The ROI for utilities includes the southern portion of MCB Camp Pendleton in which project components would be constructed and operated, and adjacent project-related areas. Utilities outside the boundaries of

MCB Camp Pendleton that may be affected as a result of implementation of the action alternatives include portions of areas serviced by FPUD. This area corresponds to the geographic area in which construction and operation of facilities associated with the action alternatives would occur and existing utilities would potentially be affected. Utilities would not be impacted within DET Fallbrook under the action alternatives; therefore, DET Fallbrook is not discussed further in this section.

3.7.4 Existing Conditions

3.7.4.1 Potable Water Supply

<u>MCB Camp Pendleton</u>

The majority of development within MCB Camp Pendleton is located in the southern portion of the base and is served by the Camp Pendleton South Water System (South System). The South System derives its supply exclusively from groundwater. Approximately 90% of this groundwater is developed within the Lower SMR Basin. SMR CUP would involve further development of surface water and groundwater resources within the SMR Basin.

The South System includes 2 iron and manganese removal plants, 1 chlorination station, 16 production wells, 16 booster pump stations, 29 reservoirs, and 14 pressure zones. Of the 16 wells, 3 are located in the Las Flores Creek watershed and the remaining 13 wells are within the Lower SMR Basin. Nine of the 16 wells are utilized; 7 wells are out of service requiring repair, replacement, or investigation. Additionally, there are 2 wells in the Lower Ysidora Sub-basin that were previously used exclusively for agricultural irrigation. The South System also includes water transmission and distribution pipelines in some of the same corridors in which the project pipelines would be constructed.

MCB Camp Pendleton’s current potable water needs in the southern portion of the base are met through existing groundwater production wells. However, to meet future demands, MCB Camp Pendleton has two primary sources of increased potable water supply available: (1) purchasing imported water from MWD through the SDCWA, and/or (2) constructing facilities within the Ysidora Basin to capture additional surface runoff during high flow that currently flows out to the Pacific Ocean. This water could be stored or “banked” in the existing groundwater recharge basins during wet years and used to augment water supplies during dry years, potentially avoiding future reliance on imported or other sources for MCB Camp Pendleton.

<u>FPUD</u>

FPUD currently imports water from the Colorado River and the State Water Project (i.e., water delivered from northern California rivers). FPUD also has groundwater wells that produce in the range of up to 70-260 af/y, but these wells are not used every year. Based on records published by the SMR Watermaster’s office, FPUD purchased 11,760 af of water from the SDCWA in 2010. Almost half of the water is used for agricultural purposes. All of the potable water distributed by FPUD is treated at the Lake Skinner Filtration plant, located just east of the City of Temecula.

Climate change is expected cause snowpack reductions over the next 50 years in the Colorado River Basin (Reclamation 2012b) and Sierra Nevada (California Department of Water Resources 2009a), which would increase competition for decreased quantities of available imported water.

3.7.4.2 Solid Waste Collection and Disposal

<u>MCB Camp Pendleton</u>

The solid waste produced on MCB Camp Pendleton is collected by a contractor and disposed of on MCB Camp Pendleton at the Las Pulgas Landfill (Area 43). MCB Camp Pendleton contracts for disposal of biosolids off-base. The first phase of a seven phase expansion program was completed for both landfills in November 1999. With completion of Phase 7, the Las Pulgas landfill is not expected to reach capacity until 2047 (MCB Camp Pendleton 2010b). This estimate is based on the Las Pulgas landfill accepting 400 tons of waste per day (i.e., the maximum permitted allowance) 5 days a week (MCB Camp Pendleton 2010b). The Qualified Recycling Program is managed by the Facilities Maintenance Department and handles paper, scrap metal, appliances, waste oil, solvents, rubber, canvas, and steel.

Other materials (i.e., non-contaminated soil, concrete, and asphalt) not classified as hazardous waste is either disposed of at the 3-Mile Pit site or recycled. The 3-Mile Pit site is located off Basilone Road approximately 3 mi (5 km) north of the junction with Vandegrift Boulevard. 3-Mile Pit is currently in the process of closure and expected to be closed by March 2014.

3.7.4.3 Electrical Power

<u>MCB Camp Pendleton</u>

The electrical power provided to MCB Camp Pendleton is purchased from SDG&E. Power is distributed to MCB Camp Pendleton via two major power lines, which run from Oceanside north to the San Mateo Substation and from Fallbrook onto MCB Camp Pendleton. SDG&E has three 69-kilovolt (kV) to 12-kV substations and six 12 kV-4.16 kV substations on MCB Camp Pendleton that provide electric power (MCB Camp Pendleton 2003c). The 69-kV to 12-kV, 50-megavolt amp Haybarn substation located near the junction of Basilone Road and Vandegrift Boulevard, is the largest among the substations. This substation is supplied 69 kV from a branch of the Oceanside line and 69 kV from the Fallbrook alternative feed line. The substation distributes power to 14 developed areas at 12 kV through six 400-amp overhead feeders that consume approximately 110,000,000 kilowatt hours (kWH), or 60% of the total MCB Camp Pendleton annual power consumption (MCB Camp Pendleton 2003c). There are approximately 23 4-kV substations and 175 transformers with various sizes connected to these feeders.

The MCB Camp Pendleton electrical system consists of mostly aboveground lines, with a limited number of underground lines that serve several areas on base, including the Headquarters Area, SMR circuits, Areas 22, 24, 25, 32, 33, Wire Mountain, and the Naval Hospital. MCB Camp Pendleton is currently in the project planning stages to add approximately 70 megawatts (MW) to the Haybarn Canyon substation. Several SDG&E high voltage regional power lines (approximately 138 kV) also traverse MCB Camp Pendleton. SDG&E has obtained easements from MCB Camp Pendleton for these transmission lines and others throughout MCB Camp Pendleton. In addition, SDG&E has acquired an easement of a 200-ft (61-m) right-of-way and installed power lines adjacent to the north and northeastern MCB Camp Pendleton boundaries.

<u>FPUD</u>

SDG&E provides electrical power to FPUD facilities and consumers within the FPUD service area.

3.7.4.4 Natural Gas Systems

MCB Camp Pendleton

Three regional pipelines run through MCB Camp Pendleton, which transport natural gas and petroleum products from the refineries in Long Beach to the distribution center in Mission Valley, San Diego. The Southern California Gas Company pipeline is approximately 12 in (30 cm) in diameter and runs through MCB Camp Pendleton along the coastline, following the railroad easement.

The other two pipelines, 16 in and 10 in (41 cm and 25 cm) in diameter, are operated by Kinder Morgan (also known as San Diego Pipeline Company) for the delivery of petroleum product. One of the two petroleum pipelines is currently not in use, but it is not considered abandoned. The pipelines run parallel to each other entering MCB Camp Pendleton in the Talega Area, following Basilone Road, and exiting MCB Camp Pendleton southwest of Chappo. MCB Camp Pendleton purchases liquefied natural gas from SDG&E and the gas is distributed throughout MCB Camp Pendleton via various gas mains.

Liquefied petroleum gas and heating fuel oil are purchased from sources in the San Diego area and obtained from tanker trucks, which deliver to holding facilities throughout MCB Camp Pendleton.

FPUD

SDG&E provides natural gas service to FPUD facilities and consumers within the FPUD service area.

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CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

Consistent with the discussion of the affected environment (Chapter 3), this chapter has been divided into seven resource areas to provide a comparative framework for evaluating the impacts of the action alternatives (including No-Action Alternative) on individual resources. Each resource area identifies the potential impacts that could be expected as a result of implementation of the action alternatives. Where impacts have been identified, appropriate mitigation measures have been proposed to reduce impacts to below a level of significance.

4.1 GEOLOGICAL RESOURCES

4.1.1 Approach to Analysis

In general, the action alternatives may cause impacts to geological resources if the project caused major changes to surface topography or subsurface integrity; which could result in the project area becoming more susceptible to geological hazards (landslides, subsidence, seismic hazards); or result in substantial change to soil stability.

4.1.2 Alternative 1

4.1.2.1 Construction

Topography

Construction activities such as grading and excavation would have the potential to alter topography. The majority of the earthwork required for this project consists of excavating below ground to lay pipelines. Most of the project components would be situated where topographic slope is gentle relative to the surrounding area because pipeline alignments have been selected that follow low-lying areas and established roadways or existing pipeline alignments where slopes have already been moderated to facilitate vehicle traffic or previous projects. Construction of production wells, pump stations, and the FPUD WTP would require minimal earthwork to provide level surfaces, as these components are located in already level or previously graded areas. Through implementation of SCMs listed in Section 2.3.1.4, natural surface drainages and preconstruction vegetation patterns would be reestablished following construction. Therefore, the impacts to topography due to earthwork associated with the construction under Alternative 1 would be less than significant.

Geology

Landslides

As indicated under SCMs listed in Section 2.3.1.4, a project-specific geotechnical study would be conducted that would evaluate the engineering characteristics of the soils to be excavated, and make recommendations for slope excavation; retaining wall locations; and fill material suitability, screening, compaction, and placement that would ensure that the earthwork does not affect natural slope stability or create an unstable surface for construction. The project design phase would also include specifications for routing stormwater runoff to ensure that the earthwork does not cause erosion that would affect slope stability.

Because topography would not be substantially altered, and all subsurface filling would be done in accordance with geotechnical recommendations for stability, there would be no significant impact regarding slope stability and landslides as a result of implementation of Alternative 1.

Subsidence

Dewatering during construction and pumping associated with well development would be short term and involve small quantities of groundwater (relative to the aquifer). Therefore, no significant impacts would occur due to subsidence associated with construction activities under Alternative 1.

Seismicity and Seismic Hazards

The types of construction activities proposed (below-grade excavation, trenching to depths of less than 10 ft [3 m] below the surface, backfilling, grading, well drilling and installation, sloped canyon wall excavations within a limited area, site leveling, and concrete slab construction) are not of the type that would potentially make the ROI more sensitive to the effects of seismic activity (i.e., blasting or large-scale slope modification).

Ground Acceleration. As indicated under SCMs listed in Section 2.3.1.4, the geotechnical study would identify the expected severity of ground shaking for all project component locations, and provide seismic design parameters in accordance with the Uniform Building Code and the California Building Code. The geotechnical study would also specify requirements for trench excavation for pipeline construction to prevent collapse during construction, slope stability parameters for excavations, and retaining walls, and foundation setbacks. All new MCB Camp Pendleton facilities would be designed to comply with the NAVFAC P-355 Seismic Design Manual and the criteria identified in the most recent design specifications of the Structural Engineering Association of America.

All new FPUD facilities would be constructed in accordance with applicable County of San Diego seismic regulations.

Liquefaction. Using site-specific information about soil characteristics and depth to groundwater, the geotechnical study would also provide recommendations for design and construction procedures to minimize differential settlement in specific areas determined to be subject to liquefaction.

Therefore, construction of Alternative 1 would not cause significant impacts as a result of seismically-induced ground movement.

<u>Soils</u>

Construction activities such as grading and trenching would directly impact soils. Disturbed soils may experience changes to soil structure, loss of soil productivity, and water infiltration or holding capacities. Soil permeability could either be increased or decreased by construction activities, resulting in more or less water infiltration, because of the disruption of the existing soil structure or compaction from vehicle use. Direct effects would be confined to the construction and staging areas. Changes in soil permeability may locally increase surface water runoff, increase or decrease water loss via evaporation, or improve or reduce vegetation growth and transpiration. Disturbed soils would also be subject to indirect impacts through wind and water erosion, and increased sediment load and/or sedimentation in ephemeral drainages.

However, through the implementation of SCMs listed in Section 2.3.1.4, impacts to soils, erosion, and sedimentation would be minimized. The project design would incorporate the use of grading and drainage control to minimize erosion during the construction period, and procedures to ensure that slopes and backfilled areas do not erode when construction is completed. To prevent erosion and soil loss, excavation and grading would be scheduled to avoid the rainy season to the maximum extent practical. Construction activities would be completed in compliance with the geotechnical recommendations incorporated into project design and the CGP. As part of the CGP, a SWPPP would incorporate erosion control measures as recommended in the site-specific geotechnical study for proposed construction activities. In addition, as outlined in the *California RWQCB Erosion and Sediment Control Field Manual* (RWQCB 1999), the *MCB Camp Pendleton Soil Erosion Management Practice Handbook* (MCB Camp Pendleton 2000), the *Stormwater Best Management Handbook* (California Stormwater Quality Association 2009), and the INRMP (MCB Camp Pendleton 2011), BMPs would be implemented on MCB Camp Pendleton before, and during, the rainy season to maximize the effectiveness of erosion and sediment control measures.

At DET Fallbrook and within the community of Fallbrook, erosion control measures would also include any additional requirements of the applicable jurisdiction. Provisions for both temporary and permanent erosion and sediment controls would be implemented in accordance with the SWPPP prepared and designed specifically for the construction sites. Once implemented, these control measures would be monitored and maintained to ensure their effectiveness. With implementation of BMPs, compliance with established plans and policies, and incorporation of standard erosion control measures into project design and construction, no significant impacts to soils would occur under Alternative 1.

Following construction, soils would be stabilized and re-vegetated with native plants, as appropriate, to minimize post-construction erosion. Therefore, no significant impacts to soils would occur with implementation of Alternative 1.

Through application of the above referenced plans and procedures, there would be no significant construction impacts to geological resources with implementation of Alternative 1.

4.1.2.2 Operations

<u>Topography</u>

During operations, no further alterations of surface topography would take place, aside from minor excavation that may be required for maintenance of facilities or pipelines. Should excavation be required, SCMs would be followed and the surface would be re-graded to previous contours and stabilized with vegetation to prevent erosion from undermining the excavated area. Therefore, no significant impacts to topography would occur as a result of operational activities under Alternative 1.

<u>Geology</u>

Landslides and Seismicity and Seismic Hazards

The types of proposed operations (water diversion, transfer, storage in percolation ponds; water treatment; and pipeline maintenance) are not of the type that would increase the potential for landslides or make the ROI more sensitive to the effects of seismic activity (e.g., blasting, mining, or high-pressure subsurface liquid injection). The project facilities and components would be designed and constructed according to the requirements of the project-specific geotechnical study, and the building codes and engineering criteria described above. These design criteria would ensure that the completed facilities would not present slope or seismic hazards. Therefore, no significant impacts relative to landslides or seismicity and seismic hazards would occur as a result of operational activities under Alternative 1.

Subsidence

Groundwater pumping that is not managed has the potential to cause subsidence through aquifer compaction in the Chappo and Lower Ysidora basins if groundwater levels drop below saturated clay layers. Geological cross sections prepared for the Permit 15000 Feasibility Study (Stetson 2001) identified clay layers underlying the Ysidora aquifers that would be susceptible to subsidence. However, the surface water and groundwater model developed for the project established constraints on groundwater pumping so as not to draw the water table below these clay layers (Reclamation 2007b). Through implementation of the AMP/FOP, groundwater levels would be monitored during operations and these constraints would be implemented to maintain the groundwater level above the known clay layers susceptible to compaction (Stetson 2001; Reclamation 2009). Maintaining the groundwater level above these established levels through groundwater level monitoring would prevent compaction of the aquifer due to groundwater withdrawal (Reclamation 2007b; Reclamation 2009). Therefore, no significant impacts would occur due to subsidence and differential settlement associated with operational activities under Alternative 1.

<u>Soils</u>

The proposed facilities would incorporate standard erosion control measures to minimize potential erosion from the sites during post-construction activities (i.e., operations and maintenance). These erosion control measures and sediment control actions (e.g., planting native vegetation, installing appropriately sized storm water drainage infrastructure) would be designed and constructed on a site-specific basis at each location to minimize erosion potential at each location. As a result of continued compliance with established plans and policies and continued implementation of erosion control measures, potential impacts associated with operations and maintenance of the proposed facilities would not be significant.

Through the design and engineering controls described above, there would be no significant operational impacts to geological resources with implementation of Alternative 1.

4.1.2.3 Mitigation Measures

Through implementation of SCMs listed in Section 2.3.1.4 and the AMP/FOP, Alternative 1 would not result in significant impacts to geological resources; therefore, no additional mitigation measures are proposed.

4.1.3 Alternative 2

4.1.3.1 Construction

Construction impacts to geological resources under Alternative 2 would be similar to those discussed under Alternative 1. Construction of the gallery wells and the alternative bi-directional pipeline route would result in the same types of impacts addressed under Alternative 1. The Haybarn Canyon AWTP would be constructed in a previously disturbed and graded area, with minimal additional disturbance. The design, engineering, construction methods, and SCMs to ensure slope and seismic stability and minimize erosion would be the same under Alternative 2 as discussed under Alternative 1. Therefore, construction impacts associated with Alternative 2 would be the same as those discussed under Alternative 1, and no significant impacts to geological resources would occur.

4.1.3.2 Operations

Operational activities associated with water storage and recharge, groundwater production, and water conveyance under Alternative 2 would be similar those discussed under Alternative 1. Operations associated with the gallery wells and water treatment at the expanded Haybarn Canyon AWTP and adjacent new surface water treatment facility would be similar those for production wells and FPUD WTP, respectively.

Project facilities and components would be designed, and constructed according to the requirements of the project-specific geotechnical study, and all applicable building codes and engineering criteria as under Alternative 1. Groundwater production would be managed to avoid subsidence through implementation of the AMP/FOP, as described under Alternative 1. Therefore, operational impacts associated with Alternative 2 would be the same as those discussed under Alternative 1, and no significant impacts to geological resources would occur.

4.1.3.3 Mitigation Measures

Through implementation of SCMs referenced in Section 2.3.2.4 and the AMP/FOP, Alternative 2 would not result in significant impacts to geological resources; therefore, no additional mitigation measures are proposed.

4.1.4 No-Action Alternative

Under the No-Action Alternative, the proposed conveyance pipeline and facilities would not be constructed and no ground-disturbing activities would occur. There would be no excavation, backfill, or grading required to lay pipelines or prepare sites for structural foundations. There would be no changes to slope or surface stability, no increases in soil loss or erosion, or no changes to the effects of earthquakes. Baseline conditions (as described in Section 3.1, *Geological Resources*) would remain unchanged.

Without implementation of the Proposed Action, MCB Camp Pendleton would not have access to imported water via the bi-directional pipeline during drought or drier than normal conditions. Therefore, MCB Camp Pendleton would need to rely on increased groundwater pumping, which has the potential to cause subsidence in the Chappo and Upper Ysidora sub-basins. The Baseline Model simulation run indicates that groundwater levels would be drawn down below the top of highest clay layer in the Chappo Sub-basin. Dewatering of clays may result in permanent loss of aquifer storage and minor amounts of subsidence. Therefore, significant impacts to geological resources may occur with implementation of the No-Action Alternative.

4.2 WATER RESOURCES

4.2.1 Approach to Analysis

The action alternatives are analyzed in this section relative to potential impacts to water resources including surface water and groundwater. The impact analysis for the action alternatives includes, as applicable, discussion for individual project components and/or groups of project components that would potentially impact water resources. The impact analysis discussion is conducted for four separate water resource categories:

- Surface Water Resources,
- Groundwater Resources,
- Water Quality, and
- Floodplains.

For each of the four water resource categories, the impact analysis is further broken down by construction (short-term impacts) and operations (long-term impacts).

A surface water and groundwater model (Model) is utilized to assess potential impacts to surface water and groundwater resources and compare impacts from each alternative to the Baseline Model simulation (refer to Section 3.2.4.3 and Appendix B for further explanation of the Model). The Model calculates the surface water and groundwater fluctuation occurring under the existing and proposed diversion, recharge, and pumping rates for the same hydrologic conditions over a 50-year model period.

Analysis of specific environmental parameters may be assessed from the Model's groundwater budget and groundwater level hydrographs shown in Appendix B. VOC migration occurs when groundwater production wells are placed near known contaminate plumes. Aquifer compaction may occur when groundwater levels drop below the highest clay layer in the aquifer. Impacts to riparian habitat may occur when groundwater levels near the SMR drop below the root extinction depth of riparian vegetation. Lastly, seawater intrusion may occur when subsurface outflow from the Model at the Ysidora Narrows becomes a negative number. Each of these physical and environmental factors was reviewed throughout the development of the Baseline and two project alternative model runs.

4.2.2 Alternative 1

4.2.2.1 Surface Water Resources

<u>Construction</u>

Santa Margarita River Flow Conditions

Construction of the replacement diversion structure and excavation activities within the O'Neill Ditch and headgate would occur during the dry portions of the year when flow in the SMR is naturally low. Any surface flow would be temporarily diverted around the weir construction and returned to the river channel immediately downstream of the construction area. Flow diversion to O'Neill Ditch would not occur during construction activities for the weir or ditch. Therefore, there would be no significant impacts on SMR flow.

Construction activities related to installation of the production wells would not occur within the SMR channel. Following installation, groundwater pumping would be required in order to fully develop the wells. The well development process would include pumping the wells to remove fine-grained material introduced into the filter pack during well construction. Well development increases the rate of movement of water into the well and stabilizes the aquifer formation surrounding the well. Groundwater pumping for well development would be temporary, and would therefore have no significant impacts on SMR flow. Impacts from groundwater pumping for potable water use is analyzed under *Operations* (see below).

Sediment Load in the Santa Margarita River

Approximately 1,000 cy of depositional material would be removed from the SMR on the upstream side of the weir, adjacent to the diversion headgate during replacement of the diversion structure. This area would only be excavated from the banks and no equipment would enter the river channel. Current operations of the existing sheet pile diversion periodically require similar sediment removal behind the sheet pile weir and in front of the headwall and headgate. The estimated 1,000 cy is a small portion of the 84,000 to 102,000 cy estimated to be currently trapped behind the existing sheet pile weir (Reclamation 2004b). No other components would impact sediment load in the SMR during construction activities associated with Alternative 1. Therefore, there would be no significant impacts to sediment load within the SMR downstream of the diversion structure, due to the removal of this sediment.

Operations

SMR Flow Conditions

The proposed improvements to existing diversion and recharge facilities and increased groundwater production under Alternative 1 have the potential to impact SMR flow during operational activities. Operations under Alternative 1 would be designed to increase the sustained basin yield of the Lower SMR Basin by increasing diversion and recharge of surface water during Above Normal and Very Wet hydrologic conditions and curtailing groundwater pumping during dry hydrologic conditions. The rates of diversion, recharge, and groundwater pumping under Alternative 1 would be managed through application of the AMP/FOP. The operations guided by the AMP/FOP would optimize groundwater production while meeting the following project environmental constraints: (1) maintenance of groundwater levels within historical range, (2) no aquifer compaction, and (3) no seawater intrusion.

The Alternative 1 Model (Stetson 2012b) simulates project impacts for an expected range of hydrologic conditions while following the environmental constraints that would be applied through the AMP/FOP. The data from the Alternative 1 Model simulation (Stetson 2012b) are compared against the Baseline Model simulation (Stetson 2012a) in the following sections to determine the potential range of effects under Alternative 1. The overall annual water budget for the Alternative 1 Model simulation is provided in Table 4.2-1 (refer to Table 3.2-6 for the Baseline Model simulation annual water budget).

Table 4.2-1. Annual Water Budget for the Alternative 1 Model Simulation (af/y)

Average Yield for Hydrologic Condition	All Years	Extremely Dry and Very Dry	Below Normal	Above Normal	Very Wet
Inflow					
SMR Inflow	38,300	5,500	11,700	32,700	132,900
Subsurface Underflow	600	600	600	600	600
Lake O'Neill Spill and Release	1,100	1,100	1,100	1,100	1,200
Fallbrook Creek	1,200	100	400	1,400	3,800
Minor Tributary Drainages	2,400	1,600	1,500	2,400	4,900
Areal Precipitation	800	600	500	700	1,600
Total	**44,400**	**9,500**	**15,800**	**38,900**	**145,000**
Outflow					
SMR Outflow	29,700	500	2,500	21,200	125,000
Subsurface Underflow	100	0	100	100	100
Groundwater Pumping	10,800	6,300	9,600	13,200	14,700
Evapotranspiration	2,400	1,700	2,200	2,800	3,300
Diversions to Lake O'Neill	1,600	1,500	1,500	1,600	1,600
Total	**44,600**	**10,000**	**15,900**	**38,900**	**144,700**

Note: Values are rounded to the nearest 100 af.
Source: Stetson 2012b.

Annual and Seasonal Flow. Under Alternative 1 operations, SMR flow would continue to show a large range of seasonal and annual variability based hydrologic condition (Table 4.2-1). SMR annual inflow to the Model averaged 38,300 af/y and varied from 5,500 af/y to 132,900 af/y for various hydrologic conditions; SMR Outflow from the Model boundary averaged 29,700 af/y, varying from 500 af/y during Extremely Dry/Very Dry years to 125,000 af/y during Very Wet years (Table 4.2-1).

Surface water diversions at the inflatable weir would be managed to allow for water supply requirements to be met while protecting groundwater resources and responding to environmental concerns. Table 4.2-2 summarizes the Alternative 1 average annual surface water diversion from the SMR and provides a comparison to baseline conditions. The increased diversion capacity under Alternative 1 would result in average annual diversion rates from the SMR to increase from 7,500 af/y (Baseline Model) to 10,000 af/y (Stetson 2012a,b). Changes in surface diversions under Alternative 1, as compared to the Baseline, would be least during Extremely Dry/Very Dry hydrologic conditions (+400 af/y) and greatest during Very Wet conditions (+6,500 af/y) when flow is greatest in the SMR (Table 4.2-2).

Table 4.2-2. Average Annual Surface Water Diversion at the Inflatable Weir for the Alternative 1 Model Simulation (af/y)

Location/Diversion	All Years	Extremely Dry and Very Dry	Below Normal	Above Normal	Very Wet
SMR Inflow	38,300	5,500	11,600	32,800	132,900
Diversion to Percolation ponds	8,400	1,700	5,700	11,500	16,500
Diversion to Lake O'Neill	1,600	1,500	1,500	1,600	1,600
Total Diversion	**10,000**	**3,200**	**7,200**	**13,100**	**18,100**
Change from Baseline	*+2,500 (+33%)*	*+400 (+14%)*	*+600 (+9%)*	*+3,400 (+35%)*	*+6,500 (+56%)*

Notes: SMR = Santa Margarita River.
Source: Stetson 2012a,b.

Operations associated with the new and existing production wells would include additional groundwater pumping that would also induce increased recharge directly from the SMR (refer to Section 4.2.2.2, *Groundwater Resources*, for a more detailed description of pumping rates). Table 4.2-3 shows the change in average annual surface flow under Alternative 1 that would be expected to occur at the Ysidora gage and at the downstream boundary of the Model near the SMR Estuary. Figure 4.2-1 shows the average monthly streamflow at the downstream boundary of the Model for the various hydrologic conditions under Alternative 1 and the Baseline (a more detailed comparison of average monthly conditions is provided in Appendix B).

Table 4.2-3. Change in Average Annual SMR Flow for the Alternative 1 Model Simulation (af/y)

Hydrologic Condition	Ysidora Gage			Model Downstream Boundary[1]		
	Baseline	Alternative 1	Change	Baseline	Alternative 1	Change
All Years	34,500	31,900	-2,600 (-8%)	32,000	29,700	-2,300 (-7%)
Extremely Dry/ Very Dry	1,100	1,100	0 (0%)	500	500	0 (0%)
Below Normal	6,700	4,800	-1,900 (-28%)	3,800	2,500	-1,300 (-34%)
Above Normal	28,600	24,500	-4,100 (-14%)	24,800	21,200	-3,600 (-15%)
Very Wet	132,000	127,100	-4,900 (-4%)	130,000	125,000	-5,000 (-4%)

Note: [1] Flow out of the model's downstream boundary is approximately 0.85 mi upstream of Stuart Mesa Bridge.
Sources: Stetson 2012a,b.

Operations under Alternative 1 would be guided through implementation of the AMP/FOP. The hydrologic condition would be identified each year on May 1 based on the previous winter's runoff, and the AMP/FOP would be updated to provide diversion and pumping schedules for the upcoming year. The AMP/FOP would include real-time monitoring of various physical and environmental parameters that would trigger modifications to diversion, recharge, and pumping rates to protect resources in the SMR and riparian habitats. By design, the AMP/FOP would also be modified to account for long term changes in climate patterns such as flashier winter storms, reduction in annual precipitation, and/or cyclical climate patterns (e.g., long term dry or wet periods).

Note: Modeled data is for location approximately 0.5 mile upstream of the Santa Margarita Estuary.
Source: Stetsion 2012c.

Figure 4.2-1
Simulated Average Monthly Santa Margarita River Surface Flow for Alternative 1

Overall, operations under Alternative 1 would result in additional diversion and groundwater pumping from the Lower SMR Basin, as compared to the Baseline. However, the greatest diversion/pumping rates and subsequent reduction in surface flow would occur when the most amount of water is flowing in the SMR during Very Wet years (Tables 4.2-2 and 4.2-3). High runoff during these Very Wet years would otherwise discharge to the Pacific Ocean. By design of operations under Alternative 1, MCB Camp Pendleton's water demand would be supplemented by imported water supplies during Extremely Dry/Very Dry hydrologic conditions, allowing for substantially less diversion and groundwater pumping. This would have a net result of maintaining the same annual surface flow, as compared to the Baseline simulation (Table 4.2-3) while riparian areas and associated resources are most sensitive during Extremely Dry/Very Dry hydrologic conditions.

As previously discussed in Chapter 3, streamflow during the dry season occurs due to rising groundwater at natural constrictions (e.g., the Narrows) in the Lower SMR Basin. In between these locations, the SMR may be intermittent, depending on hydrologic conditions. Surface flows would be similarly intermittent during the dry season under Alternative 1 operations.

Operations under Alternative 1 include the implementation of an AMP/FOP which would be constrained by streamflow, groundwater levels, and biological resources. These parameters would be monitored and variation outside their natural variability would result in changes in diversions and groundwater pumping. Therefore, the change in surface flow would be within the natural variability of the SMR watershed and there would no significant impacts to surface flow in the SMR.

Peak Flow. Alternative 1 would result in reduced peak surface flows in the SMR downstream from the diversion structure. With a maximum diversion of 200 cfs, as compared to the existing maximum diversion of 60 cfs, up to 140 cfs of additional surface flow could be diverted. This increase in diversion capacity would typically be utilized only in Above Normal and Very Wet years and during the hours/days (depending on magnitude of storm) following a storm event. Given proposed versus existing diversions, a reasonable assumption is that the occurrence of flows above 60 cfs would diminish as flows ranging from 200 cfs to 60 cfs would potentially be captured by diversions during the receding limb of the hydrograph.

Reductions to instantaneous peak streamflow during storm events associated with the increased diversions under Alternative 1 are provided in Table 4.2-4. Under the proposed operations, the diversion of up to 200 cfs would occur during storm events smaller than the 5-year event (8,000 cfs). Assuming the maximum potential diversion of 200 cfs under Alternative 1 did occur, the 2-year flood event (1,000 cfs) would be reduced by an additional 14% above baseline conditions, but for the 5-year and greater flood events, reductions would be less than 1.8%. Although a 14% reduction in the magnitude of the 2-year event may temporarily reduce the size of the bankfull channel, the larger events (5-year and greater) are typically responsible for affecting channel geomorphology, and peak flows would be only slightly reduced during these large events with a diversion increase of 140 cfs. Potential Impacts to habitat along the SMR resulting from this change in river geomorphology downstream of the diversion structure are discussed in Section 4.3, *Biological Resources*.

Under operations of Alternative 1, average annual increases in surface flow diversions from the SMR would be primarily due to the increased diversion capacity at the inflatable weir. The increased diversion capacity would be capable of maximizing diversions when surface flows are high during Above Normal and Very Wet years. Therefore, there would be no significant impacts to peak flow in the SMR. As discussed below, replacement of the existing sheet pile weir and Alternative 1 operations would likely result in improved sediment transport through the SMR to the Pacific Ocean.

Table 4.2-4. Flood Flow Frequency at Ysidora Gage

Return Period (years)	Frequency	Instantaneous Peak Streamflow (cfs)	Maximum Reduction in Peak Streamflow[1]	
			60 cfs Diversion	200 cfs Diversion
2	50%	1,000	6%	20%
5	20%	8,000	0.7%	2.5%
10	10%	17,000	0.4%	1.2%
20	5%	26,000	0.2%	0.8%
50	2%	37,500	0.2%	0.5%
100	1%	46,000	0.1%	0.4%

Note: [1] This assumes that maximum diversion would occur during peak flow (i.e., 1,000 cfs would be reduced to 800 cfs for the 2-year event under Alternative 1).
cfs = cubic feet per second.
Sources: USACE 2000; Reclamation 2004b.

Sediment Load in the Santa Margarita River

The existing sheet pile diversion structure allows for the accumulation of sediment behind the structure. To maintain operation of the structure, sediment is periodically excavated and hauled to an off-site location. The inflatable weir diversion structure is designed to be self-cleaning, thereby minimizing operational and maintenance costs associated with the removal of sediment that currently builds up behind the existing structure. This would also reduce the transport of sediment into the O'Neill Ditch, the percolation ponds, and Lake O'Neill. Operations personnel would lower/deflate the 46-ft (14-m) gate section of the new diversion structure during smaller flood events (i.e., the 2- to 5-year events) and both gates during the first 12 to 24 hours of any significant flood flow (i.e., greater than the 10-year event), for the purpose of flushing accumulated sediments and debris downstream. Because approximately 95% of the sediment transport in the SMR is estimated to occur during the 10-year or greater flood event (Reclamation 2004b), the designed self-cleaning nature of the proposed structure would aid in maintaining the natural flushing that is currently prevented from occurring due to the existing structure's design.

An estimated 84,000 to 102,000 cy of sediment is currently trapped behind the existing sheet pile weir and this represents approximately 2 to 4 times the estimated average annual sediment load of 36,000 to 51,000 tons per year that passes the I-5 crossing (Reclamation 2004b). Under the proposed operations of the inflatable weir, this trapped sediment would be flushed out when the gates are lowered during a 10-year or greater flood event. As a result of this self-cleaning nature, less sediment would remain trapped behind the weir and additional sediment would be carried downstream as compared to existing conditions. It is therefore likely that the amount of sediment released during subsequent flushing events would be less than the amount released during the initial flushing. The additional sediment load in the river would return sediment transport to a more "natural" condition.

Sediment transport models indicate that this sediment would initially deposit in the approximately 1-mi (1.6-km) reach just downstream of the weir where the floodplain widens substantially and the river bed is prone to deposition (Reclamation 2004b). The model also predicts that the reaches further downstream are degradational and that the sediment would be gradually transported to the mouth of the SMR, but may cause temporary aggradation near the mouth until completely flushed out (Reclamation 2004b). For existing conditions, the modeled sedimentation patterns downstream of the diversion structure suggest aggradation of up to 2 ft (0.6 m), and degradation of up to 5 ft (1.5 m) for most flood conditions.

Therefore, operational impacts from this initial temporary sediment pulse would be within the range of existing sedimentation conditions downstream of the weir.

As recommended in *Hydraulic and Sediment Considerations for Proposed Modifications to O'Neill Diversion Weir on SMR* (Reclamation 2004b), an operation plan based on analysis of river hydraulics and sediment loads would be prepared to provide guidance on operation of the diversion structure to minimize downstream impacts from sediment transport. The replacement structure would be beneficial by returning sediment transport in the SMR to more natural conditions. Therefore, there would be no significant impacts to sediment load within the SMR downstream of the diversion structure.

