Notice of Intent to Adopt a Negative Declaration

TO: Responsible Agencies, Trustee Agencies, Interested Parties

LEAD AGENCY: Irvine Ranch Water District

PROJECT TITLE: San Diego Creek Water Rights Change Petition Project

REVIEW PERIOD: August 24, 2017 through September 22, 2017

PROJECT DESCRIPTION: Irvine Ranch Water District (IRWD) is proposing to modify its existing State Water Resources Control Board (SWRCB) Permit for Diversion and Use of Water (Permit 20979), which is an appropriative water right to divert water from the San Diego Creek for "Wildlife Enhancement" at the IRWD San Joaquin Marsh. The San Joaquin Marsh is a constructed treatment wetland, and water is discharged back to San Diego Creek with improved water quality. Under Permit 20979, IRWD can divert an annual maximum of 3,600 acre feet per year (AFY) from San Diego Creek. The permit authorizes a maximum diversion rate of 5 cubic feet per second (cfs) between January 1 and December 31 of each year. The primary goal of the proposed project is to conform the permit terms to existing operations without changing the permit's face value of 3,600 AFY. The proposed project would include modifications such as changing the Place of Use to include the entirety of IRWD's San Joaquin Marsh and Wildlife Sanctuary and the neighboring Freshwater Marsh Reserve owned by the University of California's Natural Reserve System (UCNRS). In addition, the proposed modifications would include increasing the Rate of Diversion from 5 cfs to 13.3 cfs.

The proposed project would be implemented within existing facilities at the San Joaquin Marsh and would not require any construction activity. The project site is not included on any lists enumerated under Government Code Section 65962.5, which includes but is not limited to lists of hazardous waste facilities, properties, and disposal sites.

PROJECT LOCATION: The proposed project is located adjacent to and alongside San Diego Creek and IRWD Michelson Water Recycling Plant. The proposed project includes the San Joaquin Marsh and Wildlife Sanctuary.

FINDINGS/DETERMINATION: IRWD, as the Lead Agency, has prepared an Initial Study to provide the public and trustee and responsible agencies with information about the potential effects on the local and regional environment associated with the proposed project. IRWD has reviewed and considered the proposed project and has determined that the project will not have a significant effect on the environment. IRWD hereby proposes to adopt a Negative Declaration for this project.

PUBLIC REVIEW AND COMMENTS: A 30-day public review period for the Initial Study/Negative Declaration will commence on August 24, 2017, and end September 22, 2017, for interested individuals and public agencies to submit written comments on the document. Any written comments on the Initial Study/Negative Declaration must be received by the contact person listed below by **4:00 PM** on

September 22, 2017. Copies of the Initial Study/Negative Declaration are available for review as described below.

CONTACT PERSON: Jo Ann Corey
Irvine Ranch Water District
Water Resources & Environmental Compliance
15600 Sand Canyon Avenue
Irvine, California 92618
Phone: 949-453-5300

DOCUMENT AVAILABILITY: Heritage Park Library, 14361 Yale Avenue, Irvine CA 92604; and online at the IRWD Web Site (http://www.irwd.com).

PUBLIC MEETING: The IRWD Board of Directors will consider the adoption of the Initial Study/Negative Declaration at a regularly scheduled meeting following the 30-day review period. For more information, contact Jo Ann Corey at IRWD at (949) 453-5300.

POSTED

AUG 24 2017

HUGH NGUYEN, CLERK-RECORDER

BY: _____ DEPUTY

San Diego Creek Water Rights Change Petition Project

Draft Initial Study/Negative Declaration

Prepared for
Irvine Ranch Water District

August 2017

ESA

San Diego Creek Water Rights Change Petition Project

Draft Initial Study/Negative Declaration

Prepared for
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August 2017

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TABLE OF CONTENTS

San Diego Creek Water Rights Change Petition Project Draft IS/ND

Page

Figures

Tables

Appendices

Acronym List

AB	Assembly Bill
AELUP	Airport Environs Land Use Plan
AFY	Acre feet per year
ALUC	Airport Land Use Commission
AQMP	Air Quality Management Plan
BMP	Best Management Practice
CAA	Clean Air Act
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CDC	California Department of Conservation
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CERT	Community Emergency Response Training
CFCs	Chlorofluorocarbons
CFS	Cubic feet per second
CH4	Methane
CMP	Congestion Management Plan
CO2	Carbon dioxide
CO2e	Carbon dioxide-equivalent
CRA	California Resource Agency
CRPR	California Rare Plant Rank
DTSC	Department of Toxic Substances Control
ESA	Environmental Science Associates
FEMA	Federal Emergency Management Agency
FTA	Federal Transit Administration