SMR Estuary

As discussed in Section 3.2.4.3, SMR flow plays a role in keeping the SMR Estuary open to tidal influence while peak flows support the reopening of the estuary after extended periods of being closed. Historical data indicate that the estuary closed during drier hydrologic cycles and opened following winter-time high flows. Photographic evidence indicates the estuary was closed during Extremely Dry/Very Dry and Below Normal hydrologic years that occurred during the 1960s, 1970s, and 1980s; and estuary gage data show that the estuary was closed most often during drier than normal hydrologic conditions of the late 1980s, late 1990s, and in to the 2000s. Although no direct correlation may be made between streamflow rates and the status of the estuary closure, historical evidence indicates estuary closure tends to occur when SMR flow is low during drier than normal hydrologic conditions. As discussed above under *SMR Flow Conditions*, SMR CUP would result in reduction to SMR flow; however, this would not result in an overall shift of hydrologic condition going from wetter to drier. Therefore, closure of the estuary under Alternative 1 operations would be expected to continue to occur periodically during Below Normal and Extremely Dry/Very Dry hydrologic conditions at an occurrence rate similar to that which took place during existing conditions over the past 60 years.

After extended periods of closure, (i.e., greater than a few weeks), the SMR Estuary historically remained closed until the next stormwater runoff event occurred as indicated by the SMR flow hydrograph (refer to Figure 3.2-8). These increased flows typically occur as a result of the first significant winter rain event(s). Under Alternative 1 operations, the diversion from the SMR would remove only a small percentage of peak stormwater runoff (refer to Table 4.2-4). The peak streamflow rate from the 2-year storm event on this portion of the SMR is estimated to be 1,000 cfs (USACE 2000). Even with the maximum diversion rate of 200 cfs, this would only reduce the 2-year flood event peak discharge to 800 cfs, which historical data indicates would be adequate to breach the sand berm at the mouth of the SMR Estuary (refer to Figure 3.2-8). The typical early winter storm flows under Alternative 1 would be sufficient to breach a sand berm at the mouth of the estuary during closed conditions.

Therefore, operations under Alternative 1 would be expected to have minimal, if any, effects on the frequency or duration of estuary closure beyond historical occurrence and as such, impacts to the SMR Estuary would not be significant.

4.2.2.2 Groundwater Resources

<u>Construction</u>

General Construction Impacts to Groundwater Resources

Construction activities associated with pipeline trenching and excavation for facility foundations would typically remain above the groundwater table. However, if groundwater is encountered, dewatering wells or sumps may be used to lower the water table a few feet below the impacted construction area. This lowering of the water table would be temporary and water levels affected by construction dewatering would return to normal levels when construction is completed. Therefore, no significant impacts to groundwater levels would occur during general construction activities.

Production Wells and Collection System

Groundwater pumping for well development would temporarily lower groundwater levels surrounding the well, but groundwater levels would recover soon after well development pumping has ceased. Therefore, no significant impacts to groundwater levels would occur during well development. Impacts from groundwater pumping for potable water use is analyzed under *Operations* (see below).

Operations

The improvements to existing diversion and recharge facilities and increased groundwater production associated with the existing and four new proposed groundwater production wells have the potential to impact groundwater resources during operational activities. As discussed in Section 4.2.2.1, *Surface Water Resources*, Alternative 1 operations would include the implantation of an AMP/FOP and sustained basin yield would be increased. Operation of the 16 groundwater production wells (12 existing and 4 new wells) would be managed though an AMP/FOP that is constrained by (1) maintenance of water levels within historical range, (2) no aquifer compaction, and (3) no seawater intrusion. In addition to the 16 production wells, 6 observation wells that monitor groundwater levels in riparian and grassland areas of the three sub-basins would be used to manage production locations and rates.

Based on the environmental constraints and operational parameters, the Alternative 1 Model simulation shows a 2,400 af/y increase in sustained basin yield above Baseline basin yield (Stetson 2012a,b). Groundwater pumping would be curtailed during drier hydrologic conditions by relying on an annual average of 500 af/y of imported water to meet MCB Camp Pendleton's potable water demand. In addition, Alternative 1 groundwater pumping would be managed to minimize pumping near the riparian corridor and shifting pumping to grassland areas during drier periods to reduce the potential for adverse impacts to groundwater resources.

Operational activities under Alternative 1 would be based on hydrologic conditions, where the AMP/FOP would prescribe pumping rates ranging from a maximum during Very Wet years to substantial reductions in groundwater production during Extremely Dry/Very Dry years (Table 4.2-5). The change from Baseline for Extremely Dry/Very Dry hydrologic conditions (-1,100 af/y) reflects the curtailment in pumping rates during consecutive drier than normal water years.

Table 4.2-5. Average Annual Groundwater Pumping for the Alternative 1 Model Simulation (af/y)

Hydrologic Condition	Upper Ysidora Pumping	Chappo Pumping	Total Pumping	Change from Baseline
All Years	6,600	4,200	10,800	+2,400 (+29%)
Extremely Dry and Very Dry	3,900	2,400	6,300	-1,100 (-15%)
Below Normal	6,100	3,500	9,600	+900 (+10%)
Above Normal	8,200	5,000	13,200	+4,500 (+52%)
Very Wet	8,400	6,300	14,700	+6,000 (+69%)

Note: Annual recharge rates rounded to nearest 100 af/y.
Sources: Stetson 2012a,b.

The increase in pumping during wet years would coincide with increased total diversion/recharge (Table 4.2-6). When compared to Baseline conditions, the change in recharge under Alternative 1 would be least during Extremely Dry/Very Dry years and greatest during Very Wet years when diversions capture runoff from high flow events to replace storage lost during drier than normal years. The minimal change in diversion/recharge during Extremely Dry/Very Dry conditions under Alternative 1 (-200 af/y) would occur due to reductions in project related diversions and groundwater pumping which have been designed to meet environmental constraints. This would support the minimal change in streamflow at the Ysidora gage and downstream model boundary (0 af/y) as previously discussed in the Section 4.2.2.1, *Surface Water Resources*. In summary, the increased average annual groundwater production (2,400 af/y) under Alternative 1 would be balanced with increased average annual groundwater recharge (2,500 af/y) (Stetson 2012a,b), resulting in an increase to the sustained basin yield and no long term effects on the Ysidora Groundwater Basin.

Table 4.2-6. Average Annual Groundwater Recharge for the Alternative 1 Model Simulation (af/y)

Hydrologic Condition	Groundwater Recharge at Ponds 1-7	Streambed Infiltration	Total Recharge	Change From Baseline
All Years	8,900	3,700	12,600	+2,500 (+25%)
Extremely Dry and Very Dry	2,000	4,800	6,800	-200 (-3%)
Below Normal	6,000	5,200	11,200	+1,500 (+15%)
Above Normal	11,900	3,400	15,300	+3,600 (+31%)
Very Wet	17,400	200	17,600	+5,200 (+42%)

Note: Annual recharge rates rounded to nearest 100 af/y.
Sources: Stetson 2012a,b.

The groundwater available for pumping fluctuates seasonally and varies by hydrologic condition. Pumping would be reduced during dry years to prevent seawater intrusion and protect riparian habitat by maintaining minimum groundwater levels. During consecutive drier than normal water years, pumping rates would be further reduced, with restricted groundwater production continuing until wetter hydrologic conditions occur. Specifically, through the application of the AMP/FOP under Alternative 1, groundwater pumping would be curtailed when the average monthly groundwater levels drops to within 3 ft (1 m) of the historical minimum along the riparian corridor. Pumping would be further reduced or shut off if the groundwater level drops to within 0.5 ft (0.2 m) of the historic minimum. Pumping rates would remain reduced until the average monthly groundwater levels returned to 0.5 ft (0.2 m) above the historical minimum (Stetson 2009). The pumping rates for Extremely Dry/Very Dry hydrologic conditions provided in Tables 4.2-1 and 4.2-5 reflect the curtailment in pumping rates during consecutive drier than normal water years.

Based on the Alternative 1 Model simulation results presented in Appendix B, depth to groundwater would be greatest during Extremely Dry/Very Dry conditions and somewhat less during wetter than normal hydrologic conditions. Application of the AMP/FOP would include the monitoring and constraints mentioned above, therefore maintaining groundwater levels above historical groundwater lows. Decreased water levels would be temporary and seasonal, and would be created to allow for additional storage capacity within the aquifer to maximize recharge capacity during the wet season. The Alternative 1 Model simulation also indicates that groundwater levels would not increase significantly above historic baseline levels due to increased recharge rates. For this project, the effect of lowered groundwater levels may result in reduced pumping efficiency or production from other MCB Camp Pendleton supply wells. However, through application of the AMP/FOP, the wells throughout the groundwater basin would be managed to optimize pumping rates and minimize reduction in pumping efficiency.

Aquifer compaction through over-pumping could also impact groundwater resources by resulting in permanent reduction in aquifer storage volume. However, as discussed in Section 4.1.2.2, *Surface Water Resources*, groundwater pumping would be managed through the AMP/FOP to prevent subsidence through aquifer compaction by maintaining groundwater levels above saturated clay layers. Therefore, no subsidence and subsequent loss of aquifer storage volume would occur.

The Model also simulates subsurface underflow and evapotranspiration. Subsurface underflow out of the downstream Model boundary indicates the potential for seawater intrusion. A neutral or positive value for subsurface underflow indicates that a groundwater gradient toward the ocean is maintained while a negative value would indicate landward migration of saltwater into the freshwater aquifer could occur. Subsurface underflow out of the Model was positive (+100 af/y) for both the Alternative 1 and the Baseline simulations (Tables 3.2-6 and 4.2-1), indicating that no saltwater intrusion would be expected to occur.

Modeled evapotranspiration indicates the consumptive use of groundwater by riparian phreatophytes and can be used as an indicator of potential impacts to riparian habitat and the riverine environment. A substantial decline in annual evapotranspiration could be indirectly related to a stressed riverine environment. Evapotranspiration under Baseline conditions averaged 2,500 af/y (Table 3.2-6) and decreased by 100 af/y (Table 4.2-1) for Alternative 1. This would not be considered a significant decline in annual evapotranspiration. Due to Alternative 1 operations management which includes reductions in both diversions and pumping during drier than normal conditions, evapotranspiration would increase from 1,300 af/y to 1,700 af/y during Extremely Dry/Very Dry hydrologic conditions when compared to the Baseline (Tables 3.2-6 and 4.2-1, respectively). An increase in evapotranspiration is directly related to an increase in groundwater levels that support riparian vegetation and surface water flow throughout the Upper Ysidora, Chappo, and Lower Ysidora sub-basins.

Therefore, with implementation of the constraints through the AMP/FOP discussed above, there would be no significant impacts to groundwater resources with under Alternative 1 operations. Potential impacts to the riparian corridor and phreatophytes in Ysidora Basin associated with reductions in groundwater levels are discussed in Section 4.3, *Biological Resources*.

4.2.2.3 Water Quality

<u>Surface Water</u>

Construction

Construction activities associated with the Alternative 1 may result in the generation of pollutants including sediment and other construction-related constituents (such as nutrients, trace metals, oil and grease, miscellaneous waste, and other toxic chemicals). Without controls, the pollutants could potentially enter receiving waters. Because the combination of construction activities associated with the project would disturb more than 1 acre (0.4 hectare) of land, Alternative 1 would be subject to the requirements of the SWRCB CGP as described under SCMs in Section 2.3.1.4, *Special Conservation Measures*.

The construction contract would require that the construction contractor prepare and implement a SWPPP and implement all applicable BMPs in accordance with the CGP from initiation through completion of construction activities. Appropriate construction BMPs would be implemented in accordance with the CGP that meet requirements for Best Available Technology and Best Conventional Pollutant Control Technology to reduce or eliminate pollutants from entering the receiving waters. These BMPs generally fall into four main categories: erosion control, soil stabilization, sediment control, and non-stormwater management. Implementation of a SWPPP and BMPs would minimize the potential for pollutants to enter receiving waters during construction.

If trenching associated with pipeline construction encounters groundwater in portions of the pipeline alignment, dewatering would be required. Dewatering activities would be temporary and localized, and the measures indicated in Section 2.3.1.4, *Special Conservation Measures*, would be followed, including the compliance with *General Waste Discharge Requirements for Discharges from Groundwater Extraction*, if necessary.

The replacement of the diversion structure would require temporary diversion of surface water around the construction site and additional dewatering, as described in Section 2.3.1.1. Dewatering effluent from within the SMR channel would be considered "surface water" and would therefore not be subject to regulations for groundwater dewatering discharges. Pumped dewatering effluent that is free from all visible contaminants would be returned to the SMR downstream of the construction area. Pumped water that contains turbidity above ambient pre-project conditions in the SMR would be treated to remove sediment prior to being re-introduced downstream. Options for treatment include baffle systems, anionic polymers systems, dewatering bags, or off-stream tanks for either treatment (settling) or disposal. Chemical coagulants would not be used to aid the settling of dewatering effluent. Once the dewater effluent reaches ambient pre-project conditions, it would be returned to the SMR downstream of the construction area.

Approximately 6,000 cy of material would be removed from O'Neill Ditch and would be placed in Ponds 6 and/or 7 for dewatering. Through previous projects and consultations with the USACE, Ponds 1-7 were determined to be non-jurisdictional. Therefore, the materials from O'Neill Ditch would not be placed in any surface water body deemed "waters of the U.S." Water from the material would be allowed to percolate into the groundwater basin, thus, a Section 404 permit would not be required.

Trenchless construction (e.g., bore-and-jack or horizontal directional drilling) would occur in areas with sensitive water resources and wetlands such as the SMR and associated floodplain, Lake O'Neill overflow outlet, and Fallbrook Creek. A hydrogeologic evaluation would be prepared to investigate geologic formations, groundwater depths, and the distance and depth of drilling prior to trenchless construction. Trenchless construction methods such as horizontal directional drilling that result in discharge of uncontaminated slurries or drilling muds would follow SCMs indicated in Section 2.3.1.4, *Special Conservation Measures*, including the compliance with *San Diego Basin Plan Conditional Waiver No. 9-Discharges of Slurries to Land*, if necessary. Installing the pipeline beneath the SMR, Lake O'Neill overflow outlet, and Fallbrook Creek would avoid direct impacts to the creek beds and associated downstream water quality.

Therefore, through implementation of SCMs, no significant impacts to surface water quality would occur during construction activities associated with Alternative 1.

Operations

New facilities that result in the increase in stormwater runoff have the potential to affect surface water quality. Components associated with Alternative 1 do not involve the construction of large buildings or other large impervious areas such as parking lots and would therefore, contribute little additional stormwater runoff and/or pollutants to surface waters. However, all new facilities on MCB Camp Pendleton and DET Fallbrook would incorporate the concept of LID as described in Section 2.3.1.4, *Special Conservation Measures*. Therefore, increased stormwater runoff would be minimized and there would be no significant impacts to surface water quality associated with stormwater runoff.

Pipeline and well maintenance operations that result in discharge of water would follow SCMs indicated in Section 2.3.1.4, *Special Conservation Measures*. Potential water quality impacts associated with diversion/recharge/pumping operations and brine discharge are discussed below according to their potential to impact the surface and ocean water bodies within the ROI: *SMR, SMR Estuary, and the Pacific Ocean*.

SMR. The replacement inflatable diversion structure would increase the instantaneous diversion capacity from the SMR to O'Neill Ditch from 60 cfs to 200 cfs. However, the diversion structure would act as a weir, similar to the existing sheet pile weir, and serve only as a point of potential hydraulic control. This physical structure would not directly alter the water quality of flows in the SMR. Operational activities associated with the O'Neill Ditch and headgate only involve the conveyance of water diverted from SMR to the percolation ponds and Lake O'Neill and would not affect water quality.

The impact of reduced surface flows during Below Normal hydrologic conditions to water quality and beneficial uses are unknown. Reduced surface flows may have negative or positive effects on dissolved oxygen, nutrients, and water temperature depending on the contribution of rising groundwater on ambient conditions. Implementation of a water quality monitoring program as part of the AMP/FOP would monitor for changes in SMR water quality during all hydrologic conditions.

Reduction in surface flow could also potentially reduce the SMR's capacity to absorb or dilute potential spills or other contaminated discharges. However, MCB Camp Pendleton would continue to follow a base-wide Spill Prevention and Response Procedures Program to prevent spills and minimize potential adverse impacts and would comply with all San Diego RWQCB and SWRCB requirements for discharges. In addition, SCMs (Section 2.3.1.4) require implementation of the same protective and restoration measures for non-emergency accidents as would apply to construction. As discussed in Section 4.1.2.2, *Surface Water Resources,* SMR flow would be within the range of natural variability and would therefore, not be subject to greater adverse impacts due to accidental spills and discharges, as compared to the Baseline. Given the unpredictable location of accidents, their low probability in any particular place, and the relatively small-scale, temporary effects that are most likely to occur, these types of accidents would have minimal impacts on water quality.

The inclusion of the OSMZ under Alternative 1 is intended to result in continued benefit to water quality in the SMR by preventing additional construction, long-term development activities, and conversion to agricultural land use in this area that could lead to increased impairment to water quality in the SMR. The OSMZ would also continue to act as buffer between the river and surrounding agricultural and developed lands, removing nutrients and other pollutants from stormwater runoff. In addition, protection of this land would prevent development of riparian rites and increased withdrawals upstream of the project.

Therefore, there would be no significant impacts to SMR water quality from project operations and SMR water quality would continue to benefit from inclusion of the OSMZ with implementation of Alternative 1.

SMR Estuary. As described above, there would be no significant impacts SMR water quality which flows into the estuary. When the SMR Estuary is in a "closed" state, the water quality in the estuary can degrade over time, resulting in potential impairment to designated beneficial uses in the estuary. However, as discussed in Section 4.2.2.1, *Surface Water Resources*, operations under Alternative 1 would not be expected to alter the frequency or duration of estuary closure beyond historical occurrence. Therefore, operations under Alternative 1 would not contribute to significant impacts to water quality in the SMR Estuary.

Pacific Ocean. Under Alternative 1, the treatment of groundwater at the FPUD WTP would create a waste stream, consisting of RO and ion exchange brine. The maximum brine discharge would be approximately 1 cfs with an estimated TDS concentration of 5,816 mg/L that would be discharged to the Pacific Ocean via the existing Oceanside Ocean Outfall. A TDS concentration of 5,816 mg/L is slightly greater than 10% of ocean salinity. The additional brine from the FPUD WTP would be blended with the existing FPUD flows discharged under FPUD's Oceanside Ocean Outfall NPDES Permit and would meet the permit requirements for their permitted discharge flows.

FPUD has an NPDES Permit (CA0108031) that was renewed in August of 2012, which allows for an average annual discharge of up to 2.4 MGD effluent from the Oceanside Ocean Outfall. The brine discharge under Alternative 1 would be conveyed through the existing Fallbrook Outfall Pipeline, discharged under FPUD's Oceanside Ocean Outfall NPDES Permit, and would meet the permit requirements for permitted discharge flows. The City of Oceanside also has an NPDES Permit (CA0107433) to discharge via the Oceanside Ocean Outfall. The City of Oceanside discharge includes portions from other local cities or sanitation districts, MCB Camp Pendleton, and Biogen Idec Pharmaceuticals Corporation. The City of Oceanside permit includes the discharge of brine from a brackish groundwater desalination facility, which is similar to the proposed FPUD WTP brine, and allows for an average annual discharge of up to 22.9 MGD of combined effluent and brine.

The brine from the FPUD WTP would be blended with the existing flows discharged under the FPUD and Oceanside Ocean Outfall NPDES Permits and would not substantially alter the characteristics of these permitted discharge flows. The FPUD NPDES permit would need to be amended to allow for the inclusion of the brine from the project. The brine discharge from the FPUD WTP is not expected to impact the ability of FPUD to meet NPDES permit requirements. Therefore, no significant operational impacts to ocean water quality would occur with implementation of Alternative 1.

Treatment of MCB Camp Pendleton's potable water would occur at the existing Haybarn Canyon AWTP (P-113); brine discharge from the existing Haybarn Canyon AWTP was covered under NEPA in the P-113 EA, which found no significant impacts from brine discharge to the Pacific Ocean (USMC 2010).

<u>Groundwater</u>

Construction

Under Alternative 1, construction activities would include surface water quality protection measures that would also serve to protect groundwater quality. By adhering to the provisions of the CGP and implementing a SWPPP and BMPs associated with addressing site- and activity-specific water resource protection needs, there would be a reduction in stormwater pollutant loading potential and thus a reduction in pollution loading potential to the underlying groundwater. Therefore, there would be no impacts to groundwater quality due to construction activities associated with Alternative 1.

Operations

Increased groundwater recharge and extraction would have the potential to impact groundwater quality during operational activities. However, the water quality of recharge waters under Alternative 1 would be the same as the water quality of waters being recharged under existing conditions, with the primary difference being an increase in recharge volume.

As described in Section 3.2.3.4, the TDS in the SMR measured at various upstream locations near or upstream of the diversion point shows a wide range of TDS from as low as 365 mg/L to as high as 935 mg/L (refer to Table 3.2-11). The average value estimated at the point of diversion is 786 mg/L, slightly above the Basin Plan objective of 750 mg/L. As noted in Section 3.2.4.4 and Table 3.2-13, TDS concentration in the Ysidora Basin ranged from approximately 660 mg/L to over 900 mg/L and averaged 790 mg/L. Therefore, the TDS of water recharged from the SMR would be relatively similar to, or slightly better than, the underlying groundwater quality using TDS as the primary indicator of mineral quality.

Also, as indicated in Section 3.2.4.4, nitrate-N concentrations in the SMR can range from 1.2 mg/L to 4.2 mg/L with an average value of approximately 2.8 mg/L (refer to Table 3.2-11). These values are well below the 10 mg/L Basin Plan objective for groundwater nitrate, and similar to the range found in existing wells in the Ysidora Basin (Table 3.2-13).

Therefore, because the recharged SMR water would be of similar or better water quality than the underlying groundwater, the recharge of these waters to the groundwater aquifer would improve or have no significant adverse impacts on groundwater quality.

4.2.2.4 Floodplains

Construction

As mentioned above, construction of the replacement diversion structure would occur during the dry portions of the year, and therefore, construction activities are not expected to have any effect on flow conditions in the SMR during periods when potential flood flows are likely to occur. No other components would impact flood flows during construction activities associated with Alternative 1. Therefore, there would be no significant impacts on frequency of flood flows, the flood flow regime, or extent of flooding in the SMR.

Operations

The frequency and magnitude of flood flows in the SMR are driven by the hydrology of the up-gradient watershed. Both gates of the inflatable weir would be lowered/deflated during any significant flood flow (i.e., greater than the 10-year event), thereby reducing water surface elevations in the vicinity and upstream of the weir in comparison to existing conditions. In addition, the flushing of sediment currently trapped behind the weir would allow for increased conveyance in the channel upstream of the weir and also contribute to reduced water surface elevations in comparison to existing conditions. Overall, this would reduce flooding in this area as compared to the existing condition. Through implementation of LID, as described in Section 2.3.1.4, *Special Conservation Measures*, Alternative 1 would result in a minimal increase in stormwater runoff. Therefore, there would be no significant impacts on frequency of flood flows, the flood flow regime, or extent of flooding in the SMR.

4.2.2.5 Mitigation Measures

Through implementation of SCMs listed in Section 2.3.1.4 and the AMP/FOP, Alternative 1 would not result in significant impacts to water resources; therefore, no additional mitigation measures are proposed.

4.2.3 Alternative 2

4.2.3.1 Surface Water Resources

Construction

Under Alternative 2, impacts to surface water resources associated with construction activities would be the same as those described under Alternative 1. In addition, the gallery wells would be constructed adjacent to the SMR channel during the dry season. Following installation of the gallery wells, pumping would be required to develop the wells, which would result in drawdown of surface water within the

SMR. However, pumping would be temporary and SMR surface flow would quickly return to normal; therefore, no significant impacts would occur.

Operations

SMR Flow Conditions

Under Alternative 2, impacts to surface water resources associated with operation of the diversion structure and production wells would be similar to those described under Alternative 1. However, the operation of four new gallery wells under Alternative 2 would increase direct diversion from the SMR, capturing excess surface flow above the 200 cfs capacity of the improved diversion weir and O'Neill Ditch. The operations would include an AMP/FOP that would optimize groundwater production while meeting the following project environmental constraints: (1) no aquifer compaction, and (2) no seawater intrusion (*Note:* the maintenance of groundwater levels within historical range constraint would not be included under Alternative 2).

The data from the Alternative 2 Model simulation (Stetson 2012d) are compared against the Baseline Model simulation (Stetson 2012a) in the following sections to determine the potential range of effects under Alternative 2. The overall annual water budget for the Alternative 2 Model simulation is provided in Table 4.2-7 (refer to Table 3.2-6 for the Baseline Model simulation annual water budget).

Table 4.2-7. Annual Water Budget for Alternative 2 Model Simulation (af/y)

Average Yield for Hydrologic Condition	All Years	Extremely Dry and Very Dry	Below Normal	Above Normal	Very Wet
Inflow					
SMR Inflow	38,600	6,200	12,000	32,900	132,900
Subsurface Underflow	600	600	600	600	600
Lake O'Neill Spill and Release	1,500	700	1,400	1,700	2,100
Fallbrook Creek	1,200	100	400	1,400	3800
Minor Tributary Drainages	2,400	1,600	1,500	2,400	4,900
Areal Precipitation	800	600	500	700	1,600
Total	**45,100**	**9,800**	**16,400**	**39,700**	**145,900**
Outflow					
SMR Outflow	28,000	1,300	1,800	18,600	120,100
Subsurface Underflow	100	0	100	100	100
Groundwater Pumping	9,900	5,000	8,500	13,100	13,200
Gallery Well Pumping	3,000	700	1,700	4,500	5,300
Evapotranspiration	2,400	2,200	2,200	2,500	3,100
Diversions to Lake O'Neill	1,900	900	1,800	2,300	2,700
Total	**45,300**	**10,100**	**16,700**	**40,600**	**144,500**

Note: Values are rounded to the nearest 100 af; SMR = Santa Margarita River.
Source: Stetson 2012d.

Annual and Seasonal Flow. SMR annual inflow to the Model averaged 38,600 af/y and varied from 6,200 af/y to 132,900 af/y for various hydrologic conditions; SMR Outflow from the Model boundary averaged 28,000 af/y, varying from 1,300 af/y during Extremely Dry/Very Dry years to 120,100 af/y during Very Wet years (Table 4.2-7).

Table 4.2-8 summarizes the Alternative 2 average annual surface water diversion from the SMR and provides a comparison to Baseline conditions. The increased diversion capacity under Alternative 2 would result in average annual diversion rates from the SMR to increase from 7,500 af/y (Baseline

Model) to 11,800 af/y (Stetson 2012a,c). Changes in surface diversions under Alternative 2, as compared to the Baseline, would be least during Extremely Dry/Very Dry hydrologic conditions (+700 af/y) and greatest during Very Wet conditions (+9,600 af/y) when flow is greatest in the SMR (Table 4.2-8).

Table 4.2-8. Average Annual Surface Water Diversion at the Inflatable Weir and Gallery Wells for the Alternative 2 Model Simulation (af/y)

Location/Diversion	All Years	Extremely Dry and Very Dry	Below Normal	Above Normal	Very Wet
SMR Inflow	38,600	6,200	12,000	32,900	132,900
Diversion to Percolation ponds	6,900	1,900	5,200	8,700	13,200
Diversion to Lake O'Neill	1,900	900	1,800	2,300	2,700
Gallery Wells	3,000	700	1,700	4,500	5,300
Total Diversion	**11,800**	**3,500**	**8,700**	**15,500**	**21,200**
Change from Baseline	+4,300 (+57%)	+700 (+25%)	+2,100 (+32%)	+5,800 (+60%)	+9,600 (+83%)

Note: SMR = Santa Margarita River.
Source: Stetson 2012a,d.

Table 4.2-9 shows the change in average annual surface flow under Alternative 2 that would be expected to occur at the Ysidora gage and at the downstream boundary of the Model near the SMR Estuary. Figure 4.2-2 shows the average monthly streamflow at the downstream boundary of the Model for the various hydrologic conditions under Alternative 2 and the Baseline (a more detailed comparison of average monthly conditions is provided in Appendix B).

In addition to the increased diversion and groundwater pumping (as discussed under Alternative 1) direct diversion from gallery wells during the wet season would capture water in the streambed sediments that is closely tied to the streamflow available in the SMR. Average annual diversions to the gallery wells would be 3,000 af/y, ranging from 700 af/y during Extremely Dry/Very Dry conditions to 5,300 af/y during Very Wet conditions (Table 4.2-9).

Table 4.2-9. Change in Average Annual SMR Flow for the Alternative 2 Model Simulation (af/y)

Hydrologic Condition	Ysidora Gage			Model Downstream Boundary[1]		
	Baseline	Alternative 2	Change	Baseline	Alternative 2	Change
All Years	34,500	29,300	-5,200 (-15%)	32,000	28,000	-4,000 (-13%)
Extremely Dry/ Very Dry	1,100	1,600	+500 (+45%)	500	1,300	+800 (+160%)
Below Normal	6,700	3,500	-3,200 (-48%)	3,800	1,800	-2,000 (-53%)
Above Normal	28,600	20,500	-8,100 (-28%)	24,800	18,600	-6,200 (-25%)
Very Wet	132,000	121,200	-10,800 -8%)	130,000	120,100	-9,900 (-8%)

Note: [1] Flow out of the model's downstream boundary is approximately 0.85 mi upstream of Stuart Mesa Bridge.
Sources: Stetson 2012a,d.

Note: Modeled data is for location approximately 0.5 mile upstream of the Santa Margarita Estuary.

Source: Stetsion 2012d.

Figure 4.2-2

Simulated Average Monthly Santa Margarita River Surface Flow for Alternative 2

Operations under Alternative 2 would be guided through implementation of the AMP/FOP, as described under Alternative 1. Overall, operations under Alternative 1 would result in additional diversion and gallery well/groundwater pumping from the Lower SMR Basin, as compared to the Baseline. However, the greatest diversion/pumping rates and subsequent reduction in surface flow would occur when the most amount of water is flowing in the SMR during Very Wet years (Tables 4.2-8 and 4.2-9). By design of operations under Alternative 2, MCB Camp Pendleton's water demand would be supplemented by imported water supplies during Extremely Dry/Very Dry hydrologic conditions, allowing for substantially less diversion and groundwater pumping. This would have a net result of increasing annual surface flow, as compared to the Baseline simulation (Table 4.2-9) while riparian areas and associated resources are most sensitive during Extremely Dry/Very Dry hydrologic conditions.

The operations under the AMP/FOP would be constrained by streamflow and biological resources. These parameters would be monitored and variation outside their natural variability would result in changes in diversions and groundwater pumping. Therefore, the change in surface flow would be within the natural variability of the SMR watershed and there would no significant impacts to surface flow in the SMR.

Peak Flow. Alternative 2 operations would result in maximum surface diversion of 200 cfs at the inflatable weir and an additional 18 cfs at the four gallery wells; total surface diversion would increase from 60 cfs to a maximum of 218 cfs during Very Wet years. Impacts to the SMR peak flow would be less during drier hydrologic conditions because all four gallery wells would not be operated simultaneously. Therefore, impacts to peak flow under Alternative 2 would be similar to those discussed under Alternative 1 and there would be no significant impacts to SMR peak flow.

Sediment Load in the SMR

Impacts to sediment load under Alternative 2 would be the same as discussed under Alternative 1; therefore, there would be no significant impacts to sediment load within the SMR downstream of the diversion structure.

Santa Margarita River Estuary

Impacts to the SMR Estuary under Alternative 2 would be similar to those discussed under Alternative 1; therefore, operations under Alternative 2 would not be expected to alter the frequency or duration of estuary closure beyond historical occurrence and there would be no significant impacts to the SMR Estuary.

4.2.3.2 Groundwater Resources

Construction

Under Alternative 2, impacts to groundwater resources associated with construction activities would be the same as those described under Alternative 1, and no significant impacts would occur.

Operations

Under Alternative 2, impacts to groundwater resources associated with operation of the diversion structure and production wells would be similar as described under Alternative 1. In addition, the operation of gallery wells under Alternative 2 would increase direct diversion from the SMR and have the potential to impact groundwater levels. As discussed in Section 4.2.3.1, *Surface Water Resources*, Alternative 2 operations would include an AMP/FOP that would optimize groundwater production while meeting the following project environmental constraints: (1) no aquifer compaction, and (2) no seawater intrusion (*Note:* the maintenance of groundwater levels within historical range constraint would not be included under Alternative 2).

Groundwater and gallery well pumping rates are provided in Table 4.2-10. Based on the environmental constraints and operational parameters, the Alternatives 2 Model simulation shows a 4,400 af/y increase in sustained basin yield above Baseline basin yield (Stetson 2012a,d). Groundwater pumping would be curtailed during drier hydrologic conditions by relying on an annual average of 1,100 af/y of imported water to meet MCB Camp Pendleton's potable water demand. The change from Baseline for Extremely Dry/Very Dry hydrologic conditions (-1,700 af/y) reflects the curtailment in pumping rates during consecutive drier than normal water years.

Table 4.2-10. Average Annual Groundwater and Gallery Well Pumping for the Alternative 2 Model Simulation (af/y)

Hydrologic Condition	Upper Ysidora Pumping	Chappo Pumping	Gallery Well Pumping	Total Pumping	Change from Baseline
All Years	6,600	3,200	3,000	12,800	+4,400 (+52%)
Extremely Dry and Very Dry	3,500	1,500	700	5,700	-1,700 (-23%)
Below Normal	5,900	2,600	1,700	10,200	+1,500 (+17%)
Above Normal	8,700	4,400	4,500	17,600	+9,000 (+105%)
Very Wet	8,600	4,500	5,300	18,400	+9,700 (+111%)

Note: Annual recharge rates rounded to nearest 100 af/y.
Sources: Stetson 2012a,d.

The increase in groundwater and gallery pumping during wet years would coincide with increased total diversion/recharge (Table 4.2-11). When compared to Baseline conditions, there would be no change to average annual recharge during Extremely Dry/Very Dry years, with the greatest recharge during Very Wet years when diversions and gallery well pumping capture runoff from high flow events to replace storage lost during drier than normal years. The minimal impact during the driest years under Alternative 2 would occur due to reductions in project related diversions and groundwater/gallery well pumping which have been designed to meet environmental constraints. This would support the slight increase in streamflow at the Ysidora gage and downstream model boundary (800 af/y) as previously discussed in the Section 4.2.3.1, *Surface Water Resources*. In summary, the increased average annual groundwater production (4,400 af/y) under Alternative 2 would be balanced with increased average annual groundwater recharge (4,400 af/y) (Stetson 2012a,c), resulting in an increase to the sustained basin yield and no long term effects on the water availability in the Ysidora Groundwater Basin.

Table 4.2-11. Average Annual Groundwater Recharge for the Alternative 2 Model Simulation (af/y)

Hydrologic Condition	Groundwater Recharge at Ponds 1-7	Streambed Infiltration	Total Recharge	Change from Baseline
All Years	7,400	7,100	14,500	+4,400 (+44%)
Extremely Dry and Very Dry	2,300	4,700	7,000	0 (0%)
Below Normal	5,500	6,700	12,200	+2,500 (+26%)
Above Normal	9,200	8,900	18,100	+6,400 (+55%)
Very Wet	14,200	8,300	22,500	+10,100 (+81%)

Note: Annual recharge rates rounded to nearest 100 af/y.
Sources: Stetson 2012a,d.

The groundwater available for pumping fluctuates seasonally and varies by hydrologic condition. Pumping would be reduced during dry years to prevent seawater intrusion. The increase in production during Above Normal and Very Wet years is due to the gallery wells which primarily operate when winter-time flows in the SMR are high and, therefore, would not drawdown groundwater levels during summer months or dry years. The individual pumping rates of each gallery well would be approximately 4.5 cfs. Because the available streamflow fluctuates from month-to-month and year-to-year, gallery well pumping rates would be adjusted based on the adaptive management plan and available water resources. The gallery wells are not operated during the driest hydrologic conditions that exist during Extremely Dry conditions.

Based on the groundwater modeling simulation results presented in Appendix B, groundwater levels would consistently drop below baseline conditions and drop below measured historical-low groundwater levels in the Upper Ysidora Sub-basin approximately 4 out of every 10 years with implementation of Alternative 2 (Stetson 2012d). If groundwater levels drop below historical-low levels as a result of Alternative 2, there is the potential for significant impacts to occur to groundwater resources and associated riparian areas. However, with the implementation of Mitigation Measure #1 presented in Section 4.2.3.5, the AMP/FOP would be modified to include the maintenance of groundwater levels within historical range constraint to mitigate these impacts (similar to Alternative 1). Groundwater levels would decrease during periods of increased pumping, but would be monitored and pumping rates would be modified as described under Mitigation Measure #1, to prevent groundwater levels from dropping below historical levels.

Impacts to aquifer storage and seawater intrusion would be managed under Alternative 2 through implementation of the AMP/FOP, as described under Alternative 1. Therefore, no subsidence and subsequent loss of aquifer storage volume would occur. Subsurface underflow out of the Model was positive (+100 af/y) for the Alternative 1 simulation (Table 4.2-7), indicating that no saltwater intrusion would be expected to occur.

Evapotranspiration under Baseline conditions averaged 2,500 af/y (Table 3.2-6) and decreased by 100 af/y (Table 4.2-7) for Alternative 2. This would not be considered a significant decline in annual evapotranspiration. Due to Alternative 2 operations management which includes reductions in both diversions and pumping during drier than normal conditions, evapotranspiration would increase from 1,300 af/y to 2,200 af/y during Extremely Dry/Very Dry hydrologic conditions when compared to the Baseline (Tables 3.2-6 and 4.2-7, respectively). An increase in evapotranspiration is directly related to an increase in groundwater levels that support riparian vegetation and surface water flow throughout the Upper Ysidora, Chappo, and Lower Ysidora sub-basins.

Therefore, with implementation of Mitigation Measure #1 (Section 4.2.3.5), there would be no significant impacts to groundwater resources with under Alternative 2.

4.2.3.3 Water Quality

<u>Surface Water</u>

Construction

Under Alternative 2, impacts to surface water quality associated with construction activities would be the same as under Alternative 1, and no significant impacts to surface water quality would occur with implementation of SCMs under Alternative 2 construction activities.

Operations

Under Alternative 2, impacts to surface water quality in the SMR and SMR estuary associated with operational activities would be similar to those described under Alternative 1 with implementation SCMs; therefore, no significant impacts to surface water quality would occur. Water quality impacts to the Pacific Ocean are discussed below.

Pacific Ocean. The brine discharge from the expanded AWTP at Haybarn Canyon would consist of RO and ion exchange brine with an estimated average TDS concentration of 6,000 mg/L. The brine would be discharged to the Pacific Ocean via the existing Oceanside Ocean Outfall. The brine discharge would be covered under either an amendment to FPUD's existing NPDES Permit (CA0108031) to the Oceanside Ocean Outfall (the same as under Alternative 1) or an amendment to MCB Camp Pendleton's NPDES Permit (CA0109347). In either case, the brine discharge would be blended with existing discharge and is not expected to impact the ability of the FPUD/MCB Camp Pendleton to meet NPDES permit requirements. Therefore, no significant operational impacts to ocean water quality would occur with implementation of Alternative 2.

Groundwater Quality

Construction

Under Alternative 2, impacts to groundwater quality associated with construction activities would be the same as under Alternative 1, and no significant impacts to groundwater quality would occur with implementation of SCMs under Alternative 2 construction activities.

Operations

Under Alternative 2, impacts to surface water quality associated with operations would be the same as under Alternative 1. The implementation of the gallery wells would result in similar effects to groundwater as the increased recharge and groundwater production. Therefore, because the recharged SMR water would be of similar or better water quality than the underlying groundwater, the recharge of these waters to the groundwater aquifer would have no significant impacts on groundwater quality.

4.2.3.4 Floodplains

Construction

Under Alternative 2, impacts to flood flows, the flood flow regime, or extent of flooding in the SMR would be the same as under Alternative 1, and there would be no significant impacts on flooding in the SMR.

Operations

Under Alternative 2, impacts to flooding in the SMR associated with operations of the diversion weir would be the same as under Alternative 1. Therefore, replacement of the diversion weir would not increase the flooding potential and no significant impacts would occur. The lateral pipelines extending from the gallery wells under the SMR would be located below the scouring depth of the river, and therefore would not be impacted by flooding.

4.2.3.5 Mitigation Measures

There would be potentially significant impacts to groundwater resources in the Upper Ysidora Sub-basin as a result of operations under Alternative 2. In addition to the implementation of SCMs listed in Section 2.3.1.4 and the AMP/FOP, the following mitigation measure will be implemented to monitor and reduce impacts to groundwater resources to below a level of significance:

1. The AMP/FOP under Alternative 2 would be modified to include the maintenance of groundwater levels within historical range constraint (*Note:* this measure is included in the AMP/FOP as described under Alternative 1). Specifically, groundwater levels would be monitored by a series of telemetered groundwater monitoring wells and pumping would be curtailed when the average monthly groundwater level drops to within 3 ft (1 m) of the historical

minimum along the riparian corridor. Pumping would be further reduced or shut off if the groundwater level drops to within 0.5 ft (0.2 m) of the historic minimum. Pumping rates would remain reduced until the average monthly groundwater levels returned to 0.5 ft (0.2 m) above the historical minimum (Stetson 2009).

4.2.4 No-Action Alternative

Under the No-Action Alternative, the proposed facilities would not be constructed and no ground-disturbing activities would occur. Excess quantities of potentially usable runoff in the river during wetter years would continue to flow downstream toward the estuary and the Pacific Ocean without providing beneficial use. FPUD would continue to meet all of its current potable water demands from imported water purchased from SDCWA and, in order to meet increases in future water demands, increased purchases of imported water, or purchases of water from other unidentified sources would be needed.

MCB Camp Pendleton would continue to use its existing diversion, percolation, storage, and recovery system to meet its water demands. Future increases in water demands on-base would not be met without possible impacts to the environment or development of an alternative water supply, such as ocean desalination or by construction of a new pipeline to an off-base water purveyor and the initiation of routine purchases of imported water as discussed further under Section 4.7, *Utilities*. Without development of an alternative water supply, the Baseline Model scenario (Stetson 2012a) indicates that the aquifer could be over-pumped during dry hydrologic conditions resulting in groundwater levels dropping below historic lows in the Chappo Sub-basin. Therefore, with increased dependence on groundwater supply within the Ysidora Basin, significant impacts to water resources in Lower SMR Basin are possible under the No-Action Alternative.

4.3 BIOLOGICAL RESOURCES

4.3.1 Approach to Analysis

Determination of the significance of potential impacts to biological resources is based on (1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource, (2) the proportion of the resource that would be affected relative to its occurrence in the region, (3) the sensitivity of the resource to proposed activities, and (4) the duration of ecological ramifications. Impacts to biological resources are considered significant if species or habitats of concern would be adversely affected over relatively large areas or disturbances would result in a population-level change in the abundance or distribution of a special status species. In this analysis, an impact identified as significant (or potentially significant) should be considered so under both NEPA and CEQA.

Direct impacts are associated with ground-disturbing activities resulting from construction of the facilities (e.g. direct mortality of species or removal of vegetation and habitat by grading). Direct impacts may be either temporary (reversible) or permanent (irreversible). Most direct impacts are confined to the construction footprint, but some (e.g., noise or visual disturbance) may extend beyond the project boundary.

Indirect impacts are caused by or result from project-related activities, but occur later in time and are reasonably certain to occur. Indirect impacts are diffuse, resource-specific, and less amenable to quantification or mapping than direct impacts, but still need to be considered. Indirect impacts typically extend beyond the immediate construction footprint(s). Important indirect impacts to consider include those of water withdrawal from the Lower SMR Basin and the subsequent impacts on riparian and estuarine habitats.

Potential project impacts are described as temporary or permanent based on their anticipated longevity. Project impacts are evaluated based upon an understanding of project site configuration and components, construction methods and equipment that would be used, and how the site would be used after it is developed. All project impacts are described as they would occur after the SCMs described in Section 2.3.1.8 are implemented. Following construction, revegetation of temporarily disturbed areas would occur in accordance with SCMs.

4.3.2 Alternative 1

This section presents an analysis of potential direct, indirect, temporary, and permanent impacts of Alternative 1 on each subcategory of biological resources. Potential beneficial as well as adverse effects are considered.

4.3.2.1 Summary of Impacts

Facilities construction would have both direct and indirect impacts due to disturbance, displacement, and an increased risk of mortality to individuals. These impacts differ by resource and/or species as discussed in subsequent sections. Although substantial areas would be temporarily impacted by construction, with restoration as proposed, areas of permanent impact would be limited to the footprints of the facilities themselves, including the inflatable weir diversion structure; production wells; access roads to the wells and power poles along the access roads; and the FPUD WTP and pump stations. Pipeline corridors would be restored following construction but could be subject to future disturbance for maintenance and repairs. No construction would occur in the OSMZ and beneficial impacts would occur due to the protection and management of the OSMZ.

Under Alternative 1, the combined withdrawal of surface water and groundwater from the Lower SMR may reduce streamflow and groundwater levels relative to historic averages. However, model results suggest that in comparison with the Baseline scenario, the project's use of water in the Lower SMR under Alternative 1 would have minor, if any, long-term indirect effects on riparian and estuarine habitats. The potential impacts of Alternative 1 are less severe than those of the Baseline scenario, and the proposed AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, would enable negative effects on riparian habitat to be detected and minimized through modification of operations. SMR Estuary conditions are expected to be within their natural range of variability, but with the implementation of the AMP/FOP, it is expected that consideration would be given to modifying operations (e.g., to allow increased river flows to facilitate natural breaching of a berm at the mouth) when it would help avoid worsening conditions in the estuary.

4.3.2.2 Vegetation and Wildlife

<u>Construction</u>

Table 4.3-1 quantifies the potential permanent and temporary impacts of construction on different types of plant communities. Table 4.3-1 summarizes plant community types for the areas subject to construction in Alternative 1 assuming a 50-ft to 100-ft (15-m to 31-m) wide buffer around pipeline corridors, 50-ft (15-m) perimeter around proposed permanent structures, and a 20-ft (6-m) buffer around roads. A more detailed breakdown of the impacts on individual plant communities is provided in Appendix C-1. Table 4.3-2 quantifies potential permanent and temporary impacts of construction to federally-listed species' and state-listed species' habitats; the resource effects analysis model that was used for this analysis can be found in Appendix C-3.

Table 4.3-1. Potential Permanent and Temporary Impacts to Plant Communities and Aquatic Habitats within the SMR CUP Construction Footprint for Alternative 1

Plant Community Type		Acreages within the Project Areas (acres)										
		Diversion Weir[1]	O'Neill Ditch	Production Wells[2]	Bi-directional Pipeline[3]			FPUD WTP	TOTAL			Project Total
		MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	DET Fallbrook	Non-DOD	Non-DOD	MCB Camp Pendleton	DET Fallbrook	Non-DOD	
PERMANENT IMPACTS												
Upland Scrub	Coastal Sage	0.23	0.23	-	0.26	-	-	-	**0.72**	**-**	**-**	**0.72**
	Other	-	-	-	-	0.004	-	-	**-**	**0.004**	**-**	**0.004**
Riparian		0.32	1.42	0.87	-	-	-	-	**2.61**	**-**	**-**	**2.61**
Grassland/Herb		0.02	0.56	0.83	-	-	-	-	**1.41**	**-**	**-**	**1.41**
Bottomland		0.14	-	-	-	-	-	-	**0.14**	**-**	**-**	**0.14**
Upland Woodland		-	0.05	-	-	-	-	-	**0.05**	**-**	**-**	**0.05**
Disturbed/Developed		0.0004	0.06	0.25	0.17	-	0.21	5.09	**0.48**	**-**	**5.30**	**5.78**
Total		***0.71***	***2.32***	***1.95***	***0.43***	***0.004***	***0.21***	***5.09***	***5.41***	***0.004***	***5.30***	***10.71***
TEMPORARY IMPACTS												
Upland Scrub	Coastal Sage	0.23	1.84	0.20	11.67	30.64	2.76	-	**13.93**	**30.64**	**2.76**	**47.34**
	Other	-	-	-	-	-	3.98	-	**-**	**-**	**3.98**	**3.98**
Riparian		0.65	3.92	7.87	1.06	2.68	0.58	-	**13.49**	**2.68**	**0.58**	**16.75**
Grassland/Herb		0.25	3.77	2.56	4.91	14.93	4.26	-	**11.49**	**14.93**	**4.26**	**30.68**
Bottomland		0.33	0.07	0.15	-	0.75	-	-	**0.55**	**0.75**	**-**	**1.30**
Upland Woodland		-	0.22	0.001	0.91	2.89	4.61	-	**1.13**	**2.89**	**4.61**	**8.63**
Disturbed/Developed		0.05	1.85	4.67	21.38	11.09	49.21	2.15	**27.95**	**11.09**	**51.36**	**90.40**
Total		***1.50***	***11.67***	***15.47***	***39.92***	***62.98***	***65.40***	***2.15***	***68.55***	***62.99***	***67.54***	***199.09***

Notes: [1]Includes the inflatable weir control building structure.
[2]Includes the conveyance pipelines and access roads.
[3]Includes the booster pump stations.
FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant; MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook; DOD = Department of Defense.

Table 4.3-2. Potential Permanent and Temporary Impacts to Listed Species within the SMR CUP Construction Footprint for Alternative 1

Species	Diversion Weir	O'Neill Ditch	Production Wells	Groundwater Collection Pipeline	Access Roads	Bi-directional Pipeline		Total		Project Total
	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	DET Fallbrook	MCB Camp Pendleton	DET Fallbrook	
Arroyo Toad (breeding)										
Permanent	0.46	-	0.23	-	0.35	-	-	1.05	-	1.05
Temporary	0.97	0.15	0.70	5.80	-	-	-	7.62	-	7.62
Arroyo Toad (aestivation – upland only)										
Permanent	0.25	0.85	0.37	-	0.46	-	-	1.93	-	1.93
Temporary	0.48	5.82	0.52	2.06	-	-	-	8.88	-	8.88
Arroyo Toad (aestivation – riparian only)										
Permanent	<0.001	1.42	0.06	0.00	0.23	-	-	1.48	-	1.48
Temporary	<0.002	3.75	0.45	0.92	-	-	-	5.12	-	5.12
Least Bell's Vireo										
Permanent	0.32	0.78	0.29	-	0.58	-	-	1.97	-	1.97
Temporary	0.65	1.80	1.16	6.45	-	0.81	1.63	10.87	1.63	12.50
Coastal California Gnatcatcher (all years)										
Permanent	-	0.01	-	-	-	-	-	0.01	-	0.01
Temporary	-	0.07	-	-	-	5.75	8.99	5.82	8.99	14.81

Notes: Values are rounded to the nearest 0.01 acre, which may result in a summation rounding error.
Habitat for listed species has not been identified in the Non-DOD portion of the Alternative 1 construction area.

Permanent impacts are associated with facility construction that would eliminate existing vegetation. Vegetation is assumed to be temporarily removed from the pipeline construction corridor. As such, if dewatering of the trench itself proved to be necessary for construction, there would be no additional impact on vegetation. No long-term effects on drainage or soil moisture that could otherwise affect vegetation are anticipated.

All riparian habitat, wetland impacts, ARTO aestivation habitat, and CAGN occupied habitat would be mitigated in accordance with the SCMs listed under *Biological Resources* in Section 2.3.1.4. The majority of impacts to plant communities would affect disturbed/developed habitat (including agricultural land) and non-native grassland, with small areas of native plant communities impacted (refer to Appendix C-1 for a detailed breakdown). Monitoring and other protective measures listed in Section 2.3.1.4 under *Biological Resources* would reduce but not eliminate impacts on wildlife. In particular, wildlife habitats would be substantially disturbed during construction, and most resident wildlife would be displaced or subject to injury or mortality if remaining on-site during construction. Displaced wildlife would incur energetic costs and predation risks as a result of moving away from construction into other areas. Suitable habitat nearby is likely to already be occupied by members of the same species, forcing resident individuals to either share resources or move into habitats of poorer quality.

Apart from disturbance and mortality to wildlife, habitat conditions in affected areas would be altered for one to several years. Some opportunistic, wide-ranging predators (e.g., coyotes, turkey vultures), as well as consumers that feed on herbaceous plants (or seeds) or on the insects that are attracted to areas of new growth, may increase foraging in the disturbed areas, particularly as ground and vegetation disturbance increases the availability of food resources. The cover of woody vegetation, however, would be diminished for at least several years. Following construction and during operation of the project, herbicides may be used where necessary to control noxious weeds. Adherence to SCMs along with protective measures that are part of the INRMP (DET Fallbrook 2006; MCB Camp Pendleton 2011), assures that there would be no negative effect on listed species due to herbicide use. Given the proposed restoration measures, these wildlife habitat impacts (both positive and negative) would be temporary and are not considered significant.

With the avoidance of breeding-season vegetation clearance (to the maximum extent practicable) and active nests of migratory birds in CSS, riparian, and wetland habitats, followed by the restoration of native vegetation (except in new facility locations), construction impacts on migratory bird populations would be minimized. Although the removal of vegetation outside the breeding season would reduce the immediate impacts that would have otherwise occurred to breeding individuals in that location, the loss of acreage would affect migrants that subsequently return to the area. Individuals would be forced to compete for territories in new locations, and would be likely to incur increased energetic costs and reduced survivorship or breeding opportunities. With the relatively small acreage of permanent impact to these habitats, significant impacts to migratory bird populations are not likely to occur. Federally-listed species are discussed further in Section 4.3.2.4.

<u>Operations</u>

Operational impacts would include the potential for periodic disturbance of pipeline corridors due to maintenance and repairs. Such impacts would be temporary and most likely of very limited spatial scale and would be subject to the same conservation measures listed above under *Construction*. Therefore, operations associated with maintenance and repairs are not likely to adversely affect listed species or their habitats.

Diversion, recharge, and groundwater production operations would be established based on meeting certain physical and environmental constraints that include: (1) maintenance of water levels within historical range (i.e., as named in MCB Camp Pendleton's Riparian/Estuary BO (USFWS 1995a), (2) no aquifer compaction, and (3) no seawater intrusion. The ability to meet these constraints is based on the adaptive management of surface and groundwater resources consistent with hydrologic conditions.

MCB Camp Pendleton's 1995 Riparian/Estuarine BO Instructions (USFWS 1995a) emphasized that pumping regimes should minimize the drawdown to not exceed 15 ft (5 m) depth to groundwater level, because this is the upper limit of willow riparian root zone depth, beyond which plants are unable to utilize groundwater. However, the Riparian/Estuarine BO (USFWS 1995a) also recognized that the Chappo Sub-basin would incur a groundwater drop below 15 ft (5 m) due to current groundwater drawdown practices at the time. Using the results from the Lower SMR Model (refer to Appendix C-4), changes in streamflow conditions between historical baseline (Baseline) and future Alternative 1 groundwater management operations were assessed (Stetson 2013b). Using a 50-year simulation period based on 1952 to 2001 hydrology, groundwater levels below the SMR were simulated in the Upper Ysidora, Chappo, and Lower Ysidora sub-basins. Results from the Baseline model run show that groundwater levels below the streambed would be within 15 ft (5 m) of the surface in the Upper and Lower Ysidora sub-basins and within 30 ft (9 m) in the Chappo Sub-basin. Using the same 50-year simulation period, the Lower SMR Model indicates that Alternative 1 groundwater levels below the SMR bed would remain within 15 ft (5 m) in the Upper and Lower Ysidora sub-basins and within 20 ft (6 m) of the surface in the Chappo Sub-basin. The Lower SMR Model does indicate a reduction of 100 AFY (4%) in evapotranspiration by phreatophytes (deep-rooted plants that obtains water from groundwater) under Alternative 1 compared to the Baseline; reduced evapotranspiration use by phreatophytes, consistent with conditions that occur during dry or prolonged drought conditions, may result in stresses to vegetation at a slightly higher occurrence under Alternative 1. However, the simulated evapotranspiration by riparian vegetation would be within the natural variability that occurs between dry and wet years.

Operational effects discussed above and in detail in Section 4.2.2 that may affect listed species and habitats include:

- Operations would be designed to increase the sustained basin yield of the Lower SMR Basin by increasing diversion and recharge of surface water during Below Normal, Above Normal and Very Wet hydrologic conditions and curtailing groundwater pumping during dry hydrologic conditions. During Very Wet years, surface water diversions would be increased when runoff would otherwise be discharged into the Pacific Ocean. During Extremely Dry/Very Dry hydrologic conditions, groundwater pumping would be curtailed. As a result, Alternative would result in reduced surface flows in the SMR downstream from the inflatable weir during Below Normal and Above Normal hydrologic conditions.
- Under Alternative 1 operations, SMR flow would continue to show a large range of seasonal and annual variability based on hydrologic conditions.
- Operations under Alternative 1 include the implementation of an AMP/FOP which would be constrained by streamflow, groundwater levels, and biological resources.
- Alternative 1 would have a diversion of a maximum of 200 cfs, as compared to the existing maximum diversion of 60 cfs. However, because most of the sediment in the riverbed is moved during the larger storms, the effects on sediment distribution and channel geomorphology, if any, would likely be small.

- Sediment trapped behind the inflatable weir would be flushed (via lowering the gates of the weir) during 10-year or greater flood events, thus returning the SMR to a more "natural" condition.
- Access to imported water supplies under Alternative 1 would allow for protection of riparian habitats by reducing groundwater production during Extremely Dry/Very Dry hydrologic conditions.
- Alternative 1 would be expected to have minimal, if any, effects on the frequency or duration of estuary closure beyond historical occurrence, and as such, impacts to the SMR Estuary would not be significant.
- Groundwater levels beneath the grassland areas, where vegetation does not rely on groundwater, would tend to be lower during all hydrologic conditions under Alternative 1 operations.
- The Riparian/Estuarine BO (USFWS 1995a) indicates that groundwater pumping 15 feet below ground surface has been used as the upper limit of willow riparian root zone depth, beyond which plants are unable to utilize groundwater. The AMP/FOP would be developed to improve the relationship between the 15-foot depth to water and health of the riparian vegetation to prevent changes to the environment that are not within natural conditions, and modeling demonstrates that Alternative 1 would be an improvement over Baseline conditions (refer to Appendix C-4 for a detailed description).
- Relative to the Baseline, surface diversions in combination with groundwater withdrawals would increase the yearly minimum depth to groundwater along the riparian corridor during most years in the Upper Ysidora Riparian Indicator Cell. However, modeling demonstrates this would not have a long-term impact to riparian vegetation (see Section 5.3.4 and Appendix F for a detailed description).
- Reduced surface flows may have negative or positive effects on dissolved oxygen, nutrients, and water temperature depending on the contribution of rising groundwater on ambient conditions; the AMP/FOP would implement a water quality monitoring program.

4.3.2.3 Aquatic Habitats and Species

Construction

Construction impacts on aquatic habitats and species include direct impacts at construction sites and indirect impacts downstream of or subsequent to construction. To the extent that the construction cannot avoid aquatic habitats, impacts would occur at the diversion structure on the SMR, elsewhere along the SMR, and in various other locations along the bi-directional and conveyance pipelines. These impacts include the temporary disruption of sediment and surface flows, as well as the localized degradation of water quality by increased concentrations of suspended sediments, all of which would be likely to cause the displacement of, and injury or mortality to, resident aquatic species, including both the nektonic (free-swimming) and benthic (bottom-dwelling) communities.

Potential impacts on the SMR and other streams subject to construction (Lake O'Neill overflow outlet and Fallbrook Creek), and their resident species have been minimized, though not completely avoided, by limiting in-water construction to the dry season and through the use of trenchless construction as identified in the project description. Construction during the dry season reduces the potential for incidental damage to a larger area by erosion and sedimentation. There would still be surface and/or shallow groundwater flows through the construction area, which would have to be temporarily pumped or diverted around areas of excavation and structure placement. Trenchless construction would avoid surface impacts within sensitive aquatic habitats, but would result in some disturbance at access pits located adjacent to these habitats. Any resident aquatic species in the immediate areas of construction would still be negatively impacted, but this would be a very small portion of the population that inhabits the river. Since the areas affected are relatively small and downstream flows and connectivity between up- and downstream aquatic habitats would be maintained, the impact on aquatic habitat and resident aquatic species is considered less than significant.

Construction in upland and riparian habitats would expose soils to erosion which could lead to sedimentation in waterbodies downslope. However, implementation of a site-specific SWPPP incorporating BMPs for erosion and sediment control, as well as subsequent revegetation of disturbed areas, would minimize these types of impacts, such that they would not be considered significant.

Table 4.3-3 summarizes the temporary and permanent impacts to jurisdictional wetlands and other waters of the U.S. at MCB Camp Pendleton, DET Fallbrook, and non-DOD land within the community of Fallbrook. Alternative 1 would potentially impact up to 2.38 acres (0.96 hectare) of jurisdictional wetlands on MCB Camp Pendleton and 0.05 acre (0.02 hectare) of jurisdictional wetlands on DET Fallbrook (refer to Table 3.3-3 for details). Alternative 1 would also potentially impact up to 5,722 linear ft/1.29 acres (0.52 hectares) of other waters of the U.S on MCB Camp Pendleton; 1,090 linear ft/0.19 acre (0.08 hectare) of other waters of the U.S on DET Fallbrook; and 1,752 linear ft/0.39 acre (0.16 hectare) of other waters of the U.S on non-DOD land within the community of Fallbrook. However, through the implementation of various measures (i.e., relocation of pipeline alignment within buffer to existing disturbed road and/or bridge; trenchless construction; or suspending pipeline above creek), impacted area would be substantially less.

Table 4.3-3. Impacts to Jurisdictional Wetlands and other Waters of the U.S. Under Alternative 1

Wetland/Waters of the U.S.		MCB Camp Pendleton		DET Fallbrook		Non-DOD Lands	
		Temp.	**Perm.**	**Temp.**	**Perm.**	**Temp.**	**Perm.**
WETLANDS (acres)							
Palustrine Emergent		0.18	0.11	0.07	-	-	-
Palustrine Forested		0.31[1]	0.08	-	-	-	-
Palustrine Scrub-Shrub		-	-	-	-	-	-
Total Wetlands		**0.49[1]**	**0.19**	**0.07**	**-**	**-**	**-**
OTHER WATERS OF THE U.S. (feet/acres)							
Riverine Lower Perennial	*Santa Margarita River*	312/0.20	234/0.15	-	-	-	-
Riverine Upper Perennial	*Fallbrook Creek*	-	-	-	-	-	-
Riverine Intermittent	*O'Neill Ditch*	-	5,188/2.33	-	-	-	-
	Other	322/0.04[1]	-	-	-	611/0.07[1]	-
Total Other Waters of the U.S.		**634/0.24[1]**	**5,422/2.48**	-	-	**611/0.07[1]**	-

Note: [1] Only a portion of jurisdictional waters within the bi-directional pipeline buffer would be impacted.
MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook; DOD = Department of Defense.
Source: Reclamation *et al.* 2013.

Impacts to jurisdictional wetlands and other waters of the U.S. greater than 0.5 acre (0.2 hectare) would require an individual permit from the USACE. Unavoidable impacts to wetlands and other waters of the U.S. may require mitigation, as described under Mitigation Measure #1 in Section 4.3.2.5. Preparation and approval of a detailed mitigation plan would be required in conjunction with the permit application. If the unavoidable impacts to jurisdictional waters support federally listed species, then input from USFWS would also be required. The mitigation plan would describe on-site, off-site, and as needed, off-base mitigation. For all habitat restoration that is proposed, this plan would include details regarding site preparation (e.g., grading), planting specifications, and irrigation design, as well as maintenance and monitoring procedures. The plan would also outline success criteria and remedial measures should the mitigation effort fall short of the success criteria, and a strategy for long-term mitigation site management. A portion of the mitigation obligations may be satisfied by participating in a fee-based mitigation program (e.g., a wetland mitigation bank) in which case, long-term management for such mitigation would be covered under the terms of the formal banking agreement.

Operations

As discussed above, operation of the new inflatable weir diversion structure in conjunction with the groundwater production wells would increase the amount of water that is currently being removed from the SMR. The project design maximizes the use of peak flow events during wetter than normal conditions and reduces project operations during drier hydrologic conditions to minimize impact on the environment. Comparison of groundwater levels and streamflow during Extremely Dry/Very Dry conditions actually show an improvement under Alternative 1 when compared to Baseline conditions. However, under other conditions, streamflow would be diminished under Alternative 1 relative to Baseline (Table 4.2-3). Project impacts to streamflow would occur during the winter months when flows are higher, and virtually never during the dry summer months. In comparison to Baseline, the effects of Alternative 1 on streamflow would be most pronounced during below normal to above normal rainfall conditions, and during storms with a recurrence interval of 2 years or less (i.e., the bankfull condition). As described in Reclamation 2004b, the typical winter flows at the point of diversion are 100-166 cfs, and could be fully captured under Alternative 1, whereas only 60 cfs can be captured under existing/Baseline conditions. At such times, the extent and duration of seasonal aquatic habitats is expected to be diminished under Alternative 1 relative to Baseline.

Alternative 1 would capture only about 1% or less of the flow of the large-magnitude storms that transport most of the sediment down the SMR (Table 4.2-4; Reclamation 2004b). As such, Alternative 1 is expected to have little or no impact on the major natural flood events that shape channel geomorphology, scour existing vegetation, and provide new sites for vegetation establishment. The proportion of regular seasonal high flows captured would be larger (Table 4.2-4), and could affect in-channel sediment transport and microhabitats (e.g., formation of points and bars) during “normal” periods. If flows during the wet season were reduced, the extent, duration, quality, and connectivity of aquatic habitats downstream could also be reduced. Lower flows may be associated with reduced oxygenation and increased temperatures, which would typically be detrimental to native freshwater species. Stagnant pooling water may increase as a result of decreased water flow that would normally flush the low lying areas.

Use of the percolation ponds would involve regular filling and (passive) draining, and the occasional removal of accumulated sediments. Owing to the manner of operation and the relatively coarse, well-drained nature of the substrate, the percolation ponds are not expected to provide habitat for aquatic species. Aquatic organisms, organic matter, and nutrients may be transported from the SMR into the percolation ponds and Lake O’Neill via the O’Neill Ditch, but are unlikely to survive for long. The loss of organic matter, nutrients, and primary and secondary aquatic production are unavoidable adverse indirect effects of diverting water from the river that exists today under Baseline conditions.

Tidal flushing is critical to the maintenance of estuarine habitats and species (MCB Camp Pendleton 2011). Closure is associated with deteriorating water quality, which causes mortality to aquatic species, reduced biodiversity in the nektonic and benthic communities, and diminished estuary productivity. As discussed in Section 4.2.2.1, it is unlikely that the frequency or duration of closure at the mouth of the SMR Estuary would increase under Alternative 1. This estuary closure in the SMR, as for other lagoon-type estuaries in southern California, appears to be primarily controlled by the interaction of long-shore sand transport with annual patterns of drought and flooding (Lafferty 2005). Given that under Alternative 1 existing dry season low flows would be maintained and the first heavy flows of the rainy season would not be diverted, the pattern of openings and closures evident in Figure 3.2-8 is likely to continue. Freshwater inflows in combination with tidal circulation through the mouth of the estuary would typically be sufficient to retard the formation of a sand-barrier berm across the mouth. Accordingly, negative impacts on estuarine productivity are not expected. With the implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, it is expected that consideration would be given to modifying operations when it would help avoid worsening conditions in the estuary. For example, if the mouth of the estuary were to remain closed for a prolonged period, diversions could be reduced to facilitate the natural breeching of the berm and reestablish tidal flushing.

Impacts from discharging the dilute brine to the Pacific Ocean from the existing Oceanside Ocean Outfall would be minor and probably undetectable. Assuming the discharge conforms to the requirements of the NPDES permit as required, the impact on water quality and any secondary effects on organisms in the runoff areas from the pipe would be negligible.

Effects of proposed water use on the extent and duration of ponding are also of interest because of insect production that includes mosquitoes which can act as disease vectors. It would be expected that reduced flows and/or lowered water tables would generally reduce ponding and associated insect production. Although it is also possible that some areas that would otherwise be connected by surface flow would become isolated, these areas would be along the river channel where predatory species that can easily move between puddles (e.g., backswimmers that eat mosquito larvae) would remain abundant. Hence, no effect on mosquito production is anticipated.

4.3.2.4 Special Status Species

Federally-Listed Threatened and Endangered Species

Impacts to federally-listed threatened and endangered species are summarized in Table 4.3-4. Individual species' accounts follow below. Consistent with the ESA, impacts on federally-listed species are described as "effects," and conclusions are reached as to whether the action would have no effect; may affect, but is not likely to adversely affect any individuals of the species in question; or may affect and is likely to adversely affect one or more individuals of the species in question, resulting in "take" as defined under the ESA. The ESA conclusory statements are followed by NEPA/CEQA conclusions on the significance of the impact.

The ESA conclusions determine the level of consultation required: no effect requires no consultation; may affect, not likely to adversely affect requires an informal consultation and concurrence from USFWS or NOAA Fisheries, depending on which agency has jurisdiction; and may affect, likely to adversely affect requires formal consultation resulting in a BO which contains the necessary terms and conditions, as well as conservation recommendations, to allow take without jeopardizing the continuing existence of the species. The lead agencies have prepared separate BAs and are consulting with USFWS and NOAA Fisheries regarding potential adverse effects. Following consultation, specific mitigation measures outlined in the Biological Opinion will be included in the final EIS/EIR.

Table 4.3-4. Summary of Potential Effects on Listed Species with Implementation of Alternative 1

Species	Effects on Habitat	Effects on Individuals and Potential Take
CAGN	Temporary disturbance of up to 14.81 acres of CAGN occupied CSS habitat (5.82 acres on MCB Camp Pendleton and 8.99 acres on DET Fallbrook) and permanent removal of up to 0.01 acre of CAGN occupied CSS habitat on MCB Camp Pendleton. Potential localized habitat disturbance due to accidents, repairs, and maintenance.	Impacts to CAGN in the vicinity of the construction sites would be minimized to less than significant through the implementation of the SCMs listed under *Biological Resources* in Section 2.3.1.4, and the presence of a Biological monitor during the breeding season and any CSS vegetation clearing. All impacts to CAGN occupied CSS habitat would be temporary impacts and would be restored in place.
LBVI	Temporary disturbance of up to 12.50 acres of mulefat scrub, southern willow scrub, southern riparian scrub, and southern riparian woodland (10.87 acres on MCB Camp Pendleton and 1.63 acres on DET Fallbrook) and permanent disturbance of up to 1.97 acres of LBVI occupied riparian habitat on MCB Camp Pendleton. Potential localized habitat disturbance due to accidents, repairs, and maintenance. Potential changes in riparian vegetation due to reductions in the magnitude, lateral extent, and duration of surface flows in the SMR.	Impacts to LBVI in the vicinity of the construction sites would be minimized to less than significant through the implementation of the SCMs listed under *Biological Resources* in Section 2.3.1.4, and the presence of a Biological monitor during the breeding season and any riparian vegetation clearing. With implementation of the AMP/FOP, operation is not likely to adversely affect occupied LBVI habitat.
SWFL	Impacts to riparian habitat along the SMR but no impacts to occupied SWFL breeding habitat are anticipated.	With implementation of the AMP/FOP, not likely to affect occupied SWFL habitat. No effect to SWFL is anticipated.
LFCR	Reduced inflow to estuary could affect tidal flushing and productivity of salt marsh habitat.	With implementation of the AMP/FOP, not likely to adversely affect tidal flushing and estuary productivity. No effect to LFCR is anticipated.
CLTE	Reduced inflow to SMR Estuary could affect tidal flushing and lagoon foraging and nesting habitat.	With implementation of the AMP/FOP, not likely to adversely affect tidal flushing, foraging or nesting habitat. No effect to CLTE is anticipated.
SNPL	Estuary-shoreline foraging and nesting conditions for plovers could be directly or indirectly affected by changes in SMR inflows.	With implementation of the AMP/FOP, not likely to adversely affect tidal flushing, foraging or nesting habitat. No effect to SNPL is anticipated.