GHGs	Greenhouse gases
GPM	Gallons per minute
HCP	Habitat Conservation Plan
HFCs	Hydrofluorocarbons
IRWD	Irvine Ranch Water District
LUST	Leaking Underground Storage Tank
MS4	Municipal Separate Storm Sewer System
MWRP	Michelson Water Recycling Plant
N2O	Nitrous Oxide
NAHC	Native American Heritage Commission
NCCP	Natural Community Conservation Planning
ND	Negative Declaration
NRCS	Natural Resources Conservation Service
NTS	Natural Treatment System
OCFA	Orange County Fire Authority
OCTA	Orange County Transportation Authority
OPR	Office of Planning and Research
PFCs	Perfluorocarbons
RWQCB	Regional Water Quality Control Board
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SF6	Sulfur hexafluoride
SLF	Sacred Lands File
SRA	Seismic Response Area
SWRCB	State Water Resources Control Board
UCNRS	University of California's Natural Reserve System
USGS	United States Geological Survey

CHAPTER 1
Introduction

Irvine Ranch Water District (IRWD) is proposing to modify its existing State Water Resources Board (SWRCB) Permit for Diversion and Use of Water (Permit 20979), which is an appropriative water right to divert water from the San Diego Creek for "Wildlife Enhancement" at the IRWD San Joaquin Marsh. The San Joaquin Marsh is a constructed treatment wetland, and water is discharged back to San Diego Creek with improved water quality. Under Permit 20979, IRWD can divert an annual maximum of 3,600 acre feet per year (AFY) from San Diego Creek. The permit authorizes a maximum diversion rate of 5 cubic feet per second (cfs) between January 1 and December 31 of each year.

IRWD intends to submit a change petition to the SWRCB to modify the terms of Permit 20979 to conform to current operations at the IRWD San Joaquin Marsh. At the same time, IRWD intends to proceed with licensing of the water right, since the construction of the IRWD San Joaquin Marsh is complete, and the Permit has been maximized by putting 3,600 AFY to beneficial use.

The proposed modifications include changing the Place of Use to include the entirety of IRWD's San Joaquin Marsh and Wildlife Sanctuary and the neighboring Freshwater Marsh Reserve owned by the University of California's Natural Reserve System (UCNRS). The proposed modifications also include increasing the Rate of Diversion from 5 cfs to 13.3 cfs. The proposed project would not change the permit's face value of 3,600 AFY. No construction activities are proposed under the project and IRWD operations would be consistent with existing conditions.

1.1 California Environmental Quality Act Compliance

IRWD is the lead agency pursuant to the California Environmental Quality Act (CEQA) and is responsible for analyzing and approving the proposed project's CEQA document. The SWRCB is a responsible agency under CEQA for the proposed project; responsible agencies include all public agencies, other than the lead agency, which have discretionary approval power over the project (CEQA Guidelines Section 15381). The UCNRS is a trustee agency under CEQA for the proposed project; trustee agencies include state agencies having jurisdiction by law over natural resources affected by a project that are held in trust for the people of the State of California (CEQA Guidelines Section 15386). IRWD has determined that a Negative Declaration (ND) is the appropriate environmental document to be prepared in compliance with CEQA. This finding is based on the Initial Study Environmental Checklist (Section 3.0 of this Draft IS/ND). As provided for by CEQA Section 21064, a ND may be prepared for a project subject to CEQA when the project will not result in significant impacts to the environment. This Draft IS/ND has been

prepared by IRWD, in conformance with CEQA Guidelines Section 15070(a), to show that there is no substantial evidence that the project may have a significant effect on the environment.

1.2 Existing Documents Incorporated by Reference

The following is incorporated by reference in this document according to the CEQA Guidelines, Section 15150:

- Environmental Science Associates (ESA). 2014. Peters Canyon Channel Water Capture and Reuse Pipeline Project Cultural Resources Technical Reports. July.
- Environmental Science Associates (ESA). 2015. Peters Canyon Channel Water Capture and Reuse Pipeline Project Biological Resources Technical Report, Volume 2. Revised April 2015.
- Paleo Solutions. 2014. Paleontological Resources Report for Peters Canyon Channel Water Capture and Reuse Pipeline Project. March 27.

1.3 Findings

IRWD finds that the proposed project would not have a significant adverse effect on the environment based on the results of the Initial Study Environmental Checklist, as described in Section 3.0. A Negative Declaration is therefore proposed to satisfy the requirements of CEQA (California Public Resources Code, Section 21000 et seq.; 14 CCR 15000 et seq.). The Initial Study Environmental Checklist is used to review the potential environmental effects of the proposed project for each of the following areas:

- Aesthetics
- Agriculture and Forestry Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation/Traffic
- Tribal Cultural Resources
- Utilities and Service Systems
- Energy
- Mandatory Findings of Significance

1.4 Public Review and Comment

In accordance with CEQA, a good-faith effort has been made during the preparation of this IS/ND to contact responsible and trustee agencies and persons and organizations who may have an interest in this project. Reviewers of this document should focus on the analysis of impacts to the environment. Responsible and trustee agency comments should be limited to those project activities that are within the agency's area of expertise or that are required to be carried out or approved by the agency or that will be subject to the exercise of powers by the agency.

Comments may be made on this IS/ND in writing before the end of the comment period. Written comments should be sent to Jo Ann Corey at IRWD at the following address by **September 22, 2017**.

Jo Ann Corey
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, California 92618
Phone: 949-453-5300

1.5 Final IS/ND and Certification

Following the close of the public comment period, IRWD will consider this IS/ND and comments thereto in determining whether to approve the proposed project. Certification of this CEQA document and project approval will occur by the IRWD Board of Directors. Date and time information for the meeting where this document will be considered can be obtained from IRWD's website (www.irwd.com) or by contacting the IRWD Board Secretary at 949-453-5300.

In addition, the responsible agencies will also consider this IS/ND and comments thereto in determining whether to approve the proposed project.

CHAPTER 2
Project Description

2.1 Project Overview

The proposed project is a modification of IRWD's SWRCB Permit for Diversion and Use of Water (Permit 20979), which is an appropriative water right to divert water from the San Diego Creek for "Wildlife Enhancement" at the IRWD San Joaquin Marsh. The San Joaquin Marsh is a constructed treatment wetland, and water is discharged back to San Diego Creek with improved water quality. Under Permit 20979, IRWD can divert an annual maximum of 3,600 acre feet per year (AFY) from San Diego Creek. The permit authorizes a maximum diversion rate of 5 cubic feet per second (cfs) between January 1 and December 31 of each year.

IRWD intends to submit a change petition to the SWRCB to modify the terms of Permit 20979 to conform to current operations at the San Joaquin Marsh. At the same time, IRWD intends to proceed with licensing of the water right, since the construction of the San Joaquin Marsh is complete, and the Permit has been maximized by putting 3,600 AFY to beneficial use.

The proposed modifications include changing the Place of Use to include the entirety of IRWD's San Joaquin Marsh and Wildlife Sanctuary and the neighboring Freshwater Marsh Reserve owned by the University of California's Natural Reserve System (UCNRS). The proposed modifications also include increasing the Rate of Diversion from 5 cfs to 13.3 cfs. The proposed project would not change the permit's face value of 3,600 AFY.

2.2 Project Location

The proposed project is located in the City of Irvine, California. IRWD's San Joaquin Marsh and Wildlife Sanctuary are adjacent to San Diego Creek and the IRWD Michelson Water Recycling Plant, located northeast of Highway 73 and south of Interstate 405, approximately five miles upstream of Newport Bay (**Figure 2-1**). The proposed project is within the San Diego Creek/Newport Bay Watershed. The headwaters of San Diego Creek are in the Santiago and San Joaquin Hills on the northeast and southern areas of the watershed, respectively. Peters Canyon Wash joins San Diego Creek from the north, upstream of the project location. Downstream of the project location, San Diego Creek passes under CA State Route 73 and discharges into the Upper Newport Bay, which drains into the Lower Newport Bay and eventually into the Pacific Ocean.