Continued on next page

Table 4.3-4. Summary of Potential Effects on Listed Species with Implementation of Alternative 1 (cont.)

Species	Effects on Habitat	Effects on Individuals and Potential Take
ARTO	Temporary disturbance of up to 7.62 acres of riparian and freshwater breeding habitat and an additional 14.00 acres of riparian and upland aestivation habitat on MCB Camp Pendleton. Permanent disturbance of up to 1.05 acre of riparian and freshwater breeding habitat and an additional 3.41 acres of riparian and upland aestivation habitat on MCB Camp Pendleton. Reduced SMR surface flows could reduce shallow run and pool habitat, reduce scouring floods that regenerate and maintain open sandbar habitats. Potential localized habitat disturbance due to accidents, repairs, and maintenance.	Likely to adversely affect. Potential displacement of and mortality to individual toads during construction; unquantifiable take. Potential annual or long-term reductions of habitat for juveniles and adults, which would affect the SMR population. Potential adverse effects would be minimized through the AMP/FOP.
SDFS/RFS	No potential temporary or permanent disturbance would occur.	No effect. No take of individuals is expected.
SCS	Water withdrawals would cause little if any reduction in the high flows that have the greatest potential to support steelhead migration in the SMR downstream of the weir. The incorporation of a fish screen on the diversion and design and operations measures to enhance fish passage at the weir would improve conditions for steelhead passage through the study area.	Action is not likely to adversely affect SCS.
TWG	TWG does not presently occur and the action would have minor if any effects on unoccupied potential habitat in the estuary. If TWG were to occur in the future, potential effects of operations would be addressed under the AMP/FOP.	Not likely to adversely affect TWG.
BSSP (state listed)	Reduced inflow to SMR Estuary could diminish tidal flushing and flood salt marsh habitat used for nesting and foraging.	Potential adverse effects would be minimized through the AMP/FOP.
SKR	Temporary effects on potential habitat; SKR does not presently occur in the action area.	Not likely to adversely effect, no take of individuals or adverse effects on habitat are expected.

Notes: CAGN = Coastal California Gnatcatcher; CSS = coastal sage scrub; MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook; DOD = Department of Defense; LBVI = Least Bell's Vireo; SMR = Santa Margarita River; AMP/FOP = Adaptive Management Plan; FOP = system operation plan; SWFL = Southwestern Willow Flycatcher; LFCR = Light-footed Clapper Rail; CLTE = California least term; SNPL = Western Snowy Plover; ARTO = Arroyo toad; SDFS = San Diego fairy shrimp; RFS = Riverside fairy shrimp; SCS = southern California steelhead; TWG = Tidewater Goby; BSSP = Belding's Savannah Sparrow; SKR = Stephens' Kangaroo Rat.

California Gnatcatcher

Construction. As of 2010 (MCB Camp Pendleton surveys) and 2011 (DET Fallbrook surveys), five CAGN territories, all on DET Fallbrook overlap the area of potential direct impact (300 ft buffer) for Alternative 1 (refer to Figure C1-30 in Appendix C-1) (*Note*: the CAGN territory calculation is modeled after the CAGN effects analysis in the Basewide Utilities Infrastructure BO [USFWS 2010] using a territory size of 5.70 acres [2.30 hectares], which is the gnatcatcher territory size documented in a similar habitat and environmental conditions).

The permanent effect of construction under Alternative 1 on CSS would be the loss of approximately 0.72 acre (0.29 hectare) of CAGN unoccupied CSS habitat on MCB Camp Pendleton near the diversion weir and at pump station locations along the bi-directional pipeline route (see Table 4.3-1). A small 0.01 acre (<0.01 hectare) area of occupied CAGN habitat could be permanently impacted on MCB Camp Pendleton.

Construction would temporarily affect approximately 14.81 acres (5.99 hectares) of CAGN occupied CSS habitat (5.82 acres [2.35 hectares] on MCB Camp Pendleton and 8.99 acres [3.64 hectares] on DET Fallbrook). Most of the potentially affected CSS (Table 4.3-1) was not overlapped by CAGN territories as of 2010 and may therefore be considered unoccupied. A total of five CAGN territories all on DET Fallbrook would potentially be directly impacted (see Appendix C-1, Figures C1-30, C1-31, and C1-32). Moreover, the area of actual effect would be smaller than the acreages described above. This is because the majority of the occupied impact area (14.74 acres [5.97 hectares]) occurs along the bi-directional pipeline, which would only involve temporary impacts inside a 20-ft to 50-ft (6-m to 15-m) wide corridor located within the 100-ft (30-m) wide buffer corridor used for acreage calculations. An analysis of the wider 100-ft (30-m) buffer areas has been provided to allow the flexibility of placing the pipeline anywhere within the buffer area to meet site-specific construction needs and minimize effects. Individual CAGN may be displaced to adjacent habitat, especially along the pipeline corridors. Removal of small areas of patchy and disturbed CSS within the larger regional habitat is not likely to adversely affect CAGN.

Apart from vegetation removal, temporary direct effects would include the potential disturbance of CAGN during construction due to noise, traffic, and human occupancy in the project vicinity. Noise and indirect effects may extend into adjacent habitat occupied by CAGN. Individuals could be displaced to adjacent areas, and may experience energetic costs or increased risk of predation as a result; either of which may affect subsequent survival and reproduction.

Effects to CAGN would be minimized through implementation of the SCMs listed under *Biological Resources* in Section 2.3.1.4 and any additional measures developed through consultation with USFWS; therefore, temporary direct effects due to construction noise or activity would not immediately affect nesting pairs or reproduction.

The action area is already subject to noise and traffic due to training and existing roads. Noise, lighting, vehicles, and human occupancy associated with the proposed project would temporarily increase the amount and duration of noise and human activity, but this effect would be short-term and localized and would not be expected to negatively affect CAGN on a regional scale. Areas of temporarily disturbed CSS habitat would be revegetated with appropriate CSS species and would eventually return to pre-construction state.

Operations. Once construction is completed, the impacted vegetation along the pipeline corridor would be revegetated. However, portions would be occasionally subject to disturbance in the future for maintenance activities. Maintenance activities, which require clearing of CSS vegetation, would follow the SCMs listed in Section 2.3.1.4. However, the amount of suitable habitat would be temporarily reduced at the maintenance site. Individual birds adjacent to maintenance activities may move into adjacent habitat and may experience increased stress, competition, or risk of predation from the temporary loss of foraging, dispersal, and nesting habitat. Areas of temporarily disturbed CSS habitat would be stabilized and re-planted with native species that are consistent with pre-existing vegetation following SCM 31 in Section 2.3.1.4.

Conclusion. Through the implementation of SCMs listed under *Biological Resources* in Section 2.3.1.4 (and any other measures identified during consultation with the USFWS relative to this species), no effect on the overall distribution or abundance of the species is anticipated from implementation of Alternative 1. Therefore, with the implementation of SCMs and the (future) BO for this project, there would be no significant impacts to CAGN with implementation of Alternative 1. Under ESA, implementation of Alternative 1 may affect, but is not likely to adversely affect CAGN territories due to noise and disturbance from Alternative 1.

No long-term effects on the CAGN population on MCB Camp Pendleton or DET Fallbrook are anticipated. MCB Camp Pendleton and Reclamation, in coordination with DET Fallbrook, are consulting with USFWS and the terms and conditions of the resulting BO would be implemented. Therefore, Alternative 1 would not have a significant impact on the CAGN.

Least Bell's Vireo

Construction. As of 2010 (MCB Camp Pendleton surveys) and 2011 (DET Fallbrook surveys), 65 LBVI territories (64 on MCB Camp Pendleton and 1 on DET Fallbrook) overlap the area of anticipated direct impact (300 ft buffer) for Alternative 1 (refer to Figures C1-30, C1-31, and C1-32 in Appendix C-1) (*Note*: the LBVI territory calculation is modeled after the LBVI effects analysis in the Basewide Utilities Infrastructure BO [USFWS 2010] using a territory size of 1.9 acres [0.8 hectare], which is the LBVI territory size documented in a similar habitat and environmental conditions).

LBVI within construction footprint areas would experience a direct loss of foraging/nesting habitat, whereas birds within the construction buffer distance could have breeding and/or foraging behavior disrupted, with attendant effects on reproduction, energetics, or predation risk.

To minimize impacts to LVBI, construction would take place outside the breeding season to the maximum extent practicable. If seasonal avoidance is not feasible, a biological monitor would be present when construction is within 300 ft (90 m) of occupied LBVI habitat, and additional SCMs listed under *Biological Resources* in Section 2.3.1.4 would be implemented. The biological monitor would conduct nest surveys to determine the presence/absence of LBVI documented within 300 ft (90 m) of the construction sites. If a LBVI nest is found, a 300-ft (90-m) buffer around the nest would be established to minimize impacts to LBVI (refer to SCMs listed under *Biological Resources* in Section 2.3.1.4).

The principal permanent effect of Alternative 1 would be the loss of LBVI occupied habitat (defined as mulefat scrub, southern willow scrub, southern riparian scrub, and southern riparian woodland). Construction would permanently affect approximately 1.97 acres (0.80 hectare) of LBVI occupied riparian habitat, all of which occurs on MCB Camp Pendleton at the diversion weir, O'Neill Ditch, production wells, and access roads (see Table 4.3-2).

Construction would temporarily affect approximately 12.50 acres (5.06 hectares) of LBVI-occupied riparian habitat (10.87 acres [4.40 hectares] on MCB Camp Pendleton and 1.63 acres [0.66 hectare] on DET Fallbrook). The majority of these temporary impacts would occur in the location along O'Neill

Ditch, the production wells, and conveyance pipelines (see Table 4.3-2). Small areas of riparian habitat also occur along the bi-directional pipeline corridor on MCB Camp Pendleton and DET Fallbrook. However, the area of actual effect along the conveyance and bi-directional pipeline corridors would be much smaller than the acreages listed in Table 4.3-2. This is because the pipeline would be installed within a 50-ft to 100-ft (15-m to 30-m) wide corridor but temporary impacts would only occur inside a 20-ft to 50-ft (6-m to 15-m) wide corridor within the larger buffer area. An analysis of the much wider buffer areas has been provided to allow the flexibility of placing the pipeline anywhere within the buffer area to meet site-specific construction needs and minimize effects. Direct impacts to LBVI-occupied riparian habitat would be compensated in accordance with MCB Camp Pendleton's Riparian/Estuarine BO (USFWS 1995a) (refer to SCM 32 in Section 2.3.1.4); temporary impacts would be restored following SCM 31 in Section 2.3.1.4.

Effects to LBVI would be minimized through implementation of the SCMs listed under *Biological Resources* in Section 2.3.1.4 and any additional measures developed in consultation with USFWS; therefore, temporary direct effects due to construction noise or activity would not adversely affect nesting pairs or reproduction.

Operations. Riparian habitat along the SMR has consistently supported breeding LBVI (MCB Camp Pendleton 2011); the riparian habitat downstream of the weir location supports up to 399 LBVI territories, approximately 50% of the MCB Camp Pendleton population (Lynn and Kus 2011; MCB Camp Pendleton 2012a,b).

Flow in the SMR under Alternative 1 during Below Normal and Above Normal hydrologic conditions was simulated using the Lower SMR Model, which indicates that the groundwater levels below the river bed would remain within 15 ft (5 m) in the Upper and Lower Ysidora sub-basins and within 15 ft (5 m) for 39 of the 50-year simulated period in the Chappo Sub-basin (*Note*: 15 ft [5 m] below ground surface has been used as the upper limit of willow riparian root zone depth, beyond which plants are unable to utilize groundwater). The Lower SMR Model also showed that the simulated evapotranspiration by riparian vegetation under Alternative 1 would be within the natural range of variability that occurs between dry and wet years. Therefore, Alternative 1 would not adversely affect nesting pairs or reproduction. Effects to LBVI would be minimized through successful implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*. The AMP/FOP would implement riparian vegetation monitoring to help measure impacts to LBVI nesting and foraging habitat.

Preservation and management of riparian habitat in the OSMZ could have long-term beneficial effects on LBVI habitat which may, to some extent, offset effects on the LBVI population in the Lower SMR.

Conclusion. Through successful implementation of the AMP/FOP as described in Section 2.3.1.4, *Special Conservation Measures*, no significant impacts to LBVI are expected. In addition, MCB Camp Pendleton and Reclamation, in coordination with DET Fallbrook, are consulting with USFWS and the terms and conditions of the resulting BO would be implemented. No long-term effects on the LBVI population on MCB Camp Pendleton or DET Fallbrook are anticipated. Therefore, Alternative 1 would not have a significant impact on the LBVI.

Southwestern Willow Flycatcher

Construction. There have been no SWFL territories within the areas of potential permanent and temporary impact for Alternative 1 or within 300 ft (90 m) of the proposed construction areas on MCB Camp Pendleton and DET Fallbrook during any recent surveys (Appendix C). No construction would occur in OSMZ; therefore, no negative impacts would occur to the SWFL critical habitat in the OSMZ.

The principal direct effect of Alternative 1, which would occur outside of the breeding season, would be the loss of potential (future) SWFL foraging and breeding habitat. Construction would permanently affect approximately 2.61 acres (1.06 hectares) of riparian habitat, all of which occurs on MCB Camp Pendleton at the diversion weir, O'Neill Ditch, production wells, and access roads (see Table 4.3-1). Construction would temporarily affect approximately 16.17 acres (6.78 hectares) of riparian habitat (13.49 acres [5.46 hectares] on MCB Camp Pendleton and 2.68 acres [1.08 hectares] on DET Fallbrook). The majority of these temporary impacts would occur in the location of O'Neill Ditch, the production wells, and conveyance pipelines (refer to Table 4.3-1). Small areas of riparian habitat also occur along the bi-directional pipeline corridor on MCB Camp Pendleton, DET Fallbrook, and non-DOD land. However, the area of actual effect along the conveyance and bi-directional pipeline corridors would be much smaller than the acreages listed in Table 4.3-1. This is because the pipeline would be installed within a 50-ft to 100-ft (15-m to 30-m) wide corridor, but temporary impacts would only occur inside a 20-ft (6-m) wide corridor within the larger buffer area. An analysis of the much wider buffer areas has been provided to allow the flexibility of placing the pipeline anywhere within the buffer area to meet site-specific construction needs and minimize effects.

Given the long-term absence of SWFL from potential construction areas (and associated buffers), combined with the implementation of LBVI SCMs listed under *Biological Resources* in Section 2.3.1.4, construction-related disturbance to SWFL nesting behavior is unlikely. Effects on individual SWFL, if present, would be roughly similar to those on individual LBVI. However, potential interference with foraging or movements by SWFLs in this location is of greater concern because the SWFL breeding population and area of occupied habitat on MCB Camp Pendleton is very small. Disturbance to individuals in this small population could cause them to abandon the area, and the numbers are so low as to limit future breeding opportunities among remaining individuals. Since clearing during the breeding season would not occur and disturbance to riparian habitat in the SMR would be minimized per avoidance and minimization measures, potential direct effects are unlikely to occur. If breeding SWFL were found within 250 ft (76 m) of construction, the USFWS would be contacted and consultation could be re-initiated.

Operations. Riparian habitat along the Lower SMR is the only location on MCB Camp Pendleton that currently supports breeding SWFL; although in 2012, territories (one at each locale with no confirmed breeding) were established at Lake O'Neill on Fallbrook Creek and at the Sierra percolation ponds (Howell and Kus 2012).

The operation of the new inflatable diversion weir and increased groundwater pumping would lead to a decrease in the amount of water that is currently flowing down-river of the diversion structure, except during Extremely Dry/Very Dry hydrologic conditions; this decrease would be most evident during Below Normal and Above Normal years (see ARTO effects analysis below). Flow in the SMR under Alternative 1 during Below Normal and Above Normal hydrologic conditions was simulated using the Lower SMR Model for Alternative 1 (Figure 4.3-1) (see Appendix C-4); the month of June was used for analysis because the SMR typically goes subsurface downstream of Basilone Bridge by July, and SWFL nest building generally occurs mid-May to mid-July (USGS 2010).

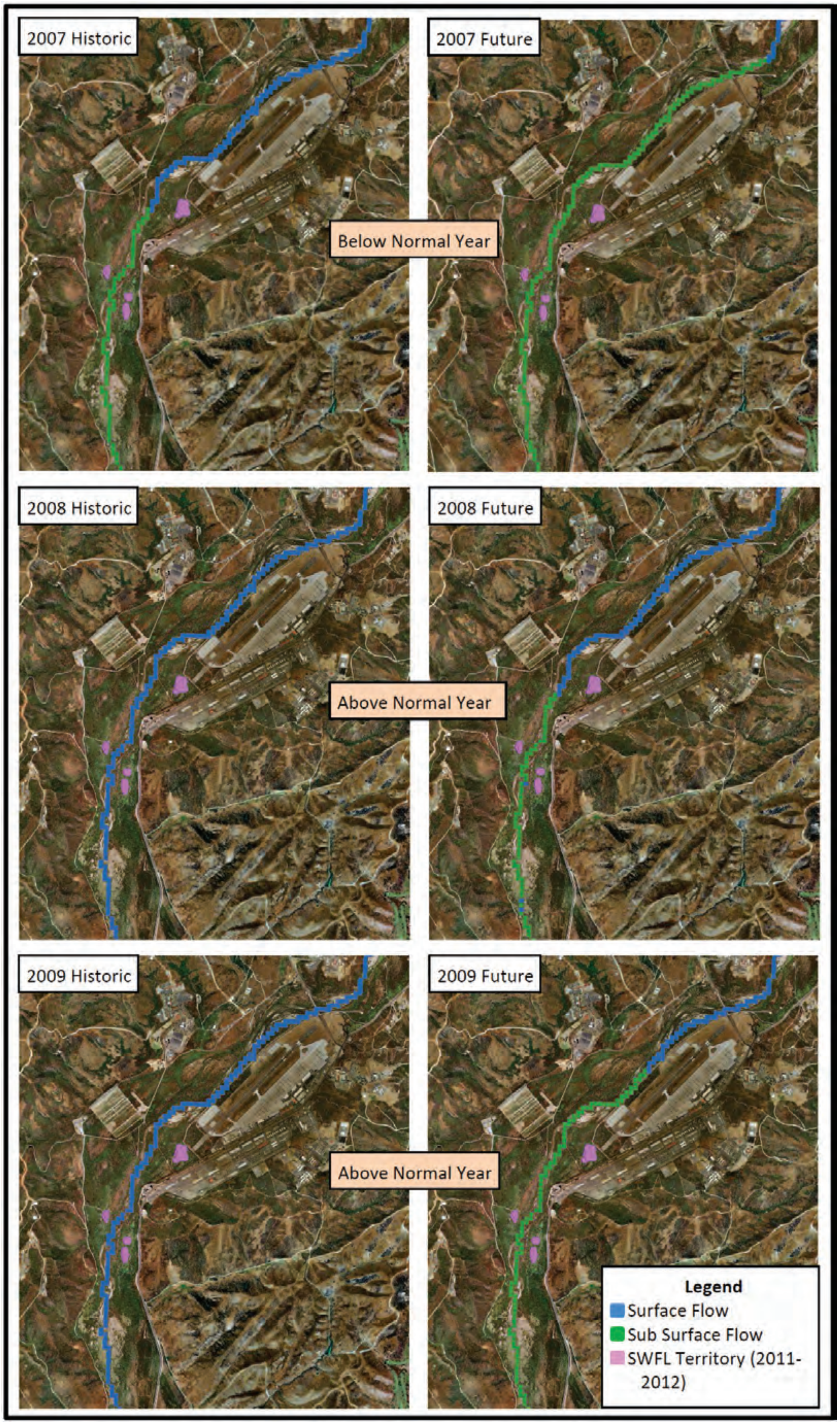

Figure 4.3-1. Historic versus Future Flow Conditions using the Lower SMR Model in Relation to SWFL Breeding Locations

Most evident with this analysis is that in all "Future" models during the Below Normal and Above Normal Year hydrologic conditions, the SMR has subsurface streamflow, while historical flow was on the surface during these same years (Figure 4.3-1) (see Appendix C-4). SWFL breed in dense riparian habitats where surface water is present or soil moisture is high enough to maintain vegetation structure (USGS 2010), and SWFL often rely on aquatic insects for a food source. However, hydrologic conditions in the Southwest are typically variable, with water availability at a site fluctuating over the course of a breeding season or from year to year (USGS 2010). Historically in 2007 and 2008, all SMR streamflow went subsurface in late June and on 5 July, respectively; the SMR was "dry" in the middle of the breeding season (i.e., during incubation, nestling stage, and the beginning of the fledging stage) (refer to Appendix C-4) (USGS 2010). In 2009, streamflow went subsurface on 5 August when SWFL breeding is typically complete; however, this is later than expected due to water release upstream (refer to Appendix C-4) (USGS 2010).

As mentioned in LBVI analysis using the Lower SMR model, simulated groundwater levels below the river bed under Alternative 1 would remain within 15 ft (5 m) in the Upper and Lower Ysidora sub-basins basins and within 15 ft (5 m) for 39 of the 50-year simulated period in the Chappo Sub-basin; and the simulated evapotranspiration by riparian vegetation would be within the natural range of variability that occurs between dry and wet years. When groundwater levels are within 15 ft (5m) of the surface, it is expected that soil moisture would remain high enough to support the current vegetation structure and therefore, Alternative 1 would not adversely affect nesting pairs or reproduction. Effects to SWFL would be minimized through successful implementation of the AMP/FOP, as described in Section 2.3.1, *Special Conservation Measures*.

Preservation and management of riparian habitat in the OSMZ could have long-term beneficial effects on the SWFL critical habitat. However, the SWFL does not currently nest in the OSMZ, and its future use of that location depends on expanding numbers from other locations, a function of the overall recovery of the population.

Conclusion. Through successful implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, habitat would be regularly monitored and if the riparian habitat value where the SWFL breed is reduced, operations would be re-evaluated, which may include re-initiation of consultation with the USFWS. With the implementation of the AMP/FOP and avoidance, minimization, and compensation measures as determined by consultation, Alternative 1 may affect, but is not likely to adversely affect, the SWFL. Therefore, Alternative 1 would not have a significant impact on the SWFL. MCB Camp Pendleton is consulting with USFWS and the terms and conditions of the resulting BO would be implemented.

Light Footed Clapper Rail

Construction. Under Alternative 1, no construction activities would occur in or near the SMR Estuary. Therefore, no effects to LFCR are expected due to construction activities.

Operations. The proposed water withdrawals from the SMR could under some conditions decrease the amount of water flowing downstream to the estuarine environment which has typically supported at least one pair of LFCR. With the implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, it is expected that consideration would be given to modifying operations (e.g., to allow increased river flows to facilitate natural breaching of a berm at the mouth) when it would help avoid worsening conditions in the estuary. For example, if the mouth of the estuary were to remain closed for a prolonged period, diversions could be reduced to facilitate the natural breeching of the berm, reestablish tidal flushing, and maintain appropriate habitat and foraging conditions for LFCR.

Conclusion. Alternative 1 may affect, but is not likely to adversely affect LFCR. Therefore, Alternative 1 would not have a significant impact on the LFCR. MCB Camp Pendleton is consulting with USFWS and the terms and conditions of the resulting BO would be implemented.

California Least Tern

Construction. Under Alternative 1, no construction activities would occur in or near the SMR Estuary. Therefore, no effects to CLTE are expected from construction.

Operations. Operational activities would result in brine discharge into the Pacific Ocean from the Oceanside Ocean Outfall. This is not expected to have any effect on water quality or marine communities, or to alter foraging conditions for CLTE.

CLTE forage in the SMR Estuary, but more frequently in the ocean, and nest on the margins of the estuary. Diminished SMR inflows to the estuary are of concern to the extent that they could contribute to reduced tidal flushing, lagoon closure, deteriorating foraging conditions, and the potential flooding of nesting habitat. The presence of a berm across the mouth of the river is not expected to affect predation risks because predatory species, the most important of which are birds and mammals (Foster 2008a) which can readily cross the river in any case. Predator management would continue to be of primary importance to CLTE survival and reproduction at this location (Foster 2008a).

As discussed under Aquatic Habitats and Species (Section 4.3.2.3), circumstances leading to closure and subsequent breaching at the mouth of the lagoon are largely controlled by large-scale seasonal and inter-annual patterns of drought and rainfall, such that any added effect of the project would be very small. With the implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, it is expected that consideration would be given to modifying operations (e.g., to allow increased river flows to facilitate natural breaching of a berm at the mouth) when it would help avoid worsening conditions in the estuary.

Conclusion. With the implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, CLTE nesting habitat and foraging conditions would be maintained in the SMR estuary and as such, Alternative 1 may affect, but is not likely to adversely affect the CLTE. Therefore, Alternative 1 would not have a significant impact on the CLTE. MCB Camp is consulting with USFWS and the terms and conditions of the resulting BO would be implemented.

Snowy Plover

Construction. Under Alternative 1, no construction activities would occur in vicinity of SNPL habitat. Therefore, no effects to SNPL are expected due to construction.

Operations. Operational activities would result in brine discharge into the Pacific Ocean from the Oceanside Ocean Outfall. This is not expected to have any effect on water quality or marine communities, or to alter foraging conditions for the SNPL.

SNPL are present nesting and foraging on the flats and shorelines of the SMR Estuary. Although changes in flow could affect estuarine conditions and tidal flushing, it is unlikely that these changes would affect the availability of beach habitat for resting and nesting above the high tide line, or reduce the abundance of invertebrate prey species. The presence of a berm across the mouth of the river is not expected to affect predation risks because predatory species, the most important of which are birds and mammals (Foster 2008b) which can readily cross the river in any case. Predator management would continue to be of primary importance to SNPL survival and reproduction at this location (Foster 2008b).

As discussed under *Aquatic Habitats and Species* (Section 4.3.2.3), circumstances leading to closure and subsequent breaching at the mouth of the lagoon are largely controlled by large-scale seasonal and inter-annual patterns of drought and rainfall, such that any added effect of the project would be very small. Berm formation and estuary closure usually occur during the dry summer-fall months and are unlikely during the spring when SNPL are nesting. With the implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, it is expected that consideration would be given to modifying operations (e.g., to allow increased river flows to facilitate natural breaching of a berm at the mouth) when it would help avoid worsening conditions in the estuary.

Conclusion. The action would have no direct effects on individual SNPL, and with the implementation of the AMP/FOP, it is very unlikely that there would be any negative impact to the estuarine and beach habitat used for nesting and foraging. Thus, the action may affect, but is not likely to adversely affect the SNPL. Therefore, Alternative 1 would not have a significant impact on the SNPL.

Arroyo Toad

Construction. Based on the acreage of immediate construction impacts, i.e., work areas, plus reasonable buffer distances for incidental disturbance (see Appendix C-3) there are approximately 8.67 acres (3.51 hectares) of ARTO occupied riparian and freshwater and open water breeding habitat subject to direct effects by temporary and permanent construction in the Alternative 1 area on MCB Camp Pendleton. In addition, approximately 17.41 acres (7.05 hectares) of ARTO aestivation (burrowing) habitat (i.e., sometimes referred to as “upland” habitat, although aestivation habitat can be riparian) on MCB Camp Pendleton would be subject to direct effects. This habitat is located in the area of the inflatable weir diversion, O’Neill Ditch, production wells, and conveyance pipelines (Appendix C-1). It is recognized that ARTOs from a larger area, extending throughout the floodplain and into adjacent uplands, may move through the action area and thereby be affected. The area of potential indirect effects is substantially larger as noted below under *Operations*.

Construction would permanently affect approximately 0.14 acre (0.06 hectare) of ARTO occupied freshwater and open water habitat, 0.91 acre (0.37 hectare) of ARTO occupied riparian habitat, and an additional 1.93 acres (0.78 hectare) of ARTO occupied upland and riparian, aestivation, habitat on MCB Camp Pendleton. Construction would temporarily affect approximately 0.41 acre (0.17 hectare) of ARTO occupied freshwater and open water habitat, 7.23 acres (2.93 hectares) of ARTO occupied riparian habitat, and an additional 6.41 acres (2.59 hectares) of ARTO occupied upland and riparian, aestivation, habitat on MCB Camp Pendleton.

Potential direct effects to ARTO individuals could occur within the proposed construction areas. During construction in ARTO breeding and aestivation habitat, ARTO that reside in or attempt to move through the project area would be at risk of injury or mortality from foot and vehicle traffic and earth-moving activities. ARTO behavior (foraging, breeding, and movement to and from riparian and adjacent upland habitats) may also be disrupted. In-stream construction could potentially cause the injury or mortality of tadpoles or eggs and could disturb algal mats, sand bars, or sandy banks used by ARTO.

ARTO density estimates were used in MCB Camp Pendleton’s Basewide Utility Infrastructure BO (USFWS 2010) to help analyze the effects of Alternative 1 on the ARTO. A similar analysis can be made using the same density estimates for the SMR watershed that was used in the Basewide Utility Infrastructure BO (USFWS 2010): 0.72 ARTO/acre in upland habitat (i.e., named aestivation habitat in this BA) and 4.6 ARTOs/acre in riparian habitat (i.e., breeding habitat). Therefore, Alternative 1 may result in 17.41 acres (7.05 hectares) of impacts (both permanent and temporary) to aestivation habitat within the SMR watershed, which could result in impacts to 13 ARTOs. Alternative 1 may result in 8.67

acres (3.51 hectares) of impacts (both permanent and temporary) to ARTO riparian breeding habitat within the SMR watershed, which could result in impacts to 40 ARTOs. Therefore, a total of 53 adult ARTOs are estimated within Alternative 1 construction footprint. Note that this estimate excludes metamorphs, which could significantly increase the number of ARTOs impacted by construction under Alternative 1. In addition, ARTO egg masses or larvae may be present within the 0.14 acre (0.06 hectare) of permanent and 0.41 acre (0.17 hectare) of temporary freshwater and open water habitat that is ARTO occupied, which would also significantly increase the impacts to ARTO.

Effects to ARTO would be minimized through implementation of the SCMs listed under *Biological Resources* in Section 2.3.1.4. Based on relatively limited areas of effect and implementation of these measures, the potential for an adverse effect on individual ARTO would be minimized. Nevertheless, a few individuals may unavoidably be injured or killed during construction activities, although this would not affect population numbers or distribution on MCB Camp Pendleton. Therefore, with the implementation of SCMs for temporary and permanent disturbance of riparian habitat, minor short-term and negligible long-term adverse effects would occur from construction.

Operations. Depending on the nature of hydrologic modifications to the river system with operations, Alternative 1 may affect and is likely to adversely affect breeding ARTO habitat and the population in the SMR downstream of the proposed diversion (refer to Appendix C-4 for a more detailed description of the expected impacts to ARTO from the operation of Alternative 1). The decrease in water flow to the lower reaches of the SMR during Below Normal conditions could have adverse effects on the persistence of shallow pools and slow-flowing areas that ARTOs use for breeding, thereby affecting the population size on MCB Camp Pendleton. During Above Normal hydrologic regimes, the impact would not be as severe as Below Normal conditions, but a small percentage of breeding pools would potentially be impacted.

Furthermore, reduced surface flows may have negative or positive effects on dissolved oxygen, nutrients, and water temperature depending on the contribution of rising groundwater on ambient conditions. The AMP/FOP would implement a water quality monitoring program in combination with an ARTO monitoring program, in coordination with those stakeholders with extensive knowledge of the ARTO population dynamics within the SMR. Impacts to ARTO would be minimized with conditions named in the AMP/FOP and SCMs in Section 2.3.1.4.

Conclusion. Alternative 1 may affect and is likely to adversely affect ARTO due to construction-related risks of injury or mortality which cannot be completely eliminated (an estimate of 53 ARTO toads may be located within the Alternative 1 construction footprint, in addition to potential egg masses/larvae, and metamorphs). Through the implementation of SCMs for temporary and permanent disturbance of riparian and aestivation habitat, minor short-term and negligible long-term adverse effects to individual toads would occur from construction. Potential adverse effects during operations would be minimized through the successful implementation AMP/FOP. Potential impacts to ARTO habitat represent a small fraction of the available ARTO habitat within MCB Camp Pendleton and are largely temporary.

Preservation of habitat in the OSMZ could have long-term beneficial effects on ARTO which may, to some extent, offset potential adverse effects on the population in the Lower SMR.

San Diego Fairy Shrimp/Riverside Fairy Shrimp

Construction. Fairy shrimp have not been documented in Alternative 1 action areas; therefore, no adverse effects to SDFS/RFS due to construction would occur. To minimize risks to SDFS/RFS potentially occurring within the proposed construction areas, the SCMs listed under *Biological Resources* in Section 2.3.1.4 would be implemented.

Operations. Fairy shrimp have not been documented in Alternative 1 areas; therefore, no adverse operational effects to SDFS/RFS would occur.

Conclusion. Because SDFS/RFS have not been documented in the Alternative 1 action area, no potential temporary or permanent disturbance would occur. Alternative 1 would have no effect on SDFS/RFS. No significant impacts would occur.

Southern California Steelhead

SCS habitat in the Lower SMR downstream of the weir is limited to migration habitat (Reclamation *et al.* 2012); there is no suitable spawning or juvenile rearing habitat in this reach of the river. However, some habitat that appears suitable for spawning occurs upstream of the action area in De Luz and Roblar Creeks. The recent documentation of SCS in the SMR, and their presence in the nearby San Luis Rey River indicates the likelihood of future spawning runs by SCS in the SMR, in which case the Lower SMR would provide habitat for passage between the ocean and upstream spawning areas. Normal marine salinities typically exist in the SMR Estuary, and transitional brackish habitat suitable for smolts migrating to the ocean appears to be of very limited extent, existing only at the upper end of the estuary (inland from I-5 to approximately Stuart Mesa Road).

Construction. Because construction of the inflatable diversion weir would occur during the dry season, when conditions for SCS are unsuitable along the Lower SMR due to high temperatures and the reduced extent of surface water, SCS would not be present in the vicinity at that time. Sediments would be disturbed during construction, but such changes would be temporary as the sediments are redistributed during the following rainy season. Other construction areas are peripheral to the SMR, and with implementation of BMPs for erosion and sediment control, including dry-season construction, no direct effects on SCS potential habitat would occur.

Operations. The report prepared by Reclamation *et al.* (2012) identified minimum flow conditions necessary to allow upstream migration of adult SCS between the SMR Estuary and diversion weir. These conditions typically only occur during Above Normal and Very Wet years. For 13-year modeled period with 4 years being Above Normal and 1 year being Very Wet, the report found that the reductions in surface flow in the SMR under Alternative 1 would result in a reduction from 4.2% to 3.8% for days in which average daily flow exceeds minimum SCS passage conditions (i.e., 166 cfs) (Reclamation *et al.* 2012). The annual maximum and average duration of storm events exceeding minimum SCS passage conditions is presented in Table 4.3-5. Under Alternative 1, duration of flows necessary to allow upstream (and downstream) migration of SCS would be reduced slightly, however there would be negligible reduction during periods when migration is most likely to occur (i.e., during long duration events in wet years).