SOURCE: ESA.

IRWD San Diego Creek Water Rights Change Petition . 130940.02

Figure 2-1
Regional Location

The project area is bounded by Michelson Drive to the north; Riparian View, San Diego Creek, and the Michelson Water Recycling Plant to the east and south; and Carlson Avenue, the University of California Irvine Arboretum, and Jamboree Road to the west and north (**Figure 2-2**). Campus Drive intersects the project area. The project area west of Campus Drive is the Freshwater Marsh Reserve, managed by the UCNRS. The project area east of Campus Drive is IRWD's San Joaquin Marsh and Wildlife Sanctuary. As shown in Figure 2-2, the San Joaquin Wildlife Sanctuary includes the San Joaquin Marsh, which is the existing 140-acre permit area, as well as the Carlson Marsh and riparian mitigation areas.

2.3 Goals and Objectives

The water right licensing process under the SWRCB Division of Water Rights has three steps: 1) submit a water right application; 2) obtain a permit; and 3) obtain a license. In April 1997, IRWD filed an Application to Appropriate Water by Permit with the SWRCB. In November 1998, IRWD received authorization under Permit 20979 to divert and use water from San Diego Creek for the purpose of wildlife enhancement and irrigation of habitat within the constructed wetlands of the San Joaquin Marsh. Since 1998, IRWD has diverted water from San Diego Creek for beneficial use at the San Joaquin Marsh, which is a constructed, eight pond, surface water treatment wetland. A major source of water in San Diego Creek is urban runoff; so in addition to providing habitat benefits, the treatment wetlands capture and treat urban runoff in response to SWRCB and Regional Water Quality Control Board regulations on municipal separate storm sewer system (MS4) discharges. In eleven out of eighteen years, the diversions to San Joaquin Marsh have exceeded 3,600 AFY, demonstrating full beneficial use of IRWD's water right (Stetson 2017).

The primary goal of modifying Permit 20979 is to conform the permit terms to existing operations without changing the permit's face value of 3,600 AFY. IRWD's objective is to concurrently file the change petition for Permit 20979 along with the application for licensing the water right. The change petition would allow for Permit 20979 to be modified to reflect current operations and to facilitate the SWRCB's ability to issue the license.

Since 1998 the permitted maximum diversion rate of 5 cfs has often been exceeded on an average daily basis. For the years 1998 through 2013, average daily flow into the marsh (influent) was 5.0 cfs; however, individual daily averages ranged between 0.0 cfs and 13.3 cfs (Stetson 2017; ESA 2015). Under the current operating guidelines for the San Joaquin Marsh, IRWD varies the rate of diversion to leverage efficiencies of pumping during off-peak hours and to maximize urban runoff capture at certain times of the year. Under the proposed project, the Permit's Rate of Diversion would be changed from 5 cfs to 13.3 cfs. This diversion rate is equal to the maximum diversion rate that can be accommodated with the two influent pumps currently installed at the San Joaquin Marsh. While the permit's maximum diversion rate would increase to 13.3 under the proposed project, the average daily flow into the marsh would not change compared to existing conditions.

SOURCE: ESA.

IRWD San Diego Creek Water Rights Change Petition . 130940.02

Figure 2-2
Project Site

In addition, the proposed project would expand the permitted Place of Use to conform to the areas where water from San Diego Creek is currently used. Under the existing operating guidelines for the San Joaquin Marsh, influent from San Diego Creek flows through the eight-pond treatment wetland system, and then effluent is either pumped back out to the creek or used to irrigate IRWD's riparian mitigation wetlands.

The riparian mitigation areas, including Carlson Marsh, also are flooded annually with storm water runoff for a two- to four-week period, typically between December and February, to simulate natural inundation cycles for ecosystem maintenance.

At the conclusion of the flooding the water is released to the UCNRS Freshwater Marsh Reserve through a culvert that passes underneath Campus Drive. Given these operating parameters, water from San Diego Creek currently is used within IRWD's greater Wildlife Sanctuary and may combine with storm water runoff released to UCNRS. Therefore, the Permit's Place of Use would be changed under the proposed project to include the originally-permitted 140 acres of the San Joaquin Marsh, as well as IRWD's Carlson Marsh and riparian mitigation areas, and the UCNRS Freshwater Marsh Reserve, for a total of 500 acres.

2.4 Project Components

The proposed project would be implemented with existing facilities and would require no construction activity. The proposed project includes a change petition to modify IRWD's Permit 20979 as follows:

Permit Term 4 – Place of Use: IRWD proposes to change the Place of Use from 140 acres of ponds at the San Joaquin Marsh to 500 acres that includes the entirety of IRWD's San Joaquin Marsh and Wildlife Sanctuary east of Campus Drive and the UCNRS Freshwater Marsh Reserve west of Campus Drive. Expanding the Place of Use would provide flexibility in the use of water, align existing operations with the Permit, and support licensing. Expanding the Place of Use would increase IRWD's operational flexibility to provide water to the UCNRS without increasing diversions from San Diego Creek. The priority of water deliveries to the San Joaquin Marsh would be maintained by IRWD by executing a separate agreement with UCNRS to provide water, at IRWD's discretion, based on hydrologic conditions and availability of storm water runoff. The agreement would reflect current operations, such that IRWD is not required to send water to UCNRS; the Freshwater Marsh Reserve is designed to be a natural wetland ecosystem that is not dependent on diversions from the San Diego Creek or San Joaquin Marsh.

Permit Term 5 – Rate of Diversion: The Rate of Diversion would be changed from 5 cfs to 13.3 cfs to reflect the existing pump capacity. The change in the Rate of Diversion would support pumping during off-peak hours, increase IRWD's operational flexibility, reflect current practices, and not impact downstream water availability. The proposed diversion rate is equal to the maximum diversion rate that can be accommodated with the two influent pumps currently installed at the San Joaquin Marsh. There are two intake pumps from San Diego Creek capable of diverting 3,400 gallons per minute (GPM) (7.6 cfs) and 3,800 GPM (8.5 cfs) independently, or 6,000 GPM (13.3 cfs) if operated together. During normal operations, only one pump is operated

at a time. The pumps normally operate between 10:00 PM and 8:00 AM, in order to capitalize on lower utility costs and meet the State's mandate to reduce daytime peak energy demands.

In addition to habitat and wildlife enhancement, the diversion and cycling of water through the San Joaquin Marsh complex also provides water quality treatment, which benefits the water quality of San Diego Creek and Newport Bay once wetland effluent is discharged back to the creek. Pollutant removal/transformation is achieved via a number of physical (e.g., adsorption, sedimentation) and biogeochemical (e.g., nitrogen cycle, carbon cycle) processes. The effluent pump that discharges water back to San Diego Creek is located downstream of the influent pumps (see Figure 2-2). The effluent pump generally operates during the same hours as the intake pumps, except during large storm events, when the pump is used to remove storm drain inputs from the marsh. Under the proposed project there would be no change to the operation of the effluent pump. Under current operations, water is discharged back to San Diego Creek, such that consumptive use is less than the amount diverted. Between 2009 and 2013, average annual daily flow into and out of the San Joaquin Marsh was 5.7 cfs and 5.3 cfs, respectively, resulting in consumptive use of less than 0.5 cfs (ESA 2015).

2.5 Project Approvals and Discretionary Actions

IRWD would use this IS/ND and supporting documentation in its decision to certify this IS/ND and approve the project. The Responsible Agencies would similarly use this IS/ND and supporting documentation to support additional discretionary actions, such as:

- **State Water Resources Control Board:** Change Petition for Permit 20979 and Licensing of Water Right

References

Environmental Science Associates (ESA). 2015. Peters Canyon Channel Water Capture and Reuse Pipeline Project Reduced Discharge Technical Study. April 2015.

Stetson Engineers Incorporated (Stetson). 2017a. Assessment of Permit 20979 and San Joaquin Marsh Operations. January, 13, 2017.