The proposed new weir has been designed to improve passage conditions for SCS, as compared to the existing sheet pile weir. Upstream migration of adult SCS would be improved through partially lowering of the shorter weir gate and directing flow to a plunge pool that would allow adult steelhead to negotiate over the weir and continue upstream during the December through May migration season. Downstream migration of both adult and juvenile SCS would be improved through the incorporation of a fish screen to prevent entrainment in the diversion structure during the December through May migration season. A fish by-pass line would be associated with the fish screen that would allow fish entrained into the intake to be returned downstream on the SMR and continue their migration downstream to the ocean. As a result, it is unlikely that individual SCS would be deterred from migration or injured in the process.

Table 4.3-5. Maximum and Average Duration of Storm Events Exceeding Minimum SCS Passage Conditions Under Alternative 1

	Baseline Conditions	Alternative 1
Annual Maximum Event Duration[1]	**Occurrence (years)**	**Occurrence (years)**
1-day	5 of 13	6 of 13
3-day	4 of 13	3 of 13
5-day	2 of 13	2 of 13
10-day or more	2 of 13	2 of 13
Average Duration (days)	**(days)**	**(days)**
Wet Years[2]	14.8	13.8
Dry Years[3]	1.3	0.5
All Years	6.2	5.9

Notes: [1]There is only one annual maximum duration event for each of the 13 years during the analysis period.
[2]Wet years account for 4 of the 13 years during the analysis period.
[3]Dry years account for 4 of the 13 years during the analysis period.
Source: Reclamation *et al.* 2012.

Conclusion. Making the precautionary assumption that SCS are present in the SMR and likely to migrate through the action area, Alternative 1 may affect, but is not likely to adversely affect, the passage of adults or juveniles in the SMR between the Pacific Ocean and inflatable weir and at the inflatable weir and O'Neill Ditch. Therefore, Alternative 1 would not have a significant impact on SCS. MCB Camp Pendleton is consulting with NOAA Fisheries and the results of the consultation would be implemented.

Tidewater Goby

Construction. TWG does not occur in areas subject to or indirectly affected by construction and hence would not be affected by construction.

Operations. Operational activities associated with the new inflatable diversion weir and increased groundwater pumping may affect flows in the SMR and thereby affect estuarine habitat conditions downstream. However, TWG is not expected to occur given its long-term absence from the SMR and the continuing accessibility of the estuary to predators. The previous analysis indicates it is very unlikely that Alternative 1 would increase the likelihood or duration of estuary closure. With the implementation of the AMP/FOP, operations could be modified if conditions warrant, for example to increase river flows in order to facilitate natural breaching of the berm at the mouth. As a result, the action would not affect the possibility of recolonization by TWG. If the species did re-enter and/or be rediscovered in the SMR, the AMP/FOP would enable consideration of the effects of operations on TWG along with other estuarine species in consultation with USFWS.

Conclusion. TWG does not occur at present, although there is a possibility of future occurrence. Given the low likelihood of any adverse effect on potential TWG habitat, coupled with the implementation of the AMP/FOP, Alternative 1 may affect, but is not likely to adversely affect, TWG. No significant impact would occur.

Stephens' Kangaroo Rat

Construction. SKR habitat occurs in areas that would be affected by construction of the bi-directional pipeline, but is currently unoccupied. Given the absence of SKR in these areas since the 1990s, it is very unlikely they would recolonize and occur during construction. Revegetation of disturbed areas as proposed following construction would assure no long term effect on habitat and the potential for future use by SKR.

Operations. Project operations would not affect SKR.

Conclusion. Alternative 1 would temporarily affect habitat for SKR, which is currently unoccupied but could be recolonized. As such, Alternative 1 may affect, but is not likely to adversely affect, SKR. No significant impacts would occur.

State-Listed Threatened and Endangered Species

Belding's Savannah Sparrow

Construction. As of 2010, 100 territories of BSSP were found in the SMR Estuary. As no construction would occur in or near the SMR Estuary, no construction impacts to BSSP are anticipated.

Operations. As discussed for LFCR, CLTE, and SNPL, it is unlikely that tidal circulation and habitat conditions in the SMR Estuary would be negatively impacted by Alternative 1. The closure and subsequent opening of the mouth of the estuary is largely controlled by large-scale conditions of climate and long shore sediment transport. Existing conditions that lead to estuary closure (seasonal low flows) and breaching of the berm by the first high flows of the rainy season would be little if at all affected by Alternative 1. With the implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, it is expected that consideration would be given to modifying operations (e.g., to allow increased river flows to facilitate natural breaching of a berm at the mouth) when it would help avoid worsening conditions in the SMR Estuary.

Conclusion. Given the persistence of the BSSP population in the SMR Estuary throughout recent history, including periods of prolonged closure that occurred prior to and during 2010, the increased possibility of closure does not pose a threat to the local population (Zembel *et al.* 2006; MCB Camp Pendleton 2011). Alternative 1 would not substantially increase the likelihood or duration of estuary closures. Therefore, Alternative 1 would not have a significant impact on BSSP.

Other Special Status Species – Plants

As noted in Section 3.3 there are two species of special status plants that were documented in the ROI that are likely to be impacted by Alternative 1.

Four additional special status plants are known to occur in the OSMZ: Engelmann oak, Fish's milkwort, ocellated Humboldt lily, and rainbow manzanita (RM). These species would benefit from the protection of the OSMZ under Alternative 1 (refer to Table 3.5-5 in Section 3.3).

Construction

Construction impacts would be temporary.

Operations

Operational impacts include potential re-disturbance of plants during maintenance and repairs. As for construction, these impacts would be temporary and less than significant.

Conclusion

Special status plant species would potentially be impacted by construction and operational activities. However, no significant impacts to these species local populations are expected from the implementation of Alternative 1. With the successful implementation of the SCMs and the AMP/FOP, as described in Section 2.3.1.4, impacts would be less than significant.

Other Special Status Species – Wildlife

Upland Species

Upland special status species that are present in the ROI include the species listed in Table 3.3-6 that occur in chaparral, CSS, grassland, and woodland habitats. Protection and management of habitat within the OSMZ would have beneficial impacts.

Construction. Many special status species are known or likely to occur in CSS or other upland habitats within the ROI (Table 3.3-6). Individuals of these species may be temporarily impacted by construction, but such impacts would be localized and minimized by proposed conservation measures and would not affect regional population sizes, distribution, or increase the need for future protection by listing under the state- or federal ESA. Therefore, these impacts would not be significant.

Operations. Maintenance or repairs during operational activities have the potential to re-disturb upland habitats. However, operations would not significantly impact upland special status wildlife species.

Conclusion. Upland special status wildlife species would not be significantly impacted by construction or operational activities. Protection and management of habitat within the OSMZ would have beneficial impacts.

Aquatic and Riparian Species

Aquatic and riparian special status species that are present in the ROI include the arroyo chub, coast range newt, western spadefoot toad, two-striped garter snake, western pond turtle, yellow-breasted chat, and yellow warbler.

Construction. Construction impacts would be temporary and would not result in a permanent loss of habitat, although construction would pose a slight risk of injury or mortality to individuals. Biological monitoring, as proposed, would minimize this risk. These impacts are considered adverse, but less than significant.

Operations. Operational impacts include potential re-disturbance of aquatic habitats during maintenance and repairs. As for construction, these impacts would be temporary and less than significant. As previously discussed, effects of water withdrawals on the aquatic habitat of the SMR are potentially significant because of its regional importance to aquatic and riparian species. Operations would potentially shrink and modify aquatic habitat along the Lower SMR, but would not eliminate habitat for these species, all of which are widely distributed in southern California. Therefore, operational impacts are considered potentially adverse but with the successful implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, less than significant. Protection and management of aquatic habitat in the OSMZ would benefit all of the aquatic special status species, at least partially offsetting impacts further downstream.

Conclusion. Aquatic and riparian special status wildlife species would potentially be impacted by construction and operational activities. With the successful implementation of the SCMs and AMP/FOP, as described in Section 2.3.1.4, impacts would be less than significant.

4.3.2.5 Mitigation Measures

In addition to the SCMs referenced in Section 2.3.1.4, including the AMP/FOP, the following mitigation measure is proposed under Alternative 1.

Jurisdictional Wetlands and Other Waters of the U.S.

1. Unavoidable impacts to jurisdictional wetlands and other waters of the U.S. may require mitigation. The development of a mitigation and monitoring plan is a requirement of CWA Sections 401 and 404 permit applications for activities that would discharge dredge or fill materials into jurisdictional waters. This plan should include details regarding site appropriateness, preparation (e.g., grading), recontouring, planting specifications (including seed mixes and plant palettes), and irrigation design (if determined necessary), as well as maintenance and monitoring procedures (including monitoring period and reporting). The plan should also outline yearly success criteria and remedial measures should the mitigation effort fall short of the success criteria.

4.3.3 Alternative 2

Under Alternative 2, the majority of the project components are identical to those under Alternative 1 (refer to Table 2.3-1), and in most respects, impacts associated with Alternative 2 would be the same as those discussed under Alternative 1. Where impacts are identical, previous discussions for Alternative 1 are not repeated, although conclusions are reiterated.

4.3.3.1 Summary of Impacts

The implementation of Alternative 2 in most respects would have impacts very similar to those discussed under Alternative 1, including mostly temporary impacts and permanent impacts where existing habitat is replaced by facilities. Additional impacts associated with Alternative 2 would occur due to the installation the gallery wells and associated conveyance pipelines/access roads and different plant communities would be affected along an alternate route for the bi-directional pipeline.

The project's use of water in the Lower SMR would result in potential impacts very similar to those discussed under Alternative 1 (i.e., the reduction of surface flows and groundwater levels could have a variety of impacts on riparian and aquatic species and habitats); however the inclusion of the gallery wells would result in additional reductions in SMR flow.

4.3.3.2 Vegetation and Wildlife

Construction

Tables 4.3-6 quantifies the potential permanent and temporary impacts of construction activities associated with Alternative 2 on different types of plant communities. A more detailed breakdown of potential impacts on individual plant communities is provided in Appendix C-1. Table 4.3-7 quantifies potential permanent and temporary impacts of construction to federally-listed species' and state-listed species' habitats; the resource effects analysis model that was used for this analysis can be found in Appendix C-3.

Compared to Alternative 1, Alternative 2 would have similar acreages of riparian and CSS temporary impacts and CSS permanent impacts, with greater permanent impacts on riparian and wetland vegetation (Table 4.3-6 and Table 4.3-7) and associated wildlife. All riparian habitat, wetland impacts, ARTO aestivation habitat, and CAGN occupied habitat would be mitigated in accordance with the SCMs as described under Alternative 1 (refer to SCMs listed under *Biological Resources* in Section 2.3.1.4).

Table 4.3-6. Potential Permanent and Temporary Impacts to Plant Communities and Aquatic Habitats within the Santa Margarita River Conjunctive Use Project Construction Footprint for Alternative 2

Plant Community Type		Acreages within the Project Areas (acres)										
		Diversion Weir[1]	O'Neill Ditch	Production Wells[2]	Gallery Wells[2]	Bi-directional Pipeline[3]			TOTAL			Project Total
		MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	DET Fallbrook	Non-DOD	MCB Camp Pendleton	DET Fallbrook	Non-DOD	
PERMANENT IMPACTS												
Upland Scrub	Coastal Sage	0.23	0.23	-	-	0.26	-	-	**0.72**	-	-	**0.72**
	Other	-	-	-	-	-	0.004	-	-	**0.004**	-	**0.004**
Riparian		0.32	1.42	0.87	4.19	-	-	-	**6.80**	-	-	**6.80**
Grassland/Herb		0.02	0.56	0.83	0.03	-	-	-	**1.44**	-	-	**1.44**
Bottomlands		0.14	-	-	-	-	-	-	**0.14**	-	-	**0.14**
Upland Woodland		-	0.05	-	-	-	-	-	**0.05**	-	-	**0.05**
Disturbed/Developed		0.0004	0.06	0.25	0.05	0.17	-	0.21	**0.53**	-	**0.21**	**0.74**
Total		***0.71***	***2.32***	***1.95***	***4.27***	***0.42***	***0.004***	***0.21***	***9.68***	***0.004***	***0.21***	***9.89***
TEMPORARY IMPACTS												
Upland Scrub	Coastal Sage	0.23	1.84	0.20	-	14.81	28.84	-	**17.08**	**28.84**	-	**45.92**
	Other		-	-	-	-	-	3.34	-	-	**3.34**	**3.34**
Riparian		0.65	3.92	7.87	2.96	1.20	2.08	0.58	**16.59**	**2.08**	**0.58**	**19.28**
Grassland/Herb		0.25	3.77	2.56	0.48	3.08	14.80	1.10	**10.15**	**14.80**	**1.10**	**26.04**
Bottomland		0.33	0.07	0.15	0.11	-	0.75	-	**0.66**	**0.75**	-	**1.41**
Upland Woodland		-	0.22	0.001	-	1.15	1.79	0.57	**1.37**	**1.79**	**0.57**	**3.73**
Disturbed/Developed		0.05	1.85	4.67	0.52	20.35	14.05	33.25	**27.43**	**14.05**	**33.25**	**74.74**
Total		***1.50***	***11.67***	***15.45***	***4.08***	***40.59***	***62.31***	***38.84***	***73.31***	***62.32***	***38.84***	***174.44***

Notes: [1]Includes the inflatable weir control building structure.
[2]Includes the conveyance pipelines and access roads.
[3]Includes the booster pump stations.
MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook; DOD = Department of Defense.

Table 4.3-7. Potential Permanent and Temporary Impacts to Listed Species within the SMR CUP Construction Footprint for Alternative 2

Species	Diversion Weir	O'Neill Ditch	Production Wells	Gallery Wells	Groundwater Collection Pipeline	Access Roads	Bi-directional Pipeline		Total		Project Total
	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	MCB Camp Pendleton	DET Fallbrook	MCB Camp Pendleton	DET Fallbrook	
Arroyo Toad (breeding)											
Permanent	0.46	-	0.23	0.88	-	3.66	-	-	5.23	-	5.23
Temporary	0.97	0.15	0.70	2.28	6.61	-	-	-	10.72	-	10.72
Arroyo Toad (aestivation – upland only)											
Permanent	0.25	0.85	0.37	-	-	-	-	-	1.96	-	1.96
Temporary	0.48	5.82	0.52	0.002	0.002	2.53	-	-	9.35	-	9.35
Arroyo Toad (aestivation – riparian only)											
Permanent	<0.0003	1.42	0.06	-	-	-	-	-	1.70	-	1.70
Temporary	<0.0016	3.75	0.45	-	-	0.93	-	-	5.13	-	5.13
Least Bell's Vireo											
Permanent	0.32	0.78	0.29	0.78	0	3.88	-	-	6.07	-	6.07
Temporary	0.65	1.80	1.16	2.09	7.14	0	1.21	1.02	14.04	1.02	15.06
Coastal California Gnatcatcher (all years)											
Permanent	-	0.01	-	-	-	-	-	-	0.01	-	0.01
Temporary	-	0.07	-	-	-	-	20.84	7.87	20.91	7.87	28.78

Notes: Values are rounded to the nearest 0.01 acre, which may result in a summation rounding error.
Habitat for listed species has not been identified in the Non-DOD portion of the Alternative 2 construction area.

As described for Alternative 1, impacts to plant communities under Alternative 2 would primarily affect disturbed/developed habitat (including agricultural land) and non-native grassland, with small areas of native plant communities impacted (refer to Appendix C-1 for a detailed breakdown). These impacts are not considered significant in light of the relatively small areas of permanent impact in comparison to the abundance of these habitats in the region. Temporary impacts, a majority of which would occur along the bi-directional pipeline corridor, would be less than significant as a result of proposed restoration/revegetation with implementation of the SCMs listed under *Biological Resources* in Section 2.3.1.4.

Operations

Operational impacts under Alternative 2 would be essentially the same as those discussed under Alternative 1; however, reductions in SMR flow would be greater with operations of the gallery wells under Alternative 2. Additional pumping from the gallery wells would further increase the depth to groundwater in riparian as well as adjacent upland habitats (refer to Section 4.2.3 for details). Relative to existing conditions, groundwater levels in the Ysidora Basin would drop below historic lows, with groundwater depths increasing by several feet in most years through the summer months. This would result in greater impacts to riparian areas under Alternative 2 than those discussed under Alternative 1. This impact is considered potentially significant, with considerable uncertainty as to the location, magnitude, and direction of changes.

4.3.3.3 Aquatic Habitats and Species

Construction

Under Alternative 2, construction impacts on aquatic habitats and species would be the same as those of Alternative 1. Table 4.3-8 summarizes the temporary and permanent impacts to jurisdictional wetlands and other waters of the U.S. at MCB Camp Pendleton, DET Fallbrook, and non-DOD land within the community of Fallbrook. Under Alternative 2, potential impacts to jurisdictional wetlands would be similar to those discussed under Alternative 1, with greater impacts to other jurisdictional waters of the U.S. under Alternative 2 (Table 4.3-8). The increase in impacts to other waters of the U.S. is primarily due to the gallery wells and the associated access road which would be located within portions of and adjacent to the SMR.

Operations

Operational impacts under Alternative 2 would be essentially the same as those discussed under Alternative 1; however, reductions in SMR flow would be greater with operations of the gallery wells under Alternative 2. Additional pumping from the gallery wells would further reduce flow in the SMR, and the resultant effects on aquatic habitats and species downstream to the estuary, are considered potentially significant. The gallery wells are unlikely to have much effect on the nektonic and benthic communities during seasonal high to moderate flows; however, as flow diminishes, the potential effects of the wells would be greater. Operation of the wells during low-flow conditions would diminish current speeds, reduce water depths, and allow insolation to raise water temperatures, increasing the likelihood of algal blooms and eutrophication. However, implementation of the AMP/FOP would enable such changes to be detected and harmful effects minimized. In addition, as a result of reduced surface flows, it is possible, though not certain, that the mouth of the SMR Estuary may be increasingly susceptible to closure. Insofar as existing aquatic species use of the estuary are affected by the extent of tidal flushing and the distribution of marine and brackish habitats, the impacts of water withdrawals from the SMR under Alternative 2 are considered potentially significant.

Table 4.3-8. Impacts to Jurisdictional Wetlands and other Waters of the U.S. Under Alternative 2

Wetland/Waters of the U.S.		MCB Camp Pendleton		DET Fallbrook		Non-DOD Lands	
		Temp.	Perm.	Temp.	Perm.	Temp.	Perm.
WETLANDS (acres)							
Palustrine Emergent		0.18	0.11	0.07[1]	-	-	-
Palustrine Forested		1.91	2.98	-	-	-	-
Palustrine Scrub-Shrub		-	-	-	-	-	-
Total Wetlands		**2.09**	**3.09**	**0.07[1]**	**-**	**-**	**-**
OTHER WATERS OF THE U.S. (feet/acres)							
Riverine Lower Perennial	*Santa Margarita River*	861/0.74	1,599/1.37	-	-	-	-
Riverine Upper Perennial	*Fallbrook Creek*	-	-	-	-	-	-
Riverine Intermittent	*O'Neill Ditch*	-	5,188/2.33	-	-	-	-
	Other	322/0.04[1]	-		-	212/ 0.01[1]	-
Total Waters of the U.S.		**1,183/ 0.78[1]**	**6,787/3.70**		-	**212/ 0.01[1]**	-

Note: [1] Only a portion of jurisdictional waters within the bi-directional pipeline buffer would be impacted.
MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook; DOD = Department of Defense.
Source: Reclamation *et al.* 2013.

Alternative 2 would also discharge dilute brine into the Pacific Ocean via the Oceanside Ocean Outfall. Assuming requirements of the NPDES permit are met as a condition of the discharge, no significant impacts on the marine environment would occur. Special Status Species

Federally-Listed Threatened and Endangered Species

Consistent with the ESA, impacts on federally-listed species are described as "effects," and conclusions are reached as to whether the action would have no effect; may affect but is not likely to adversely affect any individuals of the species in question; or may affect and is likely to adversely affect one or more individuals of the species in question, resulting in "take" as defined under the ESA. The ESA conclusory statements are followed by NEPA conclusions on the significance of the impact.

Table 4.3-9 summarizes potential effects to federally-listed threatened and endangered species with implementation of Alternative 2.

California Gnatcatcher

Construction. As of 2010 (MCB Camp Pendleton surveys) and 2011 (DET Fallbrook surveys), eight CAGN territories overlap the area of potential direct impacts (300 ft buffer) for Alternative 2 (one on MCB Camp Pendleton and seven on DET Fallbrook). No CAGN territories are within the area of permanent impact on MCB Camp Pendleton or DET Fallbrook. (*Note*: the CAGN territory calculation is modeled after the CAGN effects analysis in the Basewide Utilities Infrastructure BO [USFWS 2010] using a territory size of 5.70 acres [2.30 hectares], which is the gnatcatcher territory size documented in a similar habitat and environmental conditions).

The permanent effect of construction under Alternative 2 would be the loss of approximately 0.01 acre (<0.01 hectare) of CAGN occupied CSS habitat.

Table 4.3-9. Summary of Potential Effects on Listed Species with Implementation of Alternative 2

Species	Effects on Habitat	Effects on Individuals and Potential Take
CAGN	Temporary disturbance of up to 28.78 acres of CAGN occupied CSS habitat (20.91 acres on MCB Camp Pendleton and 7.87 acres on DET Fallbrook) and permanent disturbance of up to 0.01 acre of CAGN occupied CSS habitat on MCB Camp Pendleton. Potential localized habitat disturbance due to accidents, repairs, and maintenance.	Impacts to CAGN in the vicinity of the construction sites would be minimized to less than significant through the implementation of the SCMs listed under *Biological Resources* in Section 2.3.1.4, and the presence of a Biological monitor during the breeding season and any CSS vegetation clearing. All impacts to CAGN occupied CSS habitat would be temporary impacts and would be restored in place.
LBVI	Temporary disturbance of up to 15.06 acres of mulefat scrub, southern willow scrub, southern riparian scrub, and southern riparian woodland (14.04 acres on MCB Camp Pendleton and 1.02 acres on DET Fallbrook) and permanent disturbance of up to 6.07 acres of LBVI occupied riparian habitat on MCB Camp Pendleton. Potential localized habitat disturbance due to accidents, repairs, and maintenance. Potential changes in riparian vegetation due to reductions in the magnitude, lateral extent, and duration of surface flows in the SMR.	Impacts to LBVI in the vicinity of the construction sites would be minimized to less than significant through the implementation of the SCMs listed under *Biological Resources* in Section 2.3.1.4, and the presence of a Biological monitor during the breeding season and any riparian vegetation clearing. With implementation of the AMP/FOP, operation is not likely to affect occupied LBVI habitat.
SWFL	Impacts to riparian habitat along the SMR but no impacts to occupied SWFL breeding habitat are anticipated.	With implementation of the AMP/FOP, not likely to affect occupied SWFL habitat. No effect to SWFL is anticipated.
LFCR	Reduced inflow to estuary could affect tidal flushing and productivity of salt marsh habitat.	With implementation of the AMP/FOP, not likely to adversely affect tidal flushing and estuary productivity. No effect to LFCR is anticipated.
CLTE	Reduced inflow to SMR Estuary could affect tidal flushing and lagoon foraging and nesting habitat.	With implementation of the AMP/FOP, not likely to adversely affect tidal flushing, foraging or nesting habitat. No effect to CLTE is anticipated.
SNPL	Estuary-shoreline foraging and nesting conditions for plovers could be directly or indirectly affected by changes in SMR inflows.	With implementation of the AMP/FOP, not likely to adversely affect tidal flushing, foraging or nesting habitat. No effect to SNPL is anticipated.

Continued on next page

Table 4.3-9. Summary of Potential Effects on Listed Species with Implementation of Alternative 2 (cont.)

Species	Effects on Habitat	Effects on Individuals and Potential Take
ARTO	Temporary disturbance of up to 10.72 acres of riparian and freshwater breeding habitat, and an additional 14.48 acres of riparian and upland aestivation habitat on MCB Camp Pendleton. Permanent disturbance of up to 5.23 acres of riparian and freshwater breeding habitat and an additional 3.66 acres of upland and riparian aestivation habitat on MCB Camp Pendleton. Reduced SMR surface flows could reduce shallow run and pool habitat, reduce scouring floods that regenerate and maintain open sandbar habitats. Potential localized habitat disturbance due to accidents, repairs, and maintenance.	Likely to adversely affect. Potential displacement of and mortality to individual toads during construction; unquantifiable take. Potential annual or long-term reductions of habitat for juveniles and adults, which would affect the SMR population. Potential adverse effects would be minimized through the AMP/FOP.
SDFS/RFS	No potential temporary or permanent disturbance would occur.	No effect. No take of individuals is expected.
SCS	Water withdrawals would cause little if any reduction in the high flows that have the greatest potential to support steelhead migration in the SMR downstream of the weir. The incorporation of a fish screen on the diversion and design and operations measures to enhance fish passage at the weir would improve conditions for steelhead passage through the study area.	Action is not likely to adversely affect SCS.
TWG	TWG does not presently occur and the action would have minor if any effects on unoccupied potential habitat in the estuary. If TWG were to occur in the future, potential effects of operations would be addressed under the AMP/FOP.	Not likely to adversely affect TWG.
BSSP	Reduced inflow to SMR Estuary could diminish tidal flushing and flood salt marsh habitat used for nesting and foraging.	Potential adverse effects would be minimized through the AMP/FOP.
SKR	Temporary effects on potential habitat; SKR does not presently occur in the action area.	Not likely to adversely effect, no take of individuals or adverse effects on habitat are expected.

Notes: CAGN = Coastal California Gnatcatcher; CSS = coastal sage scrub; MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook; DOD = Department of Defense; LBVI = Least Bell's Vireo; SMR = Santa Margarita River; AMP/FOP = Adaptive Management Plan; FOP = system operation plan; SWFL = Southwestern Willow Flycatcher; LFCR = Light-footed Clapper Rail; CLTE = California least term; SNPL = Western Snowy Plover; ARTO = Arroyo toad; SDFS = San Diego fairy shrimp; RFS = Riverside fairy shrimp; SCS = southern California steelhead; TWG = Tidewater Goby; BSSP = Belding's Savannah Sparrow; SKR = Stephens' Kangaroo Rat.

Construction would temporarily affect approximately 28.78 acres (11.65 hectares) of CAGN occupied CSS habitat (20.91 acres [8.46 hectares] on MCB Camp Pendleton and 7.87 acres [3.18 hectares] on DET Fallbrook) . Most of the potentially affected CSS was not overlapped by CAGN territories as of 2010 and may therefore be considered unoccupied. A total of one CAGN territory on MCB Camp Pendleton and seven CAGN territories on DET Fallbrook would potentially be directly impacted (see Appendix C-1, Figures C1-30, C1-31, and C1-32). Moreover, the area of actual effect would be much smaller than the acreages described above. This is because the majority of the impact area (28.71 acres [11.62 hectares]) occurs along the bi-directional pipeline, which would only involve temporary impacts inside a 20-ft to 50-ft (6-m to 15m) corridor located within the 100-ft (31-m) wide buffer corridor used for acreage calculations. An analysis of the much wider 100-ft (31-m) buffer areas has been provided to allow the flexibility of placing the pipeline anywhere within the buffer area to meet site-specific construction needs and minimize effects. Individual CAGN may be displaced to adjacent habitat, especially along the pipeline corridors. Removal of small areas of patchy and disturbed CSS within the larger regional habitat is not likely to adversely affect CAGN.

Apart from vegetation removal, temporary direct effects would include the potential disturbance of CAGN during construction due to noise, traffic, and human occupancy in the project vicinity. Noise and indirect effects may extend into adjacent habitat occupied by CAGN. Individuals would be displaced to adjacent areas, and may experience energetic costs or increased risk of predation as a result; either of which may affect subsequent survival and reproduction.

Effects to CAGN occupied CSS would be minimized through conservation measures as described for Alternative 1; therefore, temporary direct effects due to noise or activity would not immediately affect nesting pairs or reproduction.

Operations. As described for Alternative 1, operations under Alternative 2 have the potential to re-disturb habitat and temporarily affect individuals. These effects would be minimized by protective measures and restoration of affected habitats.

Conclusion. Through the implementation of SCMs identified Section 2.3.2.4 (and any other measures identified during consultation with the USFWS relative to this species), no effect on the overall distribution or abundance of the species is anticipated from implementation of Alternative 2. Therefore, with the implementation of SCMs, there would be no significant impacts to CAGN with implementation of Alternative 2. Under ESA, implementation of Alternative 2 may affect, but is not likely to adversely affect CAGN territories due to noise and disturbance from Alternative 2.

No long-term effects on the CAGN population on MCB Camp Pendleton or DET Fallbrook are anticipated. Therefore, Alternative 1 would not have a significant impact on the CAGN.

Least Bell's Vireo

Construction. As of 2010 (MCB Camp Pendleton surveys) and 2011 (DET Fallbrook surveys), 78 LBVI territories (77 on MCB Camp Pendleton and 1 on DET Fallbrook) overlap the area of anticipated direct impact (300 ft buffer) for Alternative 1 (refer to Figures C1-30, C1-31, and C1-32 in Appendix C-1) (*Note*: the LBVI territory calculation is modeled after the LBVI effects analysis in the Basewide Utilities Infrastructure BO [USFWS 2010] using a territory size of 1.9 acres [0.8 hectare], which is the LBVI territory size documented in a similar habitat and environmental conditions).

LBVI within the construction footprint would experience a direct loss of foraging/nesting habitat, whereas birds within the construction buffer distance could have breeding and/or foraging behavior disrupted, with attendant effects on reproduction, energetics, or predation risk.

To minimize impacts to LVBI, construction would take place outside the breeding season to the maximum extent practicable. If seasonal avoidance is not feasible, a biological monitor would be present when construction is within 300 ft (90 m) of occupied CAGN habitat, and additional SCMs listed under *Biological Resources* in Section 2.3.1.4 would be implemented. The biological monitor would conduct nest surveys to determine the presence/absence of LBVI documented within 300 ft (90 m) of the construction sites. If a LBVI nest is found, a 300-ft (90-m) buffer around the nest would be established to minimize impacts to LBVI (refer to SCMs listed under *Biological Resources* in Section 2.3.1.4).

The permanent effect of Alternative 2 would be the loss of potential LBVI-occupied habitat (defined as mulefat scrub, southern willow scrub, southern riparian scrub, and southern riparian woodland). Construction would permanently affect approximately 6.07 acres (4.26 hectares) of LBVI occupied riparian habitat, all of which occurs on MCB Camp Pendleton at the diversion weir, O'Neill Ditch, production and gallery wells, and access roads.

Construction would temporarily affect approximately 15.06 acres (6.09 hectares) of LBVI-occupied riparian habitat (14.04 acres [5.68 hectares] on MCB Camp Pendleton and 1.02 acres [0.41 hectare] on DET Fallbrook). The majority of these temporary impacts would occur in the location along O'Neill Ditch, the production and gallery wells, and conveyance pipelines. As described under Alternative 1, the actual area of impact along the pipeline corridors would be much smaller than the acreages described in Table 4.3-6. Effects on LBVI would be minimized as described for Alternative 1.

Operations. Operational effects would be similar to those described under Alternative 1.

Conclusion. Through successful implementation of the AMP/FOP as described in Section 2.3.1.4, *Special Conservation Measures*, no significant impacts to LBVI are expected. Prior to implementation of Alternative 2, MCB Camp Pendleton and Reclamation, in coordination with DET Fallbrook, would consult with USFWS and the terms and conditions of the resulting BO would be implemented. No long-term effects on the LBVI population on MCB Camp Pendleton or DET Fallbrook are anticipated. Therefore, Alternative 2 would not have a significant impact on the LBVI.

Southwestern Willow Flycatcher

Construction. There have been no SWFL territories within the areas of potential permanent and temporary impact for Alternative 1 or within 300 ft (90 m) of the proposed construction areas on MCB Camp Pendleton and DET Fallbrook during any recent surveys (Appendix C). No construction would occur in OSMZ; therefore, no negative impacts would occur to the SWFL critical habitat in the OSMZ.

The principal direct effect of Alternative 2, which would occur outside of the breeding season, would be the loss of potential (future) SWFL foraging and breeding habitat. The principal permanent effect of Alternative 2 would be the loss of potential LBVI habitat. Construction would permanently affect approximately 6.80 acres (2.75 hectares) of riparian habitat, all of which occurs on MCB Camp Pendleton at the diversion weir, O'Neill Ditch, production and gallery wells, and access roads (see Table 4.3-6). Construction would temporarily affect approximately 19.28 acres (7.80 hectares) of riparian habitat (16.59 acres [6.71 hectares] on MCB Camp Pendleton and 2.08 acres [0.84 hectare] on DET Fallbrook). The majority of these temporary impacts would occur in the location along O'Neill Ditch, the production and gallery wells, and conveyance pipelines (see Table 4.3-6). As described under Alternative 1, the actual area of impact along the pipeline corridors would be much smaller than the acreages described in Table 4.3-6.

Given the long-term absence of SWFL from potential construction areas (and associated buffers), combined with the implementation of LBVI SCMs listed under *Biological Resources* in Section 2.3.1.4, construction-related disturbance to SWFL nesting behavior is unlikely. Effects on individual SWFL, if present, would be roughly similar to those on individual LBVI. However, potential interference with foraging or movements by SWFLs in this location is of greater concern because the SWFL breeding population and area of occupied habitat on MCB Camp Pendleton is very small. Disturbance to individuals in this small population could cause them to abandon the area, and the numbers are so low as to limit future breeding opportunities among remaining individuals. Since clearing during the breeding season would not occur and disturbance to riparian habitat in the SMR would be minimized per avoidance and minimization measures, potential direct effects are unlikely to occur. If breeding SWFL were found within 250 ft (76 m) of construction, the USFWS would be contacted and consultation could be re-initiated.

Operations. Operational effects would be similar to those described under Alternative 1.

Conclusion. Through successful implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, habitat would be regularly monitored and if the riparian habitat value where the SWFL breed is reduced, operations would be re-evaluated, which may include re-initiation of consultation with the USFWS. With the implementation of the AMP/FOP and avoidance, minimization, and compensation measures as determined by consultation, Alternative 2 may affect, but is not likely to adversely affect, the SWFL. Prior to implementation of Alternative 2, MCB Camp Pendleton and Reclamation, in coordination with DET Fallbrook, would consult with USFWS and the terms and conditions of the resulting BO would be implemented. Therefore, Alternative 2 would not have a significant impact on the SWFL.

Light footed Clapper Rail

Construction. Under Alternative 2, no construction activities would occur in or near the SMR Estuary. Therefore, no effects to LFCR are expected due to construction.

Operations. Operational effects would be the same as those described under Alternative 1.

Conclusion. Alternative 2 may affect, but is not likely to adversely affect, LFCR. Therefore, Alternative 2 would not have a significant impact on the LFCR. Prior to implementation of Alternative 2, MCB Camp Pendleton and Reclamation would consult with USFWS and the terms and conditions of the resulting BO would be implemented.

California Least Tern

Construction. Under Alternative 2, no construction activities would occur in or near the SMR Estuary. Therefore, no effects to CLTE are expected from construction.

Operations. Operational effects would be the same as those described under Alternative 1.

Conclusion. With the implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, CLTE nesting habitat and foraging conditions would be maintained in the SMR estuary and as such, Alternative 2 may affect, but is not likely to adversely affect, the CLTE. Therefore, Alternative 2 would not have a significant impact on the CLTE. Prior to implementation of Alternative 2, MCB Camp Pendleton and Reclamation would consult with USFWS and the terms and conditions of the resulting BO would be implemented.

Snowy Plover

Construction. Under Alternative 2, no construction activities would take place near SNPL nesting or foraging areas. Therefore, no effects to the SNPL are expected due to construction.

Operations. Operational effects would be the same as those described under Alternative 1.

Conclusion. The action would have no direct effects on individual SNPL, and with the implementation of the AMP/FOP, it is very unlikely that there would be any negative impact to the estuarine and beach habitat used for nesting and foraging. Thus the action may affect, but is not likely to adversely affect, the SNPL. Therefore, Alternative 2 would not have a significant impact on the SNPL.

Arroyo Toad

Construction. Construction impacts to ARTO under Alternative 2 would be similar to those discussed under Alternative 1; however, a greater area of ARTO habitat would be impacted during construction with the inclusion of the gallery wells and associated conveyance pipeline/access road under Alternative 2 (Appendix C-1). Based on the acreage of immediate construction impacts (i.e., work areas) plus reasonable buffer distances for incidental disturbance, as explained in Section 2.3, there are approximately 15.95 acres (6.45 hectares) of ARTO occupied riparian and freshwater and open water breeding habitat subject to direct effects by temporary and permanent construction in the Alternative 2 area on MCB Camp Pendleton. In addition, approximately 18.14 acres (7.34 hectares) of ARTO occupied riparian and upland aestivation habitat on MCB Camp Pendleton would be subject to direct effects.

Construction would permanently affect approximately, 5.23 acres (2.11 hectares) of ARTO occupied riparian breeding habitat and an additional 3.66 acres (1.48 hectare) of ARTO occupied upland and riparian aestivation habitat on MCB Camp Pendleton. Construction would temporarily affect approximately 10.72 acres (4.34 hectares) of ARTO occupied breeding riparian habitat and an additional 14.48 acres (5.86 hectares) of ARTO occupied upland and riparian aestivation habitat on MCB Camp Pendleton (see Figures C-31 and C-32 in Appendix C-1).

Effects to ARTO would be minimized through implementation of the SCMs listed under *Biological Resources* in Section 2.3.1.4. Based on relatively limited areas of effect and implementation of these measures, the potential for an adverse effect on individual ARTO would be minimized. Nevertheless, a few individuals may unavoidably be injured or killed during construction activities, although this would not affect population numbers or distribution on MCB Camp Pendleton.

Therefore, with the implementation of SCMs for temporary and permanent disturbance of riparian habitat, minor short-term and negligible long-term adverse effects would occur from construction.

Operations. Operational effects under Alternative 2 would be the similar to those discussed under Alternative 1, and implementation of recommended SCMs listed under *Operations* in Section 2.3.1.4 would decrease potential long-term impacts on ARTO.

Conclusion. Alternative 2 may affect and is likely to adversely affect ARTO due to construction-related risks of injury or mortality which cannot be completely eliminated. Through the implementation of SCMs for temporary and permanent disturbance of riparian and aestivation habitat, minor short-term and negligible long-term adverse effects to individual toads would occur from construction. Potential adverse effects during operations would be minimized through the successful implementation AMP/FOP. Potential impacts to ARTO habitat represent a small fraction of the available ARTO habitat within MCB Camp Pendleton and are largely temporary. Prior to implementation of Alternative 2, MCB Camp Pendleton and Reclamation would consult with USFWS and the terms and conditions of the resulting BO would be implemented.

Preservation of habitat in the OSMZ could have long-term beneficial effects on ARTO which may, to some extent, offset potential adverse effects on the population in the Lower SMR.

San Diego Fairy Shrimp/Riverside Fairy Shrimp

Because SDFS/RFS have not been documented in the Alternative 2 action area, no potential temporary or permanent disturbance would occur. Alternative 2 would have no effect on SDFS/RFS. To minimize risks to SDFS/RFS potentially occurring within the proposed construction areas, the SCMs listed under *Biological Resources* in Section 2.3.1.4 would be implemented. Therefore, no significant impacts would occur.

Southern California Steelhead

Construction. Construction impacts would be the same as those described under Alternative 1.

Operations. Operational effects would be the same as those described under Alternative 1.

Conclusion. Potential effects to SCS habitat and migration in the SMR would be the same as those discussed under Alternative 1. Making the precautionary assumption that SCS are present in the SMR and likely to migrate through the action area, Alternative 2 may affect, but is not likely to adversely affect, the passage of adults or juveniles in the SMR between the Pacific Ocean and inflatable weir and at the inflatable weir and O'Neill Ditch. Therefore, Alternative 2 would not have a significant impact on SCS. Prior to implementation of Alternative 2, MCB Camp Pendleton would consult with NOAA Fisheries and the results of the consultation would be implemented.

Tidewater Goby

Potential effects to TWG would be the same as those discussed under Alternative 1. Due to the current absence of this species downstream from the project area, and low likelihood of adverse effects on potential habitat that could be recolonized in the future, Alternative 2 may affect, but is not likely to adversely affect, TWG. No significant impacts would occur.

Stephens' Kangaroo Rat

Construction. SKR habitat occurs in areas that would be affected by construction of the bi-directional pipeline, but is currently unoccupied. Given the absence of SKR in these areas since the 1990s, it is very unlikely they would recolonize and occur during construction. Revegetation of disturbed areas as proposed following construction would assure no long term effect on habitat and the potential for future use by SKR.

Operations. Project operations would not affect SKR.

Conclusion. Alternative 2 would temporarily affect habitat for SKR which is currently unoccupied but could be recolonized. As such, Alternative 2 may affect, but is not likely to adversely affect, SKR. No significant impacts would occur.

<u>State-Listed Threatened and Endangered Species</u>

Belding's Savannah Sparrow

As in Alternative 1, Alternative 2 would not substantially increase the likelihood or duration of SMR Estuary closures and thus would not have a significant impact on BSSP.

<u>Other Special Status Species – Plants</u>

There are three species of special status plants documented in the ROI that could potentially be impacted by Alternative 2. However, no significant impacts to these species local populations are expected from the implementation of Alternative 2. With the successful implementation of the SCMs and the AMP/FOP, as described in Section 2.3.1.4, impacts would be less than significant.

Four additional special status plants were documented in the OSMZ: Engelmann oak, Fish's milkwort, ocellated Humboldt lily, and RM. These species would benefit from the protection of the OSMZ under Alternative 2.

Other Special Status Species –Wildlife

Upland Species

Impacts on upland wildlife species under Alternative 2 would be similar to those described under Alternative 1. Upland special status wildlife species would not be significantly impacted by construction or operational activities. Protection and management of habitat within the OSMZ would have beneficial impacts.

Aquatic and Riparian Species

Impacts on aquatic and riparian special status species that are present in the ROI would be the similar to those described under Alternative 1, with larger areas impacted by construction and operations of the gallery wells.

4.3.3.4 Mitigation Measures

In addition to the SCMs referenced in Section 2.3.2.4, including the AMP/FOP, the mitigation measure described under Alternative 1 is also proposed under Alternative 2 (refer to Section 4.3.25).

4.3.4 No-Action Alternative

Under the No-Action Alternative, SMR CUP would not be implemented and no ground-disturbing activities would occur. Consequently, there would be no construction impacts, and baseline conditions (as described in Section 3.4, *Biological Resources*) would remain unchanged in the short term. However, operational impacts as modeled by the Baseline Model scenario (Stetson 2012a) may be significant due to groundwater depletion and its indirect effects on riparian habitat and associated species.

4.4 CULTURAL RESOURCES

4.4.1 Approach to Analysis

This section addresses anticipated impacts from project implementation. Project components with an APE that contain no known cultural resources are briefly identified and dismissed from further analysis, since no significant impacts would occur and that have no potential to contain cultural resources. Detailed analysis is provided for project components with known cultural resources. For the purposes of this analysis, all cultural resources within or immediately adjacent to the APE were considered potentially subject to direct impacts. All impacts to cultural resources are permanent, as these are non-renewable resources, and even though an activity may be considered short-term, destruction of an archaeological resource is permanent.

MCB Camp Pendleton uses environmental planning, project design, and redesign to avoid or minimize impacts to cultural resources. However, when avoidance is not feasible, eligible resources must receive appropriate treatment. For archaeological sites considered important for their potential to provide information, this usually involves data recovery. For buildings and structures, this involves the preparation of Historic American Building Survey/Historic American Engineering Record documentation.

4.4.2 Alternative 1

Based on record searches and archaeological surveys (Becker *et al.* 2012), no cultural resources have been identified within the APE for the following project components and therefore, no effects to cultural resources would occur:

- Replacement of Exiting Sheet Pile Diversion with Inflatable Weir Diversion Structure,
- Improvements to Percolation ponds 1-7,
- Groundwater Production Wells and Associated Collection System Infrastructure, and
- FPUD WTP.

Although no cultural resources have been identified within the APE for the above listed project components, the SCM listed under *Cultural Resources* in Section 2.3.1.4 would be implemented in the event that unknown cultural resources are encountered during construction. Therefore, with implementation of this SMC, as needed, no significant impacts to cultural resources would occur during construction of the above listed components of Alternative 1. The SCADA System would not involve construction under Alternative 1 and would therefore, not impact cultural resources. Discussed in greater detail below are the project components with known cultural resources.

4.4.2.1 MCB Camp Pendleton

<u>Improvements to O'Neill Ditch and Headgate</u>

A total of four cultural resources were identified within the APE for this project component. Under Alternative 1, improvements to O'Neill Ditch (SMR-CUP 4) would include the removal of three newly identified historic culverts (SMR-CUP 1-3) for replacement, along with an increase in ditch capacity.

The northern section of the present-day O'Neill Ditch maintains a similar alignment to the original main ditch, but the original irrigation system is no longer intact. It is likely that the 1883 main ditch has been modified over time. It is more likely that a ditch has been reconstructed in a similar alignment by the military in support of the Percolation Basin. As discussed in Section 3.4.4.2, the historic culverts (SMR CUP 1-3) and O'Neill Ditch (SMR-CUP 4) are ineligible for listing on the NRHP. Should buried cultural resources be encountered during construction activities, the SCM identified in Section 2.3.1.4 would be implemented. Therefore, no significant impacts would occur with implementation of this component under Alternative 1.

<u>Other Components</u>

No sites were identified within the APE associated with the groundwater production wells, collection system infrastructure, and bi-directional pipeline on MCB Camp Pendleton. However, for any drilling/trenching operations within the upper 15 ft (5 m) of the floodplain, which has the potential for buried deposits, monitoring is required and would be conducted by a qualified archaeologist and Native American monitor approved by the Cultural Resources Branch. Should buried cultural resources be encountered during construction activities, the SCM identified in Section 2.3.1.4 would be implemented. Therefore, no significant impacts to cultural resources would occur as a result of implementation of these components of Alternative 1.

4.4.2.2 DET Fallbrook

<u>Water Conveyance/Distribution System, including Bi-Directional Pipeline to FPUD</u>

Table 4.4-1 provides a summary of NRHP eligibility status and recommendations for each of the cultural resources identified within APE to the bi-directional pipeline along Ammunition Road on DET Fallbrook.

There are three known cultural resources within the APE of this project component on DET Fallbrook: SDI-10158, Segment C of SDI-14005H, and -14381; while SDI-14375 would be avoided by a realignment of the pipeline. SDI-10158 is an NRHP eligible site, but the portion that the APE passes through was observed to be disturbed from previous grading activities. Segment C of SDI-14005H and SDI-14381 are both NRHP ineligible sites. Monitoring by a qualified archaeologist and Native American monitor approved by the Cultural Resources Manager for DET Fallbrook is required for SDI-10158 and -14381 during construction because the APE passes through both and for SDI-14375 due to its close proximity to the APE, as there is a potential for inadvertent discoveries. Additionally, a monitoring buffer of 100 ft (30 m) around each of these three sites is recommended. No monitoring is recommended for Segment C of SDI-14005H. Should buried cultural resources be encountered during construction activities, the SCM identified in Section 2.3.1.4 would be implemented. Therefore, no significant impacts to cultural resources would occur with implementation of this component of Alternative 1.

Table 4.4-1. Archaeological Sites Within or Near the APE on DET Fallbrook

Site (SDI-)	Description	NRHP Eligibility Status	Potential Effects	Treatment Needs
10158	Prehistoric bedrock milling site with 8 loci and artifacts	Disturbed portion of eligible site	Potentially Significant	Archaeological Monitoring
14005H	Segment C of the Southern California Railroad	Ineligible	No impacts expected	None
14381	Prehistoric artifact scatter	Ineligible	Potentially Significant	Archaeological Monitoring
14375	Prehistoric artifact scatter	Indeterminate	No impacts expected	Archaeological Monitoring

Source: Becker *et al*. 2012; California Office of Historic Preservation 2013.

4.4.2.3 Community of Fallbrook

<u>Water Conveyance/Distribution System, including Bi-Directional Pipeline to FPUD</u>

One cultural resource exists within this project component. The Martin Reservoir in the Gheen Zone was constructed for the FPUD as a PWA-funded project between February and June 1939, and it was evaluated for its possible eligibility to the NRHP. Although the Martin Reservoir was constructed as a part of a national program through the PWA, an association with the PWA is not enough to make the structure eligible. As discussed in Section 3.4.3.2, the Martin Reservoir is ineligible under Criteria A, B, C, and D of the NRHP. The Martin Reservoir was also evaluated for its possible eligibility to the CRHR under the four criteria and is recommended not eligible on a state or local level to the CRHR. Should buried cultural resources be encountered during construction activities, the SCM listed under *Cultural Resources* in Section 2.3.1.4 would be implemented. Therefore, no significant impacts to cultural resources would occur with implementation of this component of Alternative 1.

4.4.2.4 Mitigation Measures

Through avoidance and implementation of the SCM listed under *Cultural Resources* in Section 2.3.1.4, Alternative 1 would not result in significant impacts to cultural resources; therefore, no additional mitigation measures are proposed.

4.4.3 Alternative 2

4.4.3.1 Environmental Impacts

Under Alternative 2, project components with known cultural resources within the APE or that do not involve construction work are identical as those listed under Alternative 1. No additional cultural resources have been identified within the APE under Alternative 2 for the following project components and therefore, no effects to cultural resources would occur:

- Gallery Wells and Associated Collection System Infrastructure, and
- Expand Haybarn Canyon AWTP and Add a Surface Water Treatment Facility.

In the event that unknown cultural resources are encountered during implementation of these project components, the same procedures discussed under the Alternative 1 would be implemented to determine potential eligibility and avoidance or mitigation procedures would be followed, as appropriate. Therefore, no significant impacts to cultural resources would occur as a result of implementation of the above listed components of Alternative 2.

The project components with known cultural resources and impacts to those resources would be the same for Alternative 2 as those described under Alternative 1. As discussed under Alternative 1, monitoring is recommended for any drilling/trenching operations within the upper 15 ft (5 m) of the floodplain and for known sites along the pipeline route on DET Fallbrook (i.e., SDI-10158, -14381, and -14375). Should buried cultural resources be encountered during construction activities, the SCM listed under *Cultural Resources* in Section 2.3.1.4 would be implemented. Therefore, no significant impacts to cultural resources would occur as a result of implementation of Alternative 2.

4.4.3.2 Mitigation Measures

Through avoidance and implementation of the SCM listed under *Cultural Resources* in Section 2.3.1.4, Alternative 2 would not result in significant impacts to cultural resources; therefore, no additional mitigation measures are proposed.

4.4.4 No-Action Alternative

Under the No-Action Alternative, the proposed conveyance pipeline and facilities would not be constructed and no ground-disturbing activities would occur. Consequently, baseline conditions (as described in Section 3.4, *Cultural Resources*) would remain unchanged. Therefore, no impacts to cultural resources would occur with implementation of the No-Action Alternative.

4.5 AIR QUALITY

4.5.1 Approach to Analysis

Emission thresholds associated with federal CAA conformity requirements are the primary means of assessing the significance of potential air quality impacts associated with implementation of a Proposed Action under NEPA. A formal conformity determination is required for federal actions occurring in nonattainment or maintenance areas when the total direct and indirect stationary and mobile source emissions of nonattainment pollutants or their precursors exceed *de minimis* thresholds.

Significant air quality impacts would occur if implementation of any of the alternatives would directly or indirectly:

1) expose people to localized (as opposed to regional) air pollutant concentrations that violate state or federal ambient air quality standards;

2) cause a net increase in pollutant or pollutant precursor emissions that exceeds relevant emission significance thresholds (such as CAA conformity *de minimis* levels or the numerical values of major source thresholds for nonattainment pollutants); or

3) conflicts with adopted air quality management plans, policies, or programs.

Criteria to determine the significance of air quality impacts are based on federal, state, and local air pollution standards and regulations. The SDCAPCD has not established criteria for assessing the significance of air quality impacts for NEPA purposes. However, SDCAPCD Rule 20.3 defines a stationary source as "major" if annual emissions exceed 100 tons of CO, SO_x, or PM_{10}, or 100 tons of VOCs or NO_x. For purposes of this air quality analysis, project emissions within the MCB Camp Pendleton region would be potentially significant if they exceed these thresholds. This is a conservative approach, as the analysis compares emissions from both project-related stationary and mobile sources to these thresholds. Impacts would also be potentially significant within the MCB Camp Pendleton region if project emissions exceed the thresholds that trigger a conformity determination under Section 176(c) of the 1990 CAA (100 tons per year of VOC, NO_x, or CO).

Section 4.5.5 presents the Conformity Applicability Analysis for actions within the SDAB and Appendix D contains the Record of Non-Applicability for CAA Conformity.

4.5.2 Alternative 1

Potential air quality impacts associated with Alternative 1 include construction emissions and emissions associated with facility operations and maintenance activities.

4.5.2.1 Construction

Assumptions

Air quality impacts from proposed construction activities would occur from (1) combustion emissions due to the use of fossil fuel-powered equipment; and (2) fugitive dust emissions (PM_{10}) during construction activities, earth-moving activities, and the operation of equipment on bare soil.

Emission factors used to derive construction source emission rates were obtained from *Compilation of Air Pollution Emission Factors, AP-42, Volume I* (USEPA 2002), the *CARB OFFROAD Emissions Model* (CARB 2007a), and the *CARB EMFAC2007 Model* (CARB 2007b). Emissions associated with construction were assumed to occur within a 12-month period. It was assumed that fugitive dust emissions during grading would be controlled through watering active grading areas a minimum of three times daily. The analysis also assumes a reduction in PM_{10} emissions from earth-moving activities by 61% to take into consideration fugitive dust control measures based on the control efficiency for watering three times per day in the CalEEMod Model (ENVIRON 2011).

Construction scenarios for the proposed construction projects were provided in the project description and by Reclamation or were based on construction of similar projects. In addition to construction emissions from on-site equipment use and fugitive dust, emissions from construction workers commuting to and from the construction sites, and emissions associated with trucks hauling material to the construction sites were calculated using emission factors from the *CARB's EMFAC2007 model* (CARB 2007b). For the purpose of estimating emissions associated with surface disturbance, it was assumed that 2 acres (0.8 hectare) per day would be disturbed, with an emission factor of 20 pounds/acre-day based on the *URBEMIS 9.2.4 Model* (Rimpo and Associates 2007), and that watering three times daily would control fugitive dust by 61% in accordance with the CalEEMod Model assumptions. A complete description of the construction projects, equipment required for construction, estimates of workforce requirements, and haul truck travel are provided in Appendix D, along with the emission calculations for construction activities. Emissions calculations were based on the construction projects and assumptions listed in Table 4.5-1.

Estimated construction emissions are presented as maximum pounds per day (Table 4.5-2) and tons per year (Table 4.5-3). To address impacts under CEQA, emissions were compared with daily significance thresholds based on County of San Diego, Department of Planning and Land Use Significance Level Thresholds (County of San Diego 2007b). Although this guidance document provides hourly, daily, and annual significance thresholds, daily emission thresholds are the most appropriate for this project because construction would vary substantially on an hourly basis, and construction scenarios are not specific enough to address activities, or emissions, on an hourly basis. Annual emissions and their comparison with conformity *de minimis* thresholds as shown in SDCAPCD's Rules and Regulations (SDCAPCD 2012), which are appropriate for this project, were evaluated and are presented in Table 4.5-3.

The SCADA System would not require the use of any construction equipment and, therefore, would not produce any air emissions and is not analyzed further in this section.

Impacts

Estimated construction emissions as a result of implementation of Alternative 1 are shown in Table 4.5-2 (maximum pounds per day) and Table 4.5-3 (tons per year). Emissions associated with construction activities under Alternative 1 would be below the *de minimis* levels for CAA conformity; therefore, no significant impacts to air quality would occur.

Fugitive dust control measures that are considered part of Alternative 1 would be implemented as SCMs (refer to SCMs listed in Section 2.3.1.4) to reduce emissions of particulate matter (PM_{10} and $PM_{2.5}$) to the extent possible. These measures include watering unpaved roads and actively graded surfaces three times daily, as well as reducing speeds on unpaved roads to 15 mph (24 kph), suspending grading activities if wind speeds exceed 25 mph (40 kph), and replacing ground cover in graded areas as soon as possible. These measures have been taken into account in the emission calculations for Alternative 1.

4.5.2.2 Operations

Assumptions

Operations assumptions and methodology are similar to those described under *Construction Assumptions*.

Table 4.5-1. Construction Equipment Requirements for Alternative 1

Equipment	Number	Months of Construction
Replacement of Diversion Structure (Both Alternatives)		
Tractors/Loaders/Backhoes	2	2
Dump Trucks	2	
Bulldozers	1	
Crane	1	
Rough Terrain Forklifts	1	
Improvements to O'Neill Ditch and Headgate (Both Alternatives)		
Excavator	1	3
Tractors/Loaders/Backhoes	2	
Bulldozers	1	
Improvements to Percolation ponds 1-7 (Both Alternatives)		
Excavator	1	3
Tractors/Loaders/Backhoes	2	
Groundwater Production Wells and Associated Collection System (Both Alternatives)		
Drill Rig	1	3
Tractors/Loaders/Backhoes	2	
FPUD WTP (Alternative 1)		
Excavators	*2*	*6*
Backhoe	2	
Loaders	2	
Dump Trucks	2	
Crane	1	
Bobcat	1	
Compactor	1	
Compressor	1	
Wackers	1	
Paver	1	
Water Conveyance/Distribution System to Red Mountain Reservoir (Alternative 1)		
Rough Terrain Forklift	2	3
Excavators	4	
Trencher	1	
Compactor	2	
Backhoe	1	
Loaders	1	
Dump Trucks	1	
Crane	1	
Paver	1	

Notes: FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant.

Table 4.5-2. Alternative 1 Construction Emissions (Maximum Pounds per Day)

Component	Emissions (pounds/day)					
	CO	**VOCs**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Daily significance threshold[1]	550	75	250	250	100	55
Replacement of Diversion Structure						
Heavy Construction Equipment	53.30	14.23	122.76	0.12	6.81	6.06
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Grading	-	-	-	-	15.60	3.28
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**75.78**	**16.55**	**146.83**	**0.17**	**78.89**	**15.85**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Improvements to O'Neill Ditch and Headgate						
Heavy Construction Equipment	28.01	6.57	53.29	0.05	2.95	2.62
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Grading	-	-	-	-	15.60	3.28
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**50.49**	**8.89**	**77.36**	**0.10**	**75.03**	**12.41**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Improvements to Percolation ponds 1-7						
Heavy Construction Equipment	3.98	1.12	8.94	0.01	0.54	0.48
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**26.46**	**3.44**	**33.01**	**0.06**	**57.02**	**6.99**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Groundwater Production Wells and Associated Collection System						
Heavy Construction Equipment	20.69	5.19	40.83	0.04	2.41	2.15
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**43.17**	**7.51**	**64.9**	**0.09**	**58.89**	**8.66**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Water Conveyance/Distribution System to Red Mountain Reservoir						
Heavy Construction Equipment	56.48	16.60	134.47	0.13	7.91	7.04
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Grading	-	-	-	-	15.60	3.28
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**78.96**	**18.92**	**158.54**	**0.18**	**79.99**	**16.83**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
FPUD WTP						
Heavy Construction Equipment	63.29	19.30	145.08	0.15	9.07	8.07
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**85.77**	**21.62**	**169.15**	**0.2**	**65.55**	**14.58**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***

Notes: [1] Daily significance thresholds are based on County of San Diego, Department of Planning and Land Use Significance Level Thresholds (County of San Diego 2007b).

CO = carbon monoxide; VOC = volatile organic compound; NO_x = nitrogen oxides; SO_x = sulfur oxides; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant.

Table 4.5-3. Alternative 1 Construction Emissions (Tons per Year)

Component	Emissions (tons/year)					
	CO[2]	**VOCs[1]**	**NO_x[1]**	**SO_x[2]**	**PM_{10}[2]**	**$PM_{2.5}$[2]**
Annual Total						
Heavy Construction Equipment	9.69	2.78	21.83	0.02	1.30	1.16
Construction Worker Travel	1.04	0.21	2.85	0.00	0.13	0.11
Haul Trucks	1.77	0.08	0.16	0.00	0.02	0.01
Fugitive Dust – Grading	-	-	-	-	1.95	0.41
Fugitive Dust – Vehicles	-	-	-	-	6.91	0.69
Total Annual Emissions	**12.50**	**3.07**	**24.84**	**0.02**	**10.31**	**2.38**
De Minimis Threshold[3]	100	100	100	100	100	100
Exceeds De Minimis Threshold?	***No***	***No***	***No***	***No***	***No***	***No***

Notes: [1] SDAB is a moderate nonattainment area for the 8-hour O_3 NAAQS; VOCs and NOx are precursors to the formation of O_3.
[2] SDAB is considered a maintenance area for the CO NAAQS and is in attainment of the NAAQS for SOx, PM_{10}, and $PM_{2.5}$.
[3] Significance levels are developed from SDCAPCD major source thresholds (SDCAPCD 2012); *de minimis* levels are not applicable to NAAQS attainment areas (i.e., SO_2, PM_{10} and $PM_{2.5}$) but have been presented for planning purposes only.
CO = carbon monoxide; VOC = volatile organic compound; NO_x = nitrogen oxides; SO_x = sulfur oxides; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter.

Impacts

Air quality impacts from proposed operational activities would occur due to indirect emissions from energy use to power pumps, the FPUD WTP, and other support equipment. Due to the low energy use requirements for the FPUD WTP, emissions associated with operations of this component would be insignificant and were therefore not included in the operational emissions calculations. Emissions would also result from periodic maintenance required to maintain percolation ponds, and other maintenance activities.

Maximum daily and annual operational emissions were calculated based on the assumption that, on any single day, the maximum emissions would be associated with maintenance of percolation ponds. Annual operational emissions were based on the assumption that periodic maintenance activities for percolation ponds would require 30 days in any single year.

Emissions associated with operations under Alternative 1 are summarized in Tables 4.5-4 and 4.5-5. Emissions associated with operational and maintenance activities under Alternative 1 would be below the *de minimis* levels for CAA conformity; therefore, no significant impacts to air quality would occur.

4.5.2.3 Mitigation Measures

Through implementation of SCMs listed in Section 2.3.1.4, Alternative 1 would not result in significant air quality impacts; therefore, no additional mitigation measures are proposed.

Table 4.5-4. Alternative 1 Operations Emissions (Maximum Pounds per Day)

Component	Emissions (pounds/day)					
	CO	VOCs	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Maintenance of Percolation ponds						
Heavy Construction Equipment	3.98	1.12	8.94	0.01	0.54	0.48
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**26.46**	**3.44**	**33.01**	**0.06**	**57.02**	**6.99**
Daily significance threshold[1]	550	75	250	250	100	55
Above Threshold?	***No***	***No***	***No***	***No***	***No***	***No***

Notes: [1] Daily significance thresholds are based on County of San Diego, Department of Planning and Land Use Significance Level Thresholds (County of San Diego 2007b).
CO = carbon monoxide; VOC = volatile organic compound; NO_x = nitrogen oxides; SO_x = sulfur oxides; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter.

Table 4.5-5. Alternative 1 Operations Emissions (Tons per Year)

Component	Emissions (tons/year)					
	CO[2]	VOCs[1]	NO_x[2]	SO_x[1]	PM_{10}[2]	$PM_{2.5}$[2]
Maintenance of Percolation ponds	0.40	0.05	0.50	0.00	0.86	0.10
De Minimis Threshold[3]	100	100	100	100	100	100
Exceeds De Minimis Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Regional Emissions Inventory – 2015, tons/year	**227,614**	**50,845**	**43,691**	**766.5**	**44,348**	**11,717**
Percent of Regional Emissions Inventory	0.00018%	0.0001%	0.0011%	0.0%	0.0019%	0.00085%

Notes: [1] SDAB is a moderate nonattainment area for the 8-hour O_3 NAAQS; VOCs and NOx are precursors to the formation of O_3.
[2] SDAB is considered a maintenance area for the CO NAAQS and is in attainment of the NAAQS for SOx, PM_{10}, and $PM_{2.5}$.
[3] Significance levels are developed from SDCAPCD major source thresholds; *de minimis* levels are not applicable to NAAQS attainment areas (i.e., SO_2, PM_{10} and $PM_{2.5}$) but have been presented for planning purposes only.
CO = carbon monoxide; VOC = volatile organic compound; NO_x = nitrogen oxides; SO_x = sulfur oxides; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter.

4.5.3 Alternative 2

4.5.3.1 Construction

Assumptions

Construction assumptions and construction equipment requirements would be the same for Alternative 2 as those listed for Alternative 1. Emissions calculations were based on the construction projects and assumptions listed in Table 4.5-1 (for project components that are the same as those under Alternative 1) and Table 4.5-6 (for project components that are specific to Alternative 2).

Table 4.5-6. Construction Equipment Requirements for Alternative 2

Equipment	Number	Months of Construction
Gallery Wells and Associated Collection System (Alternative 2)		
Drill Rig	1	3
Tractors/Loaders/Backhoes	2	
Excavator	1	
Expand Existing AWTP and New Surface WTP at Haybarn Canyon (Alternative 2)		
Excavators	2	6
Backhoe	2	
Loaders	2	
Dump Trucks	2	
Crane	1	
Bobcat	1	
Compactor	1	
Compressor	1	
Wackers	1	
Paver	1	
Water Conveyance/Distribution System to Gheen Zone (Alternative 2)		
Rough Terrain Forklift	2	3
Excavators	4	
Trencher	1	
Compactor	2	
Backhoe	1	
Loaders	1	
Dump Trucks	1	
Crane	1	
Paver	1	

<u>Impacts</u>

Estimated construction emissions as a result of implementation of Alternative 2 are shown in Table 4.5-7 (maximum pounds per day) and Table 4.5-8 (tons per year). Emissions associated with construction activities under Alternative 2 account for SCMs listed in Section 2.3.1.4, controlling fugitive dust, and would be below the *de minimis* levels for CAA conformity; therefore, no significant impacts to air quality would occur.

4.5.3.2 Operations

<u>Assumptions and Impacts</u>

Operations assumptions and impacts would be the same for Alternative 2 as those described under Alternative 1. Estimated emissions would be below the *de minimis* levels for CAA conformity; therefore, no significant impacts to air quality would occur.

4.5.3.3 Mitigation Measures

Through implementation of SCMs listed in Section 2.3.1.4, Alternative 2 would not result in significant impacts to air quality; therefore, no additional mitigation measures are proposed.

Table 4.5-7. Alternative 2 Construction Emissions (Maximum Pounds per Day)

Component	Emissions (pounds/day)					
	CO	**VOCs**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Daily significance threshold[1]	550	75	250	250	100	55
Replacement of Diversion Structure						
Heavy Construction Equipment	53.30	14.23	122.76	0.12	6.81	6.06
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Grading	-	-	-	-	15.60	3.28
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**75.78**	**16.55**	**146.83**	**0.17**	**78.89**	**15.85**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Improvements to O'Neill Ditch and Headgate						
Heavy Construction Equipment	28.01	6.57	53.29	0.05	2.95	2.62
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Grading	-	-	-	-	15.60	3.28
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**50.49**	**8.89**	**77.36**	**0.10**	**75.03**	**12.41**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Improvements to Percolation ponds 1-7						
Heavy Construction Equipment	3.98	1.12	8.94	0.01	0.54	0.48
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**26.46**	**3.44**	**33.01**	**0.06**	**57.02**	**6.99**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Groundwater Production Wells and Associated Collection System						
Heavy Construction Equipment	20.69	5.19	40.83	0.04	2.41	2.15
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**43.17**	**7.51**	**64.90**	**0.09**	**58.89**	**8.66**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Gallery Wells and Associated Collection System						
Heavy Construction Equipment	24.39	6.18	51.22	0.05	2.80	2.49
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**46.87**	**8.5**	**75.29**	**0.10**	**59.28**	**9.00**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
Expansion of Existing AWTP and New Surface Water Treatment Facility						
Heavy Construction Equipment	63.29	19.30	145.08	0.15	9.07	8.07
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Grading	-	-	-	-	15.60	3.28
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**85.77**	**21.62**	**169.15**	**0.20**	**81.15**	**17.86**
Above Significance Threshold?	*No*	*No*	*No*	*No*	*No*	*No*

Continued on next page

Table 4.5-7. Alternative 2 Construction Emissions (Maximum Pounds per Day) (cont.)

Component	Emissions (pounds/day)					
	CO	VOCs	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Water Conveyance/Distribution System to Gheen Zone						
Heavy Construction Equipment	56.48	16.60	134.47	0.13	7.91	7.04
Construction Worker Travel	14.14	0.65	1.31	0.02	0.15	0.08
Haul Trucks	8.34	1.67	22.76	0.03	1.03	0.90
Fugitive Dust – Grading	-	-	-	-	15.60	3.28
Fugitive Dust – Vehicles	-	-	-	-	55.30	5.53
Total Daily Emissions	**78.96**	**18.92**	**158.54**	**0.18**	**79.99**	**16.83**
Above Significance Threshold?	***No***	***No***	***No***	***No***	***No***	***No***

Note: [1] Daily significance thresholds based on County of San Diego, Department of Planning and Land Use Significance Level Thresholds (County of San Diego 2007b).
CO = carbon monoxide; VOC = volatile organic compound; NO_x = nitrogen oxides; SO_x = sulfur oxides; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter.

Table 4.5-8. Alternative 2 Construction Emissions (Tons per Year)

Component	Emissions (tons/year)					
	CO[2]	VOCs[1]	NO_x[1]	SO_x[2]	PM_{10}[2]	$PM_{2.5}$[2]
Annual Total						
Heavy Construction Equipment	10.64	3.02	23.83	0.02	1.41	1.26
Construction Worker Travel	1.04	0.21	2.85	0.00	0.13	0.11
Haul Trucks	1.77	0.08	0.16	0.00	0.02	0.01
Fugitive Dust – Grading	-	-	-	-	1.95	0.41
Fugitive Dust – Vehicles	-	-	-	-	6.91	0.69
Total Annual Emissions	**13.45**	**3.31**	**26.84**	**0.02**	**10.42**	**2.48**
De Minimis Threshold[3]	100	100	100	100	100	100
Exceeds De Minimis Threshold?	***No***	***No***	***No***	***No***	***No***	***No***

Notes: [1] SDAB is a moderate nonattainment area for the 8-hour O_3 NAAQS; VOCs and NOx are precursors to the formation of O_3.
[2] SDAB is considered a maintenance area for the CO NAAQS and is in attainment of the NAAQS for SOx, PM_{10}, and $PM_{2.5}$.
[3] Significance levels are developed from SDCAPCD major source thresholds (SDCAPCD 2012); *de minimis* levels are not applicable to NAAQS attainment areas (i.e., SO_2, PM_{10} and $PM_{2.5}$) but have been presented for planning purposes only.
CO = carbon monoxide; VOC = volatile organic compound; NO_x = nitrogen oxides; SO_x = sulfur oxides; PM_{10} = particulate matter less than or equal to 10 microns in diameter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter.