_____. 2017b. Recommended Changes to Permit 20979 to Support San Joaquin Marsh Operations. March, 20, 2017.

CHAPTER 3
Initial Study Environmental Checklist

1. Project Title:	San Diego Creek Water Rights Change Petition Project
2. Lead Agency Name and Address:	Irvine Ranch Water District 15600 Sand Canyon Avenue Irvine, CA 92618
3. Contact Person and Phone Number:	Jo Ann Corey, IRWD (949) 453-5300
4. Project Location:	City of Irvine, Orange County, CA
5. Project Sponsor's Name and Address:	Irvine Ranch Water District 15600 Sand Canyon Avenue Irvine, CA 92618
6. General Plan Designation(s):	Preservation
7. Zoning Designation(s):	1.3 Conservation Open Space Reserve and 1.4 Preservation
8. Description of Project:	See Chapter 2, Project Description.
9. Surrounding Land Uses and Setting:	Public Facilities; Recreation; Residential; Industrial; Educational
10. Other public agencies whose approval is required:	See Chapter 2, Section 2.5.
11. Discretionary Actions:	See Chapter 2, Section 2.5.

Environmental Factors Potentially Affected

The proposed project could potentially affect the environmental factor(s) checked below. The following pages present a more detailed checklist and discussion of each environmental factor.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Geology, Soils and Seismicity
☐ Greenhouse Gas Emissions	☐ Hazards and Hazardous Materials	☐ Hydrology and Water Quality
☐ Land Use and Land Use Planning	☐ Mineral Resources	☐ Noise
☐ Population and Housing	☐ Public Services	☐ Recreation
☐ Transportation and Traffic	☐ Tribal Cultural Resources	☐ Utilities and Service Systems
☐ Mandatory Findings of Significance	☐ Energy	

DETERMINATION: (To be completed by Lead Agency)

On the basis of this initial study:

☒ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, no further environmental documentation is required.

Signature

8/22/17
Date

Jo Ann Corey
Printed Name

Irvine Ranch Water District
For

Environmental Checklist

3.1 Aesthetics

Issues (and Supporting Information Sources):		*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
1.	**AESTHETICS — Would the project:**				
a)	Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b)	Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c)	Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☐	☒
d)	Create a new source of substantial light or glare which would adversely affect daytime or nighttime views in the area?	☐	☐	☐	☒

Discussion

a) ***No Impact.*** The proposed project is located in the City of Irvine at the existing IRWD San Joaquin Marsh and Wildlife Sanctuary, adjacent to San Diego Creek and the IRWD Michelson Water Recycling Plant. The project area is surrounded by urban development on all sides, including the Rancho San Joaquin Golf Course, single-family residential homes, commercial uses, and the University of California, Irvine campus. The natural setting around the project area includes flatlands and natural watercourses, including the adjacent San Diego Creek. The City of Irvine CEQA Manual does not include designated scenic vistas, but does include several visual resources, including San Diego Creek and the project area (San Joaquin Marsh) (City of Irvine 2012). The Santiago Hills and San Joaquin Hills are not visible from public vantage points within the project area. The proposed project would not include construction, and operation of the proposed project would be consistent with existing conditions. Therefore, no impact would occur regarding scenic vistas.

b) ***No Impact.*** The City of Irvine does not contain any state-designated scenic highways within its jurisdictional limits, as designated by the California Department of Transportation (Caltrans) under the California Scenic Highway Program (Caltrans 2017). Accordingly, the City does not have any associated state scenic highway corridors, which are defined as the land generally adjacent to and visible by motorists from a scenic highway. In addition, as no construction would occur under the proposed project, the proposed project would not impact trees, rock outcroppings, or historic buildings. Therefore, implementation of the proposed project would have no impact to scenic resources within a state scenic highway corridor.

c) ***No Impact.*** As previously described within Response 1(a) above, the project area is surrounded by urban development on all sides, including residential, commercial, and institutional uses. The natural setting around the project area includes flatlands and

natural watercourses, including the adjacent San Diego Creek. The proposed project would not include construction, and operation of the proposed project would be consistent with existing conditions. The existing visual character of the project area would remain the same. Therefore, no impact would occur to visual character of the project area or its surroundings.

d) ***No Impact***. The project area consists of marshland, surrounded on all sides by urban development and associated cars and streetlights that emit light and glare during the day and night. The proposed project would not include construction, and operation of the proposed project would be consistent with existing conditions. No new temporary or permanent lighting would be necessary for the proposed project. As a result, the proposed project would have no affect to light or glare at the project area or its surroundings.

References

California Department of Transportation (Caltrans). 2017. California Scenic Highway Mapping System. Available at http://www.dot.ca.gov/hq/LandArch/16_livability/scenic_highways/.

City of Irvine. 2012. City of Irvine CEQA Manual, Volume 2: Technical Guidelines. Available at https://legacy.cityofirvine.org/civica/filebank/blobdload.asp?BlobID=21575.

3.2 Agriculture and Forestry Resources

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
2. AGRICULTURE AND FORESTRY RESOURCES — In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. **Would the project:**				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

Discussion

a/b) ***No Impact.*** According to the maps prepared for the Farmland Mapping and Monitoring Program of the California Resource Agency (CRA), the project area does not include agricultural resources. The project area is not designated as Prime, Unique or Important Farmland. The project area is designated as Urban and Built-Up Land and Other Land (CDC 2016). There are no Williamson Act contracts on any lands within the City of Irvine (City of Irvine 2012). Therefore, the proposed project would not convert Prime, Unique, or Important Farmland and would not conflict with a Williamson Act contract. There would be no impact.

c/d) ***No Impact.*** The project area does not contain forest land or timberland. The project area is located adjacent to and alongside San Diego Creek and is within an urban context. The project area is zoned as 1.3 Conservation Open Space Reserve and 1.4 Preservation (City of Irvine 2014). Therefore, implementation of the proposed project would not result in any conflicts with existing zoning or cause rezoning of forest land or timber land. The

proposed project would not convert existing forest land to non-forest uses. There would be no impact.

e) ***No Impact.*** Existing and designated land uses within and adjacent to the project area do not include agricultural land, forest land or timberland. Thus, implementation of this proposed project would not result in changes in the environment, which would result in the conversion of farmland to non-agricultural use or conversion of forest land to non-forest use. No impacts related to agricultural or forest lands would occur from implementation of the proposed project.

References

City of Irvine. 2012. City of Irvine CEQA Manual, Volume 2: Technical Guidelines. Available at https://legacy.cityofirvine.org/civica/filebank/blobdload.asp?BlobID=21575.

City of Irvine. 2014. City of Irvine Zoning Map. Available at https://legacy.cityofirvine.org/civica/filebank/blobdload.asp?BlobID=13672.

California Department of Conservation (CDC). 2016. Orange County Important Farmland 2014. Available at ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2014/ora14.pdf.

3.3 Air Quality

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
3. AIR QUALITY — Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. **Would the project:**				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☐	☒
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☐	☒
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☒
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☒

Discussion

a) ***No Impact.*** The proposed project is located within the City of Irvine (City) in Orange County, California. The City is located in the South Coast Air Basin (Basin), which is within the jurisdiction of the South Coast Air Quality Management District (SCAQMD). The SCAQMD is the agency principally responsible for comprehensive air pollution control in the Basin. A significant air quality impact may occur if a proposed project is not consistent with the applicable Air Quality Management Plan (AQMP) or would in some way obstruct the implementation of the policies or obtainment of the goals of that plan. To that end, the SCAQMD, a regional agency, works directly with the Southern California Association of Governments (SCAG), county transportation commissions, local governments, and cooperates actively with all state and federal government agencies. The SCAQMD develops rules and regulations, establishes permitting requirements, inspects emissions sources, and enforces such measures though educational programs or fines, when necessary. SCAQMD and SCAG are responsible for preparing the AQMP, which addresses federal and state Clean Air Act (CAA) requirements. Pursuant to these requirements, the SCAQMD is required to reduce emissions of criteria pollutants for which the Basin is in non-attainment. The AQMP details goals, policies, and programs for improving air quality in the Basin.

The 2012 AQMP is currently the most recent plan for the Basin, and was adopted by the SCAQMD Governing Board on December 7, 2012. The 2012 AQMP was prepared to accommodate growth, to reduce the high levels of pollutants in the Basin, to meet federal and state air quality standards, and to minimize the fiscal impact that pollution control

measures have on the local economy. It builds on the approaches taken from the previous 2007 AQMP and sets forth a comprehensive and integrated program that will lead the Basin into compliance with the federal 24-hour PM2.5 air quality standard, and to provide an update to the Basin's commitments towards meeting the federal 8-hour ozone standards. SCAG, which is the regional metropolitan planning organization for the Southern California area, has established the assumptions for growth, in terms of demographic growth and associated air quality impacts, and these assumptions are utilized in SCAQMD's AQMP.