4.5.4 Conformity Applicability Analysis

The estimated emissions associated with Alternatives 1 and 2 would be below the *de minimis* threshold levels for CAA conformity. Therefore, Alternatives 1 and 2 would conform to the SDAB SIP and would not trigger a conformity determination under Section 176(c) of the CAA. The USMC has prepared a Record of Non-Applicability (refer to Appendix D) for CAA conformity.

4.5.5 No-Action Alternative

Under the No-Action Alternative, SMR CUP would not be implemented and emissions from construction or operational activities would not occur. Consequently, baseline conditions (as described in Section 3.5, *Air Quality*) would remain unchanged. Therefore, no impacts to air quality would occur with implementation of the No-Action Alternative.

4.6 HAZARDOUS MATERIALS AND WASTES

4.6.1 Approach to Analysis

In this section, potential impacts associated with the use, storage, or disposal of hazardous materials and wastes during construction and operational activities are analyzed for the action alternatives. The potential construction and operational impacts associated with existing contamination sites within or in the vicinity of the project footprint are also analyzed along with proposed avoidance procedures. The significance of impacts associated with hazardous materials and wastes is based on the toxicity of the substance, the quantity of the substance involved, the risk of exposure, and the method of disposal. Impacts are considered significant if the storage, use, transportation, mobilization, or disposal of these substances creates a substantial increase in risk to human health or the environment or if there would be a substantial increase in risk of exposure to contaminants.

4.6.2 Alternative 1

4.6.2.1 Construction

Hazardous Materials and Waste Management

Hazardous materials associated with construction activities would include fuel and hydraulic fluid contained in heavy equipment, vehicles and vessels performing the construction tasks, and paints, coatings and sealants to be used on structures such as the FPUD WTP and inflatable weir compressor building. Excavation, construction, and pipeline assembly, and groundwater well installation are not anticipated to involve hazardous materials other than those described above. Neither the rubber-gasketed steel pipeline, nor the heat-welded HDPE pipeline requires the use of external coatings or sealants. Non-hazardous waste from construction may include short sections of HDPE and steel piping; boxes and crates used in the shipment of materials and rubble from trenching paved areas. Construction workers would use portable chemical toilets during construction. If contaminated soil or groundwater are encountered during construction activities, SCMs listed in Section 2.3.1.4 would be followed to minimize impacts from these hazardous materials.

On MCB Camp Pendleton and DET Fallbrook, the NAVFAC SW Contracting Officer would require that project design adhere to the standards and provisions included in CFR Title 40, §§ 260-265 and CFR Title 49, §§ 172, 173, and 178; Title 22 of the CCR (Division 4.5 Health Standards for the Management of Hazardous Waste); and County of San Diego Ordinance Title 6, Division 8, Chapter 11, as well as other regulations related to health and safety and emergency response. Additionally, MCB Camp Pendleton would require that hazardous waste be removed from MCB Camp Pendleton within 60 days of initial generation and that a Uniform Hazardous Waste Manifest would be prepared and brought with the waste to the Hazardous Waste Branch for signature on the way out of MCB Camp Pendleton for disposal.

Construction contractors involved with Alternative 1 would be subject to all federal, state, and County of San Diego requirements for hazardous materials and hazardous waste management, and would be required to prepare an EPP for approval by the NAVFAC SW Contracting Officer prior to the start of any construction activity on MCB Camp Pendleton and DET Fallbrook (MCB Camp Pendleton 2009a). The EPP would include measures the contractor would take to prevent or control release of contaminants to air, land, and water during construction activities. The EPP would address:

- Solid and sanitary waste management,
- Recycling project waste and demolition debris,
- Air pollution controls on equipment and operations,

- Application of paints and coatings,
- Contractor parking and laydown,
- Equipment maintenance and fueling,
- Hazardous material use,
- Hazardous waste storage and disposal, and
- Procedures if site contamination is discovered.

The construction contractor would also be required to develop a project-specific construction SWPPP or use an existing Base-wide construction SWPPP. The SWPPP would specify BMPs to prevent construction pollutants from contacting stormwater, prevent erosion, eliminate or reduce non-stormwater discharges, and perform inspections of all BMPs (SWRCB 2009a). The SWPPP would also include BMPs to minimize potential impacts related to the construction components, such as the use of sediment barriers, inlet covers, covering stockpiles, and inspecting equipment and vehicles for drips, and placing drip pans beneath vehicles and equipment (SWRCB 2009a). The SWPPP and project-specific or existing BMPs would be approved by MCB Camp Pendleton, DET Fallbrook, County of San Diego, and the SWRCB prior to initiating construction activities.

Contractors would be required to park their vehicles within staging areas designated by MCB Camp Pendleton ES, DET Fallbrook, and FPUD. No vehicle maintenance would be allowed in the staging areas. At MCB Camp Pendleton, vehicle fueling would be allowed only within fueling locations designated by MCB Camp Pendleton ES and approved by the MCB Camp Pendleton Fire Department. Contractors would also be allowed to store small amounts of fuel for small-engine powered equipment within the designated fueling location. At DET Fallbrook and within the community of Fallbrook, construction vehicle and equipment fueling would be subject to approval from the applicable jurisdiction. In the event that a spill occurs, the construction contractor would be responsible for spill response, cleanup, and regulatory reporting. As required, the applicable jurisdiction (i.e., fire department and/or San Diego RWQCB) would be contacted immediately to report any spills during construction.

Unused HDPE pipe sections would be suitable for use or recycling; the contractor's EPP would address disposition of excess/scrap HDPE material. Unused steel pipe would also be suitable for use or recycling and would be addressed by the EPP. The contractor would be required to make arrangements for recycling or disposal of other solid wastes such as packing and building scrap materials at an appropriate solid waste facility with sufficient capacity to receive the waste, as agreed to by the USMC. Construction-related earth materials (rubble from trenching paved areas and dredged materials from O'Neill Ditch) would require appropriate disposal off-Base. The contractor would be required to make arrangements for disposal of such material originating at DET Fallbrook or FPUD, per USMC agreement.

Through the implementation of SCMs listed in Section 2.3.1.4, no increase in human health risk or environmental exposure to hazardous materials or hazardous wastes would result from construction associated with Alternative 1; therefore, no significant impacts would occur due to construction activities under Alternative 1.

<u>IR Sites</u>

MCB Camp Pendleton

As indicated in SCMs listed in Section 2.3.1.4, the contractor would be required to coordinate with MCB Camp Pendleton's FFA team regarding placement of new groundwater production wells in relation to the location and status of MCB Camp Pendleton IR Sites 1119 and the 22/23 Area groundwater (see Figure

3.6-1). The contractor would also be required to obtain from the IR Branch/RCRA Division current information about groundwater monitoring wells for the IR sites in the groundwater production well basin, their specific surveyed locations, and IR sites' groundwater quality monitoring program results when determining locations for new groundwater production wells. The location of these wells and the potential impact to IR sites due to groundwater pumping would be assessed using the best available data in the AMP/FOP. The results and actions developed from the AMP/FOP would be used to meet the goals and requirements of each IR site. Therefore, there would be no significant impact to IR activities at MCB Camp Pendleton with installation of new production wells under Alternative 1. The effect of pumping groundwater from proposed new and existing wells in the vicinity of the IR sites is discussed in Section 4.6.2.2, *Operations*. There are no other IR sites or other types of cleanup sites within the project area at MCB Camp Pendleton; therefore, there would be no significant impacts to other IR activities or cleanup sites.

DET Fallbrook

For construction of the bi-directional pipeline, during the design phase the contractor would be required to coordinate with DET Fallbrook IR Program personnel to determine the exact boundaries of DET Fallbrook IR Sites 29 and 32; a route for the bi-directional pipeline would be surveyed within the 100-ft (30.5-m) buffer zone that avoid these two IR sites. Therefore, there would be no significant impact to IR activities at DET Fallbrook with installation of the bi-directional pipeline under Alternative 1.

CERCLA Sites and Cal EPA GeoTracker Database Sites

For construction of the bi-directional pipeline through the community of Fallbrook, the contractor would be required to coordinate with San Diego RWQCB personnel during the design phase to determine the exact boundaries of active remediation site Circle K#777; a route for the bi-directional pipeline would be surveyed within the 100-ft (30.5-m) buffer zone to avoid this site. Therefore, there would be no significant impact to active cleanup sites in the community of Fallbrook with installation of the bi-directional pipeline under Alternative 1.

4.6.2.2 Operations

Hazardous Materials and Waste Management

Hazardous materials associated with project operations would include paints and lubricants associated with maintaining the inflatable weir diversion structure, its compressor building, steel water conveyance pipeline, and tank components. Paints, lubricants, and fuels would be consumed during use, leaving no waste other than residue-coated containers.

Steel pipeline maintenance would consist of corrosion monitoring and occasional repairs as needed. Corrosion protection monitoring would include periodically taking electrical measurements at test stations installed on the pipe during construction in areas with potentially corrosive soils. When the pipelines are in use, possible loss of water and wastewater from the pipelines would be identified through line pressure monitoring and follow-up inspections by field technicians.

MCB Camp Pendleton

In accordance with County of San Diego requirements, Hazardous Materials Business Plans would be prepared for buildings in which hazardous materials or wastes would be present. All hazardous materials and wastes would be properly managed, segregated, labeled, and stored in accordance with all federal, state and County of San Diego regulations, and USMC requirements for hazardous materials management. Hazardous materials and hazardous waste storage areas would be inspected by the County of San Diego Department of Environmental Health.

DET Fallbrook

All hazardous materials and wastes would be properly managed, segregated, labeled, and stored in accordance with all federal, state and County of San Diego regulations, and DON requirements for hazardous materials management. Hazardous materials and hazardous waste storage areas would be inspected by the County of San Diego Department of Environmental Health.

FPUD

Hazardous materials associated with operations of the FPUD WTP would involve adding various water treatment chemicals to the water such as sodium metabisulphite ($Na_2S_2O_5$) for dechlorination prior to entry to the RO membranes; an anti-scaling agent for the RO equipment, sodium hydroxide (NaOH) for pH adjustment, and NaOCl for disinfection. While these chemicals are not hazardous when diluted in treated water, the bulk quantities and high concentrations of some chemicals used at the FPUD WTP may meet the criteria to be managed as hazardous materials.

Fuel for the FPUD WTP generator would be stored in an above ground storage tank that would comply with all federal, state, and County of San Diego requirements, and would be inspected regularly to ensure its integrity. The above ground storage tank would be equipped with a high-level indicator and alarm to prevent accidental releases during fueling operations. In accordance with County of San Diego requirements, Hazardous Materials Business Plans would be prepared for buildings in which hazardous materials or wastes would be present. All hazardous materials and wastes would be properly managed, segregated, labeled, and stored in accordance with all federal, state and County of San Diego regulations for hazardous materials management. Hazardous materials and hazardous waste storage areas would be inspected by the County of San Diego Department of Environmental Health.

The brine waste from the FPUD WTP would be discharged to the Pacific Ocean via FPUD's connection to the Oceanside Ocean Outfall. The brine discharge would meet California Ocean Plan (SWRCB 2009a) criteria for ocean discharge. None of the brine discharge would require handling or disposal as hazardous waste. As described in Section 4.2.2.3 of this EIS/EIR, FPUD's existing NPDES Permit (CA0108031) would be amended to include brine discharge from the project, and additional discharge is not expected to impact the ability to meet NPDES permit requirements, and discharge of the brine is not expected to impact the ability to meet NPDES permit requirements.

Implementation of the SCMs listed in Section 2.3.1.4 would ensure that there would be no increase in human health risk or environmental exposure to hazardous materials or hazardous wastes; therefore, no significant impacts would occur with operations under Alternative 1.

<u>IR Sites</u>

MCB Camp Pendleton

During the final design phase, the contractor would acquire current information from the IR Branch/RCRA Division about groundwater monitoring wells for MCB Camp Pendleton IR Site 1119 and the 22/23 Area groundwater site, their specific surveyed locations, and both IR sites' groundwater quality monitoring program results when determining location(s) for new groundwater production wells. The contractor would be required to coordinate with and obtain approval from MCB Camp Pendleton's FFA Team that the proposed locations and pumping rates for new groundwater production wells would minimize the potential for human exposure to contaminants in groundwater and would not impact IR activities at MCB Camp Pendleton IR Site 1119 or the 22/23 Area groundwater site. Available water quality, and other relevant hydrologic data, would be used by the AMP/FOP to assess whether or not impacts from project related groundwater production well locations would occur at IR sites.

Under Alternative 1, new well locations were sited, using available data and models, to avoid impacts to known contaminated groundwater sites based on information provided by MCB Camp Pendleton ES (MCB Camp Pendleton 2005), Parsons (2005, 2010), and Shaw Environmental Inc. (2005). Specifically, the proposed well locations were sited so that they were either cross-gradient or up-gradient of known plumes, including IR Site 1119 (Parsons 2012), so that groundwater pumping would not impact the mapped plumes. The groundwater level contours and gradients developed from the model simulation were reviewed at the locations of known contaminants under the proposed Alternative 1 pumping schedule. Review of these data indicated that known contaminate plumes would not be impacted by the placement of the proposed new production wells. All available VOC water quality data provided by MCB Camp Pendleton ES was referenced during model simulation. Therefore, the new production wells are not expected to pull in contaminants from the contaminated portion of the aquifer and the operation of production wells would not impact IR cleanup operations. During future operations, the AMP/FOP would monitor and assess available water quality and water level data from all known IR sites to meet the FFA goals and objectives. Based on pre-determined thresholds directly related to measured parameters, the AMP/FOP would determine whether goals are being met. If threshold levels are exceeded and management goals are not met, alternative courses of action consistent with MCB Camp Pendleton directives would be implemented. These courses of action may include, but not be limited to, shifting groundwater pumping to non-contaminated wells, well-head treatment for specific contaminants, other best management techniques, or curtailment of groundwater pumping.

4.6.2.3 Mitigation Measures

Through implementation of SCMs listed in Section 2.3.1.4, Alternative 1 would not result in significant hazardous materials and wastes impacts; therefore, no additional mitigation measures are proposed.

4.6.3 Alternative 2

4.6.3.1 Construction

Hazardous materials and wastes impacts under Alternative 2 would be similar to those discussed under Alternative 1. The construction contractor would be required to prepare and implement an EPP and SWPPP and coordinate with MCB Camp Pendleton FFA regarding placement of wells near MCB Camp Pendleton IR Site 1119 and the Area 22/23 groundwater site. The expansion of the existing AWTP and addition of a surface water treatment facility at Haybarn Canyon would involve similar hazardous materials as described for the FPUD WTP under the Alternative 1.

The contractor would comply with applicable federal, state, and County of San Diego regulations and USMC and DON requirements, as applicable. Therefore, construction impacts associated with Alternative 2 would be the same as discussed under Alternative 1, and no significant hazardous materials and wastes impacts would occur.

4.6.3.2 Operations

<u>Hazardous Materials and Waste Management</u>

The types of operations that would occur under Alternative 2 would be similar to those discussed under Alternative 1. In accordance with County of San Diego requirements, Hazardous Materials Business Plans would be prepared for buildings in which hazardous materials or wastes would be present. All hazardous materials and wastes would be properly managed, segregated, labeled, and stored in accordance with all federal, state and County of San Diego regulations, and USMC and DON requirements for hazardous materials management, as applicable. Hazardous materials and hazardous waste storage areas would be inspected by the County of San Diego Department of Environmental Health.

Under Alternative 2, the increase in brine discharge from the Haybarn Canyon AWTP and the disposal method would be similar to that for the FPUD WTP under Alternative 1. As described in Section 4.2.3.3 of this EIS/EIR, an existing NPDES Permit would be amended to include brine discharge from the project (either FPUD's NPDES Permit [CA0108031] or MCB Camp Pendleton's NPDES Permit [CA0109347]), and discharge of the brine is not expected to impact the ability to meet NPDES permit requirements.

Therefore, no significant operational impacts with respect to hazardous materials and wastes would occur with implementation of Alternative 2.

<u>IR Sites</u>

MCB Camp Pendleton

Under Alternative 2, the contractor would be required to follow the same SCMs listed in Section 2.3.1.4, as described under Alternative 1, in regards to MCB Camp Pendleton IR Site 1119 and the 22/23 Area groundwater site. In addition, the groundwater model simulated groundwater pumping from new well locations to show that pumping should not impact areas of known contaminated groundwater, as described under Alternative 1. Therefore, the new production wells are not expected to pull in contaminants from the contaminated portion of the aquifer and the operation of production wells would not impact IR cleanup operations. During future operations, the AMP/FOP would monitor and assess available water quality and water level data from all known IR sites to meet the FFA goals and objectives. Based on pre-determined thresholds directly related to measured parameters, the AMP/FOP would determine whether goals are being met. If threshold levels are exceeded and management goals are not met, alternative courses of action consistent with MCB Camp Pendleton directives would be implemented. These courses of action may include, but not be limited to, shifting groundwater pumping to non-contaminated wells, well-head treatment for specific contaminants, other best management techniques, or curtailment of groundwater pumping.

4.6.3.3 Mitigation Measures

Through implementation of SCMs listed in Section 2.3.1.4, Alternative 2 would not result in significant hazardous materials and wastes impacts; therefore, no additional mitigation measures are proposed.

4.6.4 No-Action Alternative

Under the No-Action Alternative, the proposed conveyance pipeline and facilities would not be constructed and no ground-disturbing activities would occur. No excavation would be required to lay pipelines. The hazardous materials and wastes associated with construction and operation under project implementation would not be present in the project area and there would be no potential for increase in human health risk or environmental exposure to hazardous materials or hazardous wastes. Baseline conditions (as described in Section 3-6, *Hazardous Materials and Wastes*) would remain unchanged. Therefore, no hazardous materials and wastes impacts would occur with implementation of the No-Action Alternative.

4.7 UTILITIES

4.7.1 Approach to Analysis

Impacts to utilities are assessed according to capacity of available infrastructure and services and/or impacts or disruptions to those services for the purposes of evaluating the environmental consequences of action alternatives. The action alternatives are analyzed in this section relative to potential impacts on individual utilities. Impact analysis is broken down by construction (short-term impacts) and operations (long-term impacts). Construction impacts would occur if a component were to require the construction, expansion, or re-location of utilities infrastructure/facilities which could result in interruptions in service or exceed the existing capacity for potable water, solid waste disposal, electrical power, or natural gas systems. Operational impacts would occur if a component or combination of components exceeds the existing capacity for the above mentioned utilities.

Brine generated from the FPUD WTP or Haybarn Canyon AWTP would discharge to the ocean under an amended NPDES permit; impact analysis for this discharge is presented in Section 4.2, *Water Resources*. The action alternatives would also not require any chilled water, steam generation capacity, or natural gas.

4.7.2 Alternative 1

4.7.2.1 Construction

The following components would involve construction activities in the vicinity of existing facilities infrastructure:

- *Production Wells and Collection System.* Most of the construction of new wells and collection piping would be away from major roads and utility corridors. However, there is a limited area where the piping would be constructed in and across Vandegrift Boulevard and the area around Haybarn Canyon where there are various existing underground utilities.
- *FPUD WTP*. The FPUD WTP would be constructed in the vicinity of the existing FPUD wastewater treatment plant where there are various existing underground utilities and overhead power lines.
- *Water Conveyance/Distribution System.* Construction of the water conveyance/distribution systems pipelines would be along Vandegrift Boulevard, Rattlesnake Canyon Road, and Fallbrook Road through MCB Camp Pendleton; Ammunition Road and various dirt roads through DET Fallbrook; and various roads within the community of Fallbrook. There are various underground utilities that exist in portions of this corridor within MCB Camp Pendleton, DET Fallbrook, and Fallbrook.

As indicated in SCMs listed in Section 2.3.1.4, *Special Conservation Measures*, pipeline alignments and construction footprints would be selected during project design to avoid or minimize disruption of existing electricity, natural gas, and water utilities. The location of underground utilities would be verified prior to excavation to further avoid impacts. Also, the design of new electrical transformers and panels that would be needed to supply power to the wells would be coordinated closely with MCB Camp Pendleton and SDG&E to minimize or eliminate any temporary disruption of power supplies during construction and start-up. Therefore, through appropriate design details and construction contract provisions, no significant impacts to existing utilities would occur during construction under Alternative 1.

Potable Water Supply

Potable water supplies within the ROI would not be impacted because nonpotable water would be provided for grading and dust control activities by the construction contractor. Therefore, no impacts to potable water supply would occur during construction under Alternative 1.

Solid Waste Collection and Disposal

Solid waste (i.e., construction debris) generated by the construction of pipelines and associated facilities would be recycled or disposed of properly by the construction contractor. Solid waste would continue to be disposed at either the San Onofre or Las Pulgas landfills, which are not expected to reach their capacities until the years 2183 and 2047, respectively.

Material dredged from O'Neill Ditch would be placed in Ponds 6 and 7 for dewatering until final disposition. There is a potential for use as daily cover at the Las Pulgas landfill on MCB Camp Pendleton. Therefore, no significant impacts to solid waste collection and disposal would occur under Alternative 1 if dredged material is used as daily cover.

Although the impacts are not significant, as part of the continuing commitment of the Marine Corps to waste minimization, the construction contractor would be required to follow MCB Camp Pendleton's reuse and recycling program goals and guidelines for solid waste, and to make the fullest use practicable of recovered construction materials.

Electricity

Implementation of Alternative 1 would require the use of portable, fuel-powered generators to supply electricity for construction activities. Proposed construction activities would not require the use of MCB Camp Pendleton's or SDG&E's electrical system. Therefore, no significant impact on the electrical system in the ROI would occur as a result of construction activities under Alternative 1.

Natural Gas

Construction activities under Alternative 1 would not require the use of natural gas. Therefore, no significant impacts on the availability of natural gas sources would occur under Alternative 1.

4.7.2.2 Operations

Potable Water Supply

MCB Camp Pendleton

Implementation of Alternative 1 is estimated to yield an additional 3,500 af/y of groundwater from the Ysidora Basin (Stetson 2012a,b). A portion of this additional supply of water would help reduce MCB Camp Pendleton's anticipated future reliance on imported water. In addition, connections to off-base water supplies would provide MCB Camp Pendleton with an emergency potable water supply. Therefore, implementation of Alternative 1 would provide a beneficial impact to potable water supplies.

FPUD

Implementation of Alternative 1 is estimated to yield an additional 3,500 af/y of groundwater from the Ysidora Basin (Stetson 2012a,b). An annual average of 3,100 af/y (Stetson 2012b) of groundwater would be delivered to FPUD and treated at the FPUD WTP, providing FPUD with a local source of potable water and reducing their dependence on imported water from the SDCWA. Therefore, implementation of Alternative 1 would provide a beneficial impact to potable water supplies.

Solid Waste Collection and Disposal

MCB Camp Pendleton

During normal operations of Alternative 1, periodic maintenance dredging of the percolation ponds would occur. The material would be hauled to Las Pulgas landfill on MCB Camp Pendleton and used as daily cover. Therefore, no significant impacts to solid waste collection and disposal would occur under Alternative 1.

FPUD

At the FPUD WTP, iron and manganese solids would be pumped to sludge drying beds, allowed to dry, and then removed for disposal at a nearby landfill. This would occur periodically and the nearby landfill has sufficient capacity to handle the volume. Therefore, no significant impacts to solid waste collection and disposal would occur under Alternative 1.

Electrical Power

MCB Camp Pendleton

During normal operations of Alternative 1, electrical power would be needed for operation of the production well pumps and the MCB Camp Pendleton booster pump associated with the water conveyance/distribution system. The estimated annual average and peak (maximum hour) demands for Alternative 1 components are summarized in Table 4.7-1. The components with the large majority of the demands would be located in the general vicinity of or serviced by the existing Haybarn Canyon substation on MCB Camp Pendleton, which is undergoing expansion to nearly 70 MW of capacity (MCB Camp Pendleton 2010b). This expansion of capacity would accommodate the on-base demand for SMR CUP of 0.66 MW, as noted in Table 4.7-1. Therefore, no significant impacts on MCB Camp Pendleton's electrical system would occur as a result of implementation of Alternative 1.

Table 4.7-1. Electricity Demand Under Operation of Alternative 1

Project Component	Annual Average Energy Consumption (MW-hour/Year)	Peak Hour Energy Consumption (MW)
Production Wells and Collection System	1,770	0.19
Booster Stations at Haybarn Canyon and MCB Camp Pendleton/DET Fallbrook boundary	2,258	0.47
Subtotal - MCB Camp Pendleton Facilities	**7,013**	**0.66**
FPUD WTP	2,250	0.80
Booster Station at site of Gheen Zone/Martin Reservoir	735	0.56
Subtotal - FPUD Facilities	**2,985**	**1.36**

Notes: MW = megawatt; MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook; FPUD = Fallbrook Public Utility District; WTP = Water Treatment Plant.

FPUD

Under Alternative 1, electrical power demand for operation of the FPUD WTP and Gheen Zone/Martin Reservoir Pump Station would be 1.36 MW, as summarized in Table 4.7-1. Power is currently provided at these sites and SDG&E has the capacity to provide power for project components (FPUD 2009).

Therefore, no significant impacts on SDG&E's electrical system would occur as a result of implementation of Alternative 1.

Natural Gas Systems

Operations under Alternative 1 would not require the use of natural gas. Therefore, no significant impacts on existing natural gas sources would occur under Alternative 1.

4.7.2.3 Mitigation Measures

Through implementation of SCMs listed in Section 2.3.1.4, Alternative 1 would not result in significant impacts to utilities; therefore, no additional mitigation measures are proposed.

4.7.3 Alternative 2

Under Alternative 2, many of the components would be the same as those described under Alternative 1; therefore, impacts to utilities associated with these components would be the same as those described under Alternative 1. Impact analysis for the following components unique to Alternative 2 is provided below:

- Gallery Wells and Collection System. and
- Expanded Haybarn Canyon AWTP and New Surface Water Treatment Facility.

4.7.3.1 Construction

In addition to components already described under Alternative 1, the following components would involve construction activities in the vicinity of existing facilities infrastructure:

- *Gallery Wells and Collection System.* Most of the construction of new gallery wells and associated pipelines would be away from major roads and utility corridors. However, there is a limited area where pipelines would be constructed in and across Vandegrift Boulevard and the area around Haybarn Canyon where there are various existing underground utilities.
- *AWTP and New Surface Water Treatment Facility.* The expanded AWTP and new surface water treatment facilities at Haybarn Canyon would include construction in the area around Haybarn Canyon where there are various existing underground utilities and overhead power lines.

Through application of SCMs listed in Section 2.3.1.4, *Special Conservation Measures*, existing utilities would be avoided through appropriate design details and construction contract provisions. Therefore, no significant impacts on existing utilities would occur during construction under Alternative 2.

4.7.3.2 Operations

Potable Water Supply

MCB Camp Pendleton

Implementation of Alternative 2 is estimated to yield an additional 5,500 af/y of groundwater from the Ysidora Basin (Stetson 2012a,d). A portion of this additional supply of water would help reduce MCB Camp Pendleton's anticipated future reliance on imported water. In addition, connections to off-base water supplies would provide MCB Camp Pendleton with an emergency potable water supply. Therefore, implementation of Alternative 2 would provide a beneficial impact to potable water supplies.

FPUD

Implementation of Alternative 2 is estimated to yield an additional 3,500 af/y of groundwater from the Ysidora Basin (Stetson 2012a,d). An annual average of approximately 3,100 af/y (Stetson 2012b) of potable water would be delivered to FPUD, providing FPUD with a local source of potable water and reducing their dependence on imported water from the SDCWA. Therefore, implementation of Alternative 2 would provide a beneficial impact to potable water supplies.

Solid Waste Collection and Disposal

MCB Camp Pendleton

In addition to periodic maintenance dredging of the percolation ponds, as described under Alternative 1, solid wastes would be generated by the expanded AWTP and new surface water treatment facility. All solid wastes from backwash recovery would be treated and disposed of in accordance with MCO 5090.2A, Chapter 17 and in compliance with all state and federal regulations and respective permits regarding waste disposal. This includes all relevant Waste Discharge Requirements from the SWRCB and San Diego RWQCB and Solid Waste Facility Permits issued by the County of San Diego as the local enforcement agency. Therefore, no significant impacts to solid waste collection and disposal would occur under Alternative 2.

FPUD

No significant volumes of waste would be generated by FPUD during normal operations under Alternative 2. Therefore, no significant impacts to solid waste collection and disposal would occur under Alternative 2.

Electrical Power

MCB Camp Pendleton

Normal operations under Alternative 2 would be similar to those under Alternative 1, with the addition of gallery wells and expanded AWTP and new surface water treatment facility. The estimated annual average and peak (maximum hour) demands for Alternative 2 components are summarized in Table 4.7-2. The components with the large majority of the demands would be located in the general vicinity of or serviced by the existing Haybarn Canyon substation on MCB Camp Pendleton, which is undergoing expansion to nearly 70 MW of capacity (MCB Camp Pendleton 2010b). This expansion of capacity would accommodate the on-base demand for SMR CUP of 1.58 MW, as noted in Table 4.7-2. Therefore, no significant impacts on MCB Camp Pendleton's electrical system would occur as a result of implementation of Alternative 2.

FPUD

Under Alternative 2, electrical power demand for operation of the Gheen Zone/Martin Reservoir Pump Station would be 0.56 MW, as summarized in Table 4.7-2. Power is currently provided at this site and SDG&E has the capacity to provide power for this project component (FPUD 2009). Therefore, no significant impacts on SDG&E's electrical system would occur as a result of implementation of Alternative 2.

Natural Gas Systems

Operations under Alternative 2 would not require the use of natural gas. Therefore, no significant impacts on existing natural gas sources would occur under Alternative 2.

Table 4.7-2. Electricity Demand Under Operation of Alternative 2

Project Component	Annual Average Energy Consumption (MW-hour/Year)	Peak Hour Energy Consumption (MW)
Production Wells and Collection System	1,770	0.19
Gallery Wells and Conveyance System	271	0.12
AWTP and Treatment Train	2,250	0.80
Booster Stations at Haybarn Canyon and MCB Camp Pendleton/DET Fallbrook boundary	2,258	0.47
Subtotal - MCB Camp Pendleton Facilities	**6,549**	**1.58**
Booster Station at site of Gheen Zone/Martin Reservoir	735	0.56
Subtotal - FPUD Facilities	**735**	**0.56**

Notes: MW = megawatt; AWTP = Advanced Water Treatment Plant; MCB = Marine Corps Base; DET Fallbrook = Naval Weapons Station Seal Beach, Detachment Fallbrook.

4.7.3.3 Mitigation Measures

Through implementation of SCMs listed in Section 2.3.1.4, Alternative 2 would not result in significant impacts to utilities; therefore, no additional mitigation measures are proposed.

4.7.4 No-Action Alternative

Under the No-Action Alternative, no new construction activities would occur. Baseline conditions (as described in Section 3.7, *Utilities*) would remain unchanged and no significant impacts to solid waste disposal, electrical power, and natural gas systems would occur.

Under the No-Action Alternative, potential impacts on potable water resources would occur since MCB Camp Pendleton and FPUD would have to become more dependent upon either SDCWA for imported water or seek other sources such as seawater desalination to meet future water demands. Imported water sources (Colorado River Water and State Project Water) are already becoming substantially less reliable as a result of reduced diversions from both the Colorado River and the Sacramento Delta due to a number of factors. Seawater desalination is also a potential supply, but has a number of potentially significant environmental impacts. Furthermore, both imported water and seawater desalination require substantially greater energy inputs per acre-foot of water delivered compared to the action alternatives. Any future potable water development projects for MCB Camp Pendleton would be subject to the NEPA and/or CEQA process, as appropriate. Therefore, no significant impacts to utilities would occur with implementation of the No-Action Alternative.

CHAPTER 5
CUMULATIVE IMPACTS

5.1 ANALYSIS OF CUMULATIVE IMPACTS

CEQ regulations implementing the procedural provisions of NEPA define cumulative effects as: "The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions." (40 CFR § 1508.7). Cumulative impacts can result from "individually minor but collectively significant actions taking place over a period of time" (40 CFR § 1508.7). The CEQ also provides guidance on cumulative impacts analysis in *Considering Cumulative Effects Under the National Environmental Policy Act* (CEQ 1997) and the *Memorandum Guidance on the Consideration of Past Actions in Cumulative Effects Analysis* (CEQ 2005). Noting that environmental impacts result from a diversity of sources and processes, this CEQ guidance observes that "no universally accepted framework for cumulative effects analysis exists," while noting that certain general principles have gained acceptance. One such principal provides that "cumulative effects analysis should be conducted within the context of resource, ecosystem, and community thresholds—levels of stress beyond which the desired condition degrades." Thus, "each resource, ecosystem, and human community must be analyzed in terms of its ability to accommodate additional effects, based on its own time and space parameters." Therefore, cumulative effects analysis normally will encompass geographic boundaries beyond the immediate area of the Proposed Action, and a timeframe including past actions and foreseeable future actions, in order to capture these additional effects. Bounding the cumulative effects analysis is a complex undertaking, appropriately limited by practical considerations. Thus, CEQ guidelines observe, "[i]t is not practical to analyze cumulative effects of an action on the universe; the list of environmental effects must focus on those that are truly meaningful."

This section presents an analysis of potential cumulative environmental impacts of the Proposed Action combined with other planned programs having a similar implementation schedule and ROI. The two action alternatives (i.e., Alternative 1 and 2) under the Proposed Action (refer to Chapter 2) would be similar in nature to each other with respect to cumulative impacts. While Alternatives 1 and 2 are not specifically called out in the following discussion, the cumulative analysis presented in this section applies to either action alternative under the Proposed Action.

Projects on MCB Camp Pendleton and some off-base areas were considered as part of this analysis. The cumulative effects ROI associated with the Proposed Action includes MCB Camp Pendleton, DET Fallbrook, the City of Oceanside, and communities associated with the SMR Basin (i.e., Fallbrook, De Luz, Rainbow, and Murrieta). Therefore, this analysis considers additional effects arising from the Proposed Action with effects of other known current and future actions within the ROI.

5.2 GEOGRAPHIC BOUNDARIES FOR CUMULATIVE IMPACT ANALYSIS

Geographic boundaries for analyses of cumulative impacts in this EIS/EIR vary for different environmental resources. For example, for air quality, the potentially affected air basin is the appropriate boundary for assessment of cumulative impacts from releases of pollutants into the atmosphere. For resources such as fish or marine mammals, impacts from Alternative 1 might combine with impacts from distant sources to affect the resource species, necessitating a wider geographic scope for the analysis. The cumulative impacts analysis focuses on those training/testing projects that directly overlap with Alternative 1 (i.e., occur in similar locations and potentially impact similar resources). As previously mentioned for the purposes of this analysis, the cumulative region includes MCB Camp Pendleton, DET Fallbrook, the City of Oceanside, and communities associated with the SMR Basin (i.e., Fallbrook, De Luz, Rainbow, and Murrieta) (refer to Section 1.5 and Figure 1-1).

5.3 OTHER PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

Identifiable effects of other past, present, and reasonably foreseeable actions are analyzed and evaluated to the extent they may be additive to impacts of the Proposed Action. In general, the USMC and Reclamation need not list or analyze the effects of individual past actions; cumulative impacts analysis appropriately focuses on aggregate effects of past actions. Reasonably foreseeable future actions that may have impacts additive to the effects of the Proposed Action are also analyzed. As part of the evaluation of cumulative impacts, a review of other projects in the vicinity of the Proposed Action was conducted. Cumulative projects that could interact directly or indirectly with the Proposed Action are discussed below. Other projects on MCB Camp Pendleton, DET Fallbrook, and within FPUD that do not have the potential to interact cumulatively with the Proposed Action are not addressed in this EIS/EIR.

5.3.1 Santa Margarita River Flood Control Project (P-030)

The USMC has constructed a flood control project to protect MCB Camp Pendleton assets located within the limits of the 100-year floodplain on the SMR during a storm event of up to 100 years in magnitude. This included construction of a levee and floodwall, stormwater management system, sediment control structures, and stormwater pump stations. The EIS prepared for the action identified potential significant impacts to biological resources and the ROD was signed on 8 February 1998.

5.3.2 Southern Region Tertiary Treatment Plant and Associated Facilities

The USMC has constructed a new tertiary sewage treatment plant to replace five aging STPs (four operational, one operating as a pump station in the southern part of the base) on MCB Camp Pendleton, near the existing STP 13. Other project components under construction include the relocation of the existing Recycling Center, construction of conveyance infrastructure to transport wastewater from the old STPs 1, 2, and 3 to the new tertiary treatment plant, demolition of the old plants, and construction of a treated wastewater reclamation system and effluent conveyance that is compliant with federal, state, and local regulations. The USMC will use the tertiary treated wastewater flows for reclamation to the maximum extent practicable; excess effluent would discharge via an existing ocean outfall. The Southern Region Tertiary Treatment Plant EIS prepared for the action identified no significant environmental impacts and the ROD was signed on 17 June 2004.

5.3.3 Wastewater Conveyance System Supplemental EA (P-110)

The USMC has constructed and is currently operating and maintaining a wastewater conveyance pipeline and associated facilities at MCB Camp Pendleton. The purpose of this action is to achieve compliance with the requirements outlined in the April 2004 *Final Environmental Impact Statement for the Tertiary Treatment Plant and Associated Facilities, MCB Camp Pendleton* that stipulated the need to update the regulatory agencies once specific conveyance line/associated facilities locations and associated potential impacts were identified. Construction of wastewater conveyance pipelines and related facilities were analyzed in the aforementioned Southern Region Tertiary Treatment Plant EIS; however, modifications have occurred during the design phase of the project which necessitated additional environmental analyses. The Supplemental EA (SEA) evaluated areas to construct conveyance facilities not previously analyzed in the Southern Region Tertiary Treatment Plant EIS, as well as the addition of associated facilities such as pump stations and utilities. The SEA prepared for the action identified no significant environmental impacts and was completed in February 2007.

5.3.4 Improvements to Groundwater Production Wells and New Reservoir

The following interrelated MCB Camp Pendleton projects involve groundwater production wells, collection pipelines, iron and manganese water treatment, and a new reservoir at Haybarn Canyon.

Raw Water Transmission Pipeline and Iron/Manganese Treatment Plant Modifications (P-068)

P-068 constructed 4.2 mi (6.8 km) of raw water transmission pipeline to connect seven existing wells, which are currently connected directly into the potable water distribution system, to the original IM-1. The new pipeline runs along the north side of Vandegrift Boulevard, between the Santa Margarita Valley water supply wells and the IM-1. P-068 modified the existing treatment works to accommodate the new source of raw water by adding chemical feed pumps, piping, electrical equipment, and control equipment. Under P-069, the pipeline provides a point of connection for the new treatment plant (IM-2) and reservoir near Haybarn Canyon (see P-071 below).

Iron/Manganese Treatment Plant and Reservoir in the Santa Margarita River Basin (P-071)

P-071 constructed and made operational a second IM treatment plant (IM-2) and a new reservoir with a capacity of approximately 3.0 million gallons per day in Haybarn Canyon. The IM-2 is supplied from the existing raw water pipeline that supplies water from the wells to the existing treatment plants on MCB Camp Pendleton. The IM-2, in conjunction with the existing IM-1 on Vandegrift Boulevard, allows MCB Camp Pendleton to treat all the water from the wells at the same time. This project provides potable water that meets drinking water standards to the South Water Distribution System. Associated with the IM-2 and reservoir are connecting pipelines for the treatment plant, connecting pipelines and an access road for the reservoir, and supporting systems and facilities. The EA prepared for the action identified no significant impacts and was completed in April 2003.

5.3.5 Advanced Water Treatment Facility/Utility Corridor Project (P-113)

The purpose of the P-113 project is the reduction of (1) TDS to maximize wastewater reuse options on base, and (2) total organic carbon and total trihalomethanes to comply with the Federal Stage 2 Disinfectants and Disinfection Byproducts Rule for total trihalomethanes in drinking water. The proposed P-113 Project is also needed to ensure MCB Camp Pendleton compliance with drinking water and wastewater standards for TDS. Under this project, the USMC upgraded the existing Haybarn Canyon Drinking Water IM-2 through the addition of modular microfiltration, granular activated carbon, and RO components. Disinfection and pH adjustment are also applied to the treated water stream. Construction of the P-113 project began in 2011, and is ongoing.

5.3.6 Basewide Utilities Infrastructure Improvements Project

The USMC proposes to upgrade and improve the basewide water, wastewater, electrical, communication, and natural gas systems at MCB Camp Pendleton. The purpose of the proposed action is to allow the base to efficiently meet its mission and to provide (1) new or upgraded, reliable, and compliant utility systems to support military training and operations throughout MCB Camp Pendleton and quality of life services; and (2) system redundancy that would enable the delivery of utility services during periods of scheduled, unscheduled, and emergency outages. Specifically, the proposed action would include the construction and operation, including maintenance, of utility infrastructure upgrades, expansions, and improvements to water, wastewater, electrical, communication, and natural gas systems within MCB Camp Pendleton. These improvements would include a new tertiary wastewater treatment plant and associated facilities serving the northern portion of MCB Camp Pendleton; upgrades to the base 69-kV electrical distribution systems and associated facilities, including replacement of existing 4.16kV and 12kV electrical distribution systems; upgrades to the basewide communication systems; upgrades to the basewide natural gas systems; and new water and wastewater facilities and road improvements to Range 130. The Basewide Utilities Infrastructure EIS prepared for the action identified no significant environmental impacts and the ROD was signed on 23 September 2010.

5.3.7 Basewide Water Infrastructure Project

The USMC is constructing water infrastructure improvements at MCB Camp Pendleton. The project allows MCB Camp Pendleton to efficiently meet its mission by providing improved and compliant drinking water treatment capabilities, capacity, and redundancy, and by providing more efficient water delivery in the northern region of MCB Camp Pendleton and throughout the base during periods of scheduled, unscheduled, and emergency system interruption. The project accomplishes this purpose through two separate projects designed to meet current and future needs. Specifically, the construction, operation, and maintenance of potable water infrastructure upgrades. These improvements include a Northern Advanced Water Treatment plant and associated facilities, including an effluent discharge system, and connection of the MCB Camp Pendleton northern and southern water systems. The Basewide Water Infrastructure EIS prepared for the action identified significant impacts to biological resources and cultural resources; however, MCB Camp Pendleton would avoid or minimize impacts on these resources to the maximum extent practicable during project design and construction. The ROD was signed on 25 September 2012.

The infrastructure developed through the Basewide Water Infrastructure Project will be used to support this project. Groundwater produced and treated in the Northern Water System may be available for conveyance to the Southern Water System when available to mitigate pumping related impacts of the proposed project. Availability of water in the Northern Water System will be accounted for in the AMP/FOP when management objectives are being considered to avoid project related impacts. During some conditions, water supply form the Northern System may be limited due to prolonged drought or temporary and/or permanent increases in demand. The AMP/FOP is being developed to account for all potable water resources so that purpose and need of the project, including the water delivery schedule to FPUD, is maintained throughout all types of hydrologic conditions.

5.3.8 Emergency Storage Project

The SDCWA's Emergency Storage Project is designed to protect the San Diego region from potential disruptions to the water delivery system by increasing the amount of water stored locally. Under this project, new emergency water storage and pipeline connections would be installed, enabling water to continue to flow throughout the region even if the imported water supply is disrupted. The Emergency Storage Project is expected to meet the county's emergency water needs through 2030. Construction of the first components began in 2000; the last facilities will be complete in 2014.

The Emergency Storage Project is being implemented in four phases with the period of construction ranging from 2000 to 2014. EIRs were prepared for each phase and the SDCWA implemented an environmental mitigation-monitoring program to ensure environmental protection during construction. The Water Authority's mitigation monitoring program includes: avoiding and minimizing impacts to sensitive biological resources; preserving offsite mitigation lands; and compensating for impacts by restoring affected habitat.

5.3.9 Known and Unknown IR Site Remediation

MCB Camp Pendleton is currently investigating draft IR Site 1119 in the 26-Area for VOC related contamination in the groundwater aquifer. Although all known water quality and water level data from this site were used in determining locations of future groundwater well locations to support the CUP, the full extent of Site 1119 has not yet been characterized. Additionally, there may be other undiscovered IR sites on MCB Camp Pendleton that would require investigation and potential remedial action. The model and other hydrologic tools developed for the AMP/FOP would be updated and recalibrated as new data and site information becomes available. Although project related migration of VOC contamination is not expected to occur, the AMP/FOP would develop a rule-based course of action, consistent with MCB Camp Pendleton management goals, which would be implemented based on continuous monitoring of specific parameters (triggers) when pre-determined thresholds are exceeded. If these thresholds are breeched, the course of actions may include, but not be limited to, removing wells from service, installation of well-head treatment specific to known contaminants, implementation of other best management practices, or curtailment of CUP project related pumping.

One goal of MCB Camp Pendleton's adaptive management of its aquifers would be to avoid production of groundwater from areas of known contaminants whenever possible. If contaminants are detected, remedial steps for assuring public safety and environmental protection would be followed, including the courses of action previously described. Through the AMP/FOP, if public and environmental safety cannot be assured through remedial actions, groundwater pumping would be curtailed, The adaptive management process programmed in the AMP/FOP would continually review goals and objectives of stakeholders and interest parties to assure compliance with project related physical and environmental constraints as they evolve as hydrologic conditions vary in the future.

5.4 POTENTIAL CUMULATIVE IMPACTS BY ENVIRONMENTAL RESOURCE AREA

5.4.1 Geological Resources

The ROI considered in the geological resources analysis includes MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook. Construction activities such as grading and excavation under the Proposed Action and cumulative projects listed in Section 5.3 have the greatest potential to contribute to cumulative impacts on geological resources such as topography and soils. However, the Proposed Action would not involve extensive excavation or grading in any one location and trenching for pipelines would occur in some of the same corridors as other cumulative projects on MCB Camp Pendleton, DET Fallbrook, and in the community of Fallbrook. Therefore, cumulative impacts to topography would be less than significant. The Proposed Action and other projects would utilize geotechnical studies, as needed, to minimize impacts from landslides, subsidence, and seismicity. Therefore, cumulative impacts from geological hazards would be minimal.

The construction projects listed in Section 5.3 and the Proposed Action would require similar types and volumes of excavation in the ROI. The projects described in Section 5.3 have undergone separate NEPA/CEQA analysis and were found to have either no significant geological impacts or no significant geological impacts are anticipated (i.e., for projects currently undergoing NEPA analysis). Major components of some of these projects have been completed, such as P-071 (construction of the existing Haybarn Canyon IM-2) completed in 2005, and P-068 (repair of the original IM-1 located south of the Marine Corps Air Station Camp Pendleton) completed in 2006. Through use of the design, engineering, and erosion control measures listed in Section 4.1 of this EIS/EIR, no significant soil loss or erosion would occur during construction under the Proposed Action and the other cumulative projects. The geological resources impacts would be minor, and when combined with geological resources impacts from other projects, would have a negligible cumulative impact.

In regard to operations under the Proposed Action, the main impact that could contribute to potential cumulative impacts upon geologic resources would be the replacement of the natural substrate conditions in the same areas along Vandegrift Boulevard and streets in the community of Fallbrook with multiple water-filled pipelines surrounded by backfill. Pipeline corridor routes either avoid the routes of existing pipelines, or incorporate buffer zones that allow new pipelines to be placed a sufficient distance from existing lines to prevent the creation of wide areas underlain by pipelines. Impacts to topography and soils would be limited to excavation during maintenance and would be minimal. The Proposed Action and other cumulative project facilities would be designed and constructed according to the requirements of the project-specific geotechnical study, building codes, and engineering criteria. These design criteria would ensure that the completed facilities would not present slope or seismic hazards. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts to geological resources.

5.4.2 Water Resources

The ROI for water resources includes those areas that contain surface water or groundwater features within the SMR watershed that may be impacted by the Proposed Action and the other cumulative projects. The main impacts to water resources associated with the Proposed Action that could contribute to cumulative impacts would be to surface water quality resulting from simultaneous construction activities and to surface and groundwater supplies resulting from other water development projects. The Proposed Action and other construction projects in the ROI that disturb greater than 1 acre (0.4 hectare) of land would be required to obtain and comply with the SWRCB General Permit for Construction Activities. The General Permit would require that construction contractors prepare and implement a SWPPP and implement all applicable BMPs in accordance with the General Permit from initiation through completion of construction activities as well as post construction BMPs. Implementation of a SWPPP and BMPs would further minimize the potential for pollutants to enter receiving waters during construction.

The water development projects listed in Section 5.3 and the Proposed Action would utilize water resources within the SMR Basin. In consideration of cumulative impacts to water resources, several technical studies and reports have been conducted to determine the sustainable groundwater yield for SMR CUP while minimizing environmental impacts within the Lower SMR Basin (Reclamation 2004b, 2005, 2007a,b; Reclamation *et al.* 2012; Stetson 2008a, 2012a,b,d). These studies take into account the natural variations of the hydrologic condition and changes to the hydrologic regime resulting from other projects in the ROI.

In addition, the AMP/FOP would be implemented, as described in Section 2.3.1.4, *Special Conservation Measures and Section 5.3.9 Known and Unknown IR Site Remediation*, during operations under the Proposed Action. The AMP/FOP would be used to optimize groundwater yield while protecting environmental resources and would allow for operations to be adjusted due to both the natural variations of the hydrologic condition and other changes to the hydrologic regime (i.e., from other cumulative projects in the ROI). Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts to water resources.

5.4.3 Biological Resources

Potential cumulative impacts on biological resources are considered from the standpoint of both construction and operations under the Proposed Action.

5.4.3.1 Construction

Vegetation and Wildlife

The Proposed Action would cause both temporary and permanent losses of vegetation and wildlife habitat through the construction of new facilities. These losses would be reduced by restoration, and offset over time by compensation. There is continuing recognition and conservation of the most valuable habitats, especially CSS and riparian habitat, on MCB Camp Pendleton and DET Fallbrook via the INRMP for each installation, as well as the installations' NEPA reviews of each new construction project. The INRMPs also provide support for and coordination with local and regional non-military planning and conservation of biological resources. Habitat protection and compensation for losses is also emphasized in the subarea plans of the County of San Diego Multiple Species Conservation Plan, which are incorporated into local and regional general plans. Overall, incremental losses of valuable vegetation and wildlife habitat have been and will continue to be reduced. Development and land use are increasingly managed to avoid losses of biodiversity. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts to vegetation and wildlife.

Aquatic Habitats and Species

Facilities construction for the Proposed Action would have mostly temporary impacts on aquatic species and habitats associated with the river and its tributaries. Conservation measures would minimize these impacts. Other activities in the watershed would have similar temporary effects, which would also be limited through SWPPPs and Section 404 permitting requirements. The minimization of project impacts coupled with the existing regulatory framework ensures that significant cumulative impacts on aquatic habitats and species would not occur due to project construction. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts to aquatic habitat and species.

Special Status Species

Facilities construction for the Proposed Action would have mostly temporary impacts on special status species populations and habitats. Although some displacement and mortality of individuals, coupled with a loss of habitat, would occur initially, these impacts would be reduced over time through restoration and compensation. It is not expected that construction would significantly diminish populations of these species within the ROI, and thus it would not increase the vulnerability of special status species to extinction, or increase the need for additional protection under the federal or state ESA. As for vegetation and wildlife, the MCB Camp Pendleton and DET Fallbrook INRMPs and NEPA reviews, coupled with local and regional conservation planning, also reduce and manage incremental impacts to special status species. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts to special status species.

5.4.3.2 Operations

Operational impacts associated with the Proposed Action predominantly reflect the impacts of diminished surface flows and increased depths to groundwater in portions of the Lower SMR. These sources of impact apply to all subcategories of biological resources; hence a breakdown by subcategory is not necessary.

Since MCB Camp Pendleton and FPUD are the end-users of water in the SMR, the potential for cumulative impacts on biological resources depends on whether the incremental effects of the Proposed Action are affected by other users of the river's water or development in the watershed upstream of the

ROI. In recent years, the settlement between MCB Camp Pendleton and RCWD (i.e., the CWRMA) (Reclamation 2008a) has resulted in restored low flows to the Lower SMR, which might have contributed to improved tidal flushing and apparently less frequent and shorter-duration closures of the river mouth relative to previous conditions (MCB Camp Pendleton 2009b). Continuing urbanization and loss of agricultural land in the watershed is likely to increase runoff from impervious surfaces, and reduce the net use of water. When these increases occur during normally dry summer months, they can have detrimental effects on native southern California riparian species, which are adapted to seasonal drought conditions (Turschak *et al.* 2008). Future development on MCB Camp Pendleton could increase the base's water demand, which could in turn affect the conjunctive use strategy.

The incremental effects of the Proposed Action on biological resources depend on both the supply of water from the watershed, and the demand from users in the FPUD service area and on MCB Camp Pendleton. In addition, biological resources associated with the river are likely to respond to, and be affected indirectly by, even minor changes in flow and groundwater levels. As a result, the potential for a significant cumulative impact exists. However, successful implementation of the AMP/FOP, as described in Section 2.3.1.4, *Special Conservation Measures*, would reduce this cumulative impact, as well as the project-specific impact, to less than significant. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts to biological resources.

5.4.4 Cultural Resources

The cultural resources APE (i.e., ROI) encompasses all areas that may be subject to physical disturbance from project implementation, including construction within 100-ft (30-m) wide conveyance pipeline corridors and facility sites.

Implementation of the Proposed Action could potentially result in cumulative impacts on cultural resources. However, the cultural resources evaluation process is designed to ensure that impacts to cultural resources are avoided and that cultural resources are preserved whenever possible. Any portion of the Proposed Action with potential for significant impacts to cultural resources has undergone Section 106 review and would be mitigated, as required. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the APE, would not result in significant cumulative impacts to cultural resources.

5.4.5 Air Quality

5.4.5.1 Criteria Pollutants

The ROI considered in this air quality cumulative analysis includes the SDAB.

Direct and indirect impacts resulting from the Proposed Action, when combined with impacts from other projects identified in Section 5.3, would potentially occur during construction and operational activities within MCB Camp Pendleton and the service area of the FPUD. Proposed construction activities would produce short-term emissions that would remain below applicable NEPA and conformity emission significance thresholds. Any concurrent emissions-generating action that occurs in the vicinity of proposed construction activities would potentially contribute to the ambient impacts of these emissions. Since proposed construction would produce a nominal amount of emissions that are short-term and temporary in nature, the combination of proposed construction and future project air quality impacts would not contribute to an exceedance of an ambient air quality standard. As a result, proposed construction activities would produce less than cumulatively considerable air quality impacts.

Implementation of recommended fugitive dust control measures would ensure that air emissions from proposed construction activities would produce less than significant cumulative impacts.

Operational activities associated with the Proposed Action would generate emissions that are less than those for construction activities because operational activities would only include improvements to Percolation ponds 1-7. As discussed in Section 4.5.3.2, these activities would occur over a period of 30 days per year. As shown in Table 4.5-4, annual operational emissions would be below the *de minimis* thresholds for nonattainment pollutants, and would be less than 0.002 percent of the SDAB emissions inventory for all pollutants. Therefore, operational emissions would also produce less than significant cumulative air quality impacts. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts to air quality.

5.4.5.2 Greenhouse Gases

The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Therefore, an appreciable impact on global climate change would only occur when proposed GHG emissions are combined with GHG emissions from other man-made activities on a global scale.

Currently, there are no formally adopted or published NEPA thresholds for GHG emissions. On 18 February 2010, the CEQ released draft guidance for addressing climate change in NEPA documents (CEQ 2010). The draft guidance, which has been issued for public review and comment, recommends quantification of GHG emissions, and proposes a reference point of 25,000 metric tons of CO_2e emissions. The CEQ indicates that use of 25,000 metric tons of CO_2e emissions as a reference point would provide federal agencies with a useful indicator, rather than an absolute standard of significance, for agencies to provide action-specific evaluation of GHG emissions and disclosure of potential impacts.

Formulating such thresholds is problematic, as it is difficult to determine what level of proposed emissions would substantially contribute to global climate change. In the absence of formally-adopted thresholds of significance, this EIS/EIR compares quantification of GHG emissions, and proposes 25,000 metric tons of CO_2e emissions as a starting point at which calculation and disclosure of GHG emissions may be meaningful for consideration by decision makers and the public. As shown in Table 5.4-1, CO_2e emissions would be well below the 25,000 metric tons of CO2e level proposed in the CEQ's draft guidance (see Appendix D for GHG emission data for project alternatives). Emissions were also compared to MCB Camp Pendleton's annual baseline GHG conditions and the United States GHG baseline inventory of 2010 (USEPA 2012a). Construction and operations emissions would be approximately 0.95% and 0.22% of MCB Camp Pendleton baseline CO_2e emissions, and approximately 0.00004% and 0.000009% of the total U.S. CO_2e emissions. Since GHG emissions would be minimal when compared with the annual MCB Camp Pendleton GHG baseline and the United States GHG baseline inventory, the proposed action would not have a significant cumulative effect on global climate change

Although the Proposed Action would only cause negligible cumulative impacts associated with global climate change, this important topic warrants discussion of DON and USMC leadership in broad-based programs to reduce energy consumption and shift to renewable and alternative fuels, thereby reducing emissions of CO_2 and other GHGs.

EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, was adopted in October 2009 and provides early strategic guidance to federal agencies in the management of GHG emissions. The early strategy directs the agencies to increase renewable energy use to achieve general

GHG emission reductions. According to the provisions of EO 13514, federal agencies are required to develop a 2008 baseline for scope 1 and 2 GHG emissions, and to develop a percentage reduction target for agency-wide reductions of scope 1 and 2 GHG emissions by FY 2020. As part of this effort, federal agencies are to evaluate sources of GHG emissions, and develop, implement, and annually update an integrated Strategic Sustainability Performance Plan that will prioritize agency actions based on lifecycle return on investment. The intent is to evaluate GHG emissions on a lifecycle basis and to identify feasibility of sustainability strategies on that basis. The DOD is currently developing its Strategic Sustainability Performance Plan that will guide USMC initiatives to reduce GHG emissions.

Table 5.4-1. Annual GHG Emissions – Proposed Action

Scenario/Activity	**Metric Tons per Year[1]**			
	CO_2	**CH_4**	**N_2O**	**CO_2e**
Construction				
Heavy Construction Equipment	1,934	0.25	0.41	2,066
Construction Worker Travel	223	0.02	-	224
Haul Trucks	329	0.01	-	320
TOTAL Construction	**2,486**	**0.28**	**0.41**	**2,619**
MCB Camp Pendleton 2008 Baseline GHG Emissions	-	-	-	276,877
Proposed Action Construction Emissions as a percent of MCB Camp Pendleton 2008 Baseline Emissions	-	-	-	0.95%
United States. 2006 Baseline Emissions (10^6 metric tons)[2]	-	-	-	6,821.8
Proposed Emissions as a % of U.S. Emissions	-	-	-	0.00004%
Operations				
Maintenance of Percolation ponds	122	0.01	0.06	140
TOTAL Operations	**518**	**0.04**	**0.33**	**617**
MCB Camp Pendleton 2008 Baseline GHG Emissions	-	-	-	276,877
Proposed Action Operational Emissions as a percent of MCB Camp Pendleton 2008 Baseline Emissions	-	-	-	0.22%
United States 2006 Baseline Emissions (10^6 metric tons)	-	-	-	6,821.8
Proposed Emissions as a % of U.S. Emissions	-	-	-	0.000009

Notes: [1]$CO_2e = (CO_2 * 1) + (CH_4 * 21) + (N_2O * 296)$.
CO_2 = carbon dioxide; CH_4 = methane; N_2O =nitrous oxide; CO_2e = carbon dioxide equivalent; MCB = Marine Corps Base; GHG = greenhouse gas.
Source: USEPA 2012a.

The Commandant of the Marine Corps' *Facilities Energy and Water Management Program Campaign Plan* (USMC 2009a) declares the intent to implement measures to conserve energy and to reduce greenhouse gas emissions and dependence on foreign oil. The campaign plan identifies long-term goals to reduce energy intensity and increase the percentage of renewable electrical energy consumed. This plan requires base commanders to "evaluate the effectiveness of incorporating emerging technologies" including integrated photovoltaics, cool roofs, daylighting, ground source heat pumps, heat recovery ventilation, high efficiency chillers, occupancy sensors, premium efficiency motors, radiant heating, solar water heating, and variable air volume systems.

Marine Corps Installations West has undertaken a study to evaluate and address GHG emissions, documented in the draft *Greenhouse Gas Assessment for Marine Corps Installations West* (USMC 2009b). The study provides the basis for recommended GHG management policies at Marine Corps Installations West.

5.4.6 Hazardous Materials and Wastes

The ROI considered in the hazardous materials and wastes analysis includes MCB Camp Pendleton, DET Fallbrook, and FPUD. The main impacts to hazardous materials/hazardous waste associated with the Proposed Action that could contribute to cumulative impacts would be construction of the components associated with the Proposed Action, and operation of the FPUD WTP. The construction projects listed in Section 5.3 and the Proposed Action would bring similar types and volumes of construction-related hazardous materials into the ROI. The projects described in Section 5.3 have undergone separate NEPA/CEQA analysis and were found to have either no significant hazardous materials and wastes impacts or no significant hazardous materials and wastes impacts are anticipated (i.e., for projects currently undergoing NEPA analysis). Through use of the measures listed in Section 4.6.3 of this EIS/EIR, no significant impacts associated with the use, storage, or disposal of construction-related hazardous materials or hazardous wastes would occur.

In regard to operation of the FPUD WTP, the main hazardous material or waste-related impact that could contribute to hazardous waste impacts would be the generation of large volumes of wastewater from the various treatment processes (i.e., brine discharge). None of the brine discharge would require handling or disposal as hazardous waste. The total projected brine discharge volume would be accommodated without affecting the ability of FPUD to meet its wastewater processing needs. An existing NPDES Permit would be amended to include brine discharge from the project (either FPUD's NPDES Permit [CA0108031] or MCB Camp Pendleton's NPDES Permit [CA0109347]), and additional discharge is not expected to impact the ability to meet NPDES permit requirements. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would not result in significant cumulative impacts from the use, storage, and disposal of hazardous materials and wastes.

5.4.7 Utilities

The ROI for utilities includes the southern portion of MCB Camp Pendleton, DET Fallbrook, and the community of Fallbrook. Implementation of the Proposed Action would result in beneficial impacts to potable water supplies for MCB Camp Pendleton and FPUD, resulting in reduced reliance on imported water. Construction activities would generate manageable amounts of solid waste that would not put significant demands on MCB Camp Pendleton's waste disposal system. Increased electrical power demands under the Proposed Action operations would be accommodated by the Basewide Utilities Infrastructure Improvements Project or SDG&E. Long-term operation of the project would generate limited amounts of solid waste from maintenance dredging percolation ponds, and limited amounts of wastewater, but would not employ the use of MCB Camp Pendleton's or SDG&E's natural gas systems.

The Basewide Utilities Infrastructure Improvements Project is designed to upgrade MCB Camp Pendleton's existing utilities infrastructure and will be able to accommodate the demands from the Proposed Action or other projects within the MCB Camp Pendleton portion of the ROI where the majority of the Proposed Action's utilities demands would be located. Therefore, implementation of the Proposed Action, in conjunction with other similar actions in the ROI, would result in beneficial cumulative impacts to utilities, specifically to potable water.

5.5 CONCLUSIONS

Implementation of the Proposed Action would not result in significant cumulative impacts to any environmental resource area. The Proposed Action, as well as the other project listed in Section 5.3, would comply with established policies, regulations, and directives to ensure that project-specific impacts are minimized or avoided. Therefore, cumulative impacts from the Proposed Action, in conjunction with other past, present, and reasonably foreseeable future actions, would not be significant.

CHAPTER 6
OTHER REQUIRED CONSIDERATIONS

6.1 GROWTH INDUCEMENT

Section 15 126(g) of the CEQA Guidelines also requires a discussion of how the potential growth-inducing impacts of the proposed project could foster economic or population growth or the construction of new housing, either directly or indirectly. Induced growth is distinguished from the direct employment, population, or housing growth of a project. If a project has characteristics which "may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively," then these aspects of the proposed action must be discussed as well. Induced-growth is any growth that exceeds planned growth and results from new development that would not have taken place in the absence of the proposed project. For example, a project could induce growth by lowering or removing barriers to growth or by creating or allowing a use such as an industrial facility that attracts new population or economic activity. CEQA Guidelines also indicate that the topic of growth should not be assumed to be either beneficial or detrimental.

Construction of the components of the Proposed Action would result in some economic inducement associated with construction expenditures. Although the number of employees involved and the total amount of wages is unknown at this time, it is anticipated that the majority of employees would either live or reside temporarily in the immediate area. No new housing or temporary lodging would be constructed as a result of implementation of Alternative 1.

Implementation of the Proposed Action would not induce potential future growth at MCB Camp Pendleton or within the FPUD service area. The Proposed Action would improve water supply reliability and support current MCB Camp Pendleton activities by managing yield of the Lower SMR Basin. This increased water yield would not result in growth inducement but would rather reduce dependence on imported water, which is anticipated to increase in the future regardless of project implementation. Based on consideration of the effects of the construction and operation of the various components, growth inducement would not occur as a result of implementation of the Proposed Action.

6.2 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

Both the NEPA, 42 USC §§ 4321-4370d, and the CEQA Guidelines, 14 CCR § 15000 *et seq.*, require an analysis of irreversible or irretrievable commitment of resources. Resources that are irreversibly or irretrievably committed to a project are those that are used on a long-term or permanent basis. This includes the use of nonrenewable resources such as wood, fuel, metal, and other natural or cultural resources. Human labor is also considered a nonrenewable resource. These resources are considered nonrenewable or irretrievable if they would be used for the Proposed Action when they could have been used for other purposes. Another issue that falls under the category of the irreversible and irretrievable commitment of resources is the unavoidable destruction of natural and cultural resources, which could limit the variety of potential uses for that particular environment.

For the construction and operation of the proposed facilities, most impacts are short-term and temporary in nature. Implementation of any of the action alternatives would constitute an irreversible or irretrievable commitment of nonrenewable or depletable resources for the materials and energy expended during construction and implementation. Expenditure of building materials, fuel for construction vehicles and equipment, and other resources would not be reversible or retrievable. Implementation of any of the action alternatives would not result in the destruction of environmental resources such that the range of potential uses of the environment would be limited. Implementation of any of the action alternatives would have short-term effects on natural resources but would not adversely affect the biodiversity in the area. In addition, although implementation of any of the action alternatives would require the use of nonrenewable and depletable resources, MCB Camp Pendleton, Reclamation, and FPUD would attempt to minimize the irreversible or irretrievable commitment of resources.

6.3 SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

NEPA, 42 USC §§ 4321-4370d, requires an EIS to address the short-term gains versus long-term benefits of Alternative 1 and identify where Alternative 1 forecloses future options (40 CFR § 1502.16). Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing one development option reduces future flexibility in pursuing other options, or that giving over a parcel of land or other resource to a certain use often eliminates the possibility of other uses being performed at that site.

Implementation of the Proposed Action would result in both short-term environmental effects and long-term productivity. However, implementation of any of the alternatives would not result in any impacts that would reduce environmental productivity, permanently narrow the range of beneficial uses of the environment, or pose long-term risks to health, safety, or the general welfare of the public.

6.4 UNAVOIDABLE ADVERSE EFFECTS

NEPA, 42 USC §§ 4321-4370d, and the CEQA Guidelines, 14 CCR § 15000 *et seq.*, require a description of any significant impacts resulting from implementation of a proposed action, including those that can be mitigated to a less than significant level. The environmental effects of the SMR CUP alternatives are discussed in Chapter 4 (Environmental Consequences) and Chapter 5 (Cumulative Impacts). The analysis in Chapter 4 addresses whether implementation of an alternative would result in a significant adverse impact to any of the specific environmental resource areas. When significant impacts were identified, mitigation measures were developed that could reduce impacts to a less than significant level, provided that such mitigation could feasibly be accomplished.

CHAPTER 7
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CHAPTER 8
AGENCIES CONTACTED

Federal, state, and local agencies were consulted prior to and during the preparation of this EIS/EIR. Agencies were notified by publication of an NOI and NOP announcing preparation of a Draft EIS/EIR as required by NEPA and CEQA, respectively, and by public scoping meetings. The agencies' viewpoints were solicited with regard to activities within their jurisdictions. The agencies and organization contacted are listed below.

Agency	Location
Federal Agencies	
U.S. Department of the Interior, Bureau of Reclamation	Temecula, CA
U.S. Marine Corps Base, Camp Pendleton	Camp Pendleton, CA
U.S. Environmental Protection Agency	San Francisco, CA
U.S. Fish and Wildlife Service	San Diego, CA
U.S. Army Corps of Engineers	San Diego, CA
National Marine Fisheries Service	Long Beach, CA
State Agencies	
California Department of Fish and Game	San Diego, CA
California State Historical Preservation Office	Sacramento, CA
California State Water Resources Control Board	Sacramento, CA
County of San Diego Agencies	
County of San Diego Air Pollution Control District	San Diego, CA
Regional Agencies	
California Regional Water Quality Control Board	San Diego, CA
Other Local Agencies	
Fallbrook Public Utilities District	Fallbrook, CA

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CHAPTER 9
PREPARERS

<u>Project Management and Quality Assurance</u>

Douglas Billings, Program/Project Manager
B.S., Physical Geography/Geologic Sciences

J. Scott Coombs, Deputy Project Manager/Water Resources, HazMat, Utilities
M.S., Marine Science

Kimberly Wilson, Quality Assurance

<u>Technical Analysts</u>

Mike Dungan, Biological Resources Lead
Ph.D., Ecology and Evolutionary Biology

Maggie Bach, Geology and Soils
B.A. Geology

Melissa Tu, Biological Resources
B.A. Environmental Science-Biology

Christopher Noddings, Biological Resources
M.S., Environmental Science and Management

Jason Harshman, Biological Resources, GIS Support
B.A., Geography

Shannon Brown, GIS Support
B.S., Environmental Sciences

<u>Subcontractors</u>

ASM Affiliates

Mark Becker, Cultural Resources Survey and Impact Analysis
Ph.D. Anthropology

Dave Iversen, Cultural Resources Survey and Impact Analysis
M.A. Anthropology

Sarah Stringer-Bowsher, Cultural Resources Survey and Impact Analysis
M.A. History

Michelle Dalope, Cultural Resources Survey and Impact Analysis
B.A. Anthropology

Scientific Resources Associates

Valorie Thompson, Air Quality Analysis
Ph.D., Chemical Engineering

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