Since the forecasted growth in SCAQMD's AQMP for the Basin relies on SCAG's regional growth forecasts, and because SCAG's growth forecasts are based upon, among other things, land uses specified in city general plans, a project that is consistent with the land use designated in a city's general plan would also be consistent with the AQMP growth projections. As discussed in Chapter 2 (Project Description), the proposed project consists of modifying IRWD's existing Permit #20979 to conform the permit terms to existing operations. Implementation of the proposed project does not include construction activities and operation would be consistent with existing conditions. Thus, the proposed project would not generate additional air emission and would not result in any additional population or housing growth in the project area that has not been accounted for in the general plan of the City. Consequently, as no growth-inducing development or land use changes would occur under the proposed project, implementation of the proposed project would not conflict with or obstruct the implementation of SCAQMD's AQMP. No impact would occur.

b) ***No Impact.*** A proposed project may have a significant impact where project-related emissions would exceed federal, state, or regional standards or thresholds, or where project-related emissions would substantially contribute to an existing or projected air quality violation. The proposed project would not include any construction activities and as such, would not generate any additional air emissions. Operation of the proposed project would be consistent with existing conditions and would not generate additional air emissions. Therefore, implementation of the proposed project would not violate any air quality standard, and no impact would occur.

c) ***No Impact.*** With respect to air quality, a significant impact may occur if the proposed project would add a considerable cumulative contribution to federal or state non-attainment pollutants. As the Basin is currently classified as a state nonattainment area for ozone, PM_{10}, and $PM_{2.5}$, cumulative development consisting of the proposed project along with other reasonably foreseeable future projects in the Basin as a whole could violate an air quality standard or contribute to an existing or projected air quality violation. However, as stated above, the proposed project would not include any construction activities and as such, would not generate any additional air emissions. Operation of the proposed project would be consistent with existing conditions and would not generate additional air emissions. Therefore, implementation of the proposed project

would not result in a cumulatively considerable net increase of any criteria pollutant, and no impact would occur.

d) ***No Impact.*** A significant impact may occur if a project were to generate pollutant concentrations to a degree that would significantly affect sensitive receptors. Sensitive receptors are populations that are more susceptible to the effects of air pollution than are the population at large. The nearest sensitive receptors to the project area are residential uses across San Diego Creek to the east and southeast. However, as stated above, the proposed project would not include any construction activities, and operational activities would be consistent with existing conditions. Thus, the proposed project would not generate any additional air emissions and would not affect sensitive receptors within the project vicinity. No impacts to sensitive receptors would occur.

e) ***No Impact.*** A significant impact may occur if objectionable odors occur which would adversely impact sensitive receptors. According to the SCAQMD *CEQA Air Quality Handbook*, land uses associated with odor complaints typically include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, landfills, dairies, and fiberglass molding. As the proposed project does not involve construction activities, no odors associated with construction equipment would occur. Further, operation of the proposed project would be consistent with existing conditions, and no new odors would be generated with implementation of the proposed project. Thus, the proposed project would not result in objectionable odors, and no impact would occur.

References

South Coast Air Quality Management District (SCAQMD). 1993. CEQA Air Quality Analysis Handbook. Accessed June 2017. Available: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook

South Coast Air Quality Management District (SCAQMD). 2013. 2012 Air Quality Management Plan. February.

3.4 Biological Resources

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
4. BIOLOGICAL RESOURCES — Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☒
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

Discussion

The analysis provided below is based on the *Peters Canyon Channel Water Capture and Reuse Pipeline Project Biological Resources Technical Report* (ESA 2015). A biological reconnaissance survey was conducted by ESA biologists on April 1, 2014 for the Peters Canyon Channel Water Capture and Reuse Pipeline Project (Peters Canyon Project), which included surveys in the project area.

Adjacent to lower San Diego Creek, the IRWD San Joaquin Marsh is one of the largest inland freshwater marsh systems in southern California. The San Joaquin Marsh receives freshwater from a diversion from San Diego Creek located within Sediment Basin No. 2. The marsh is owned and operated by IRWD and is split roughly equally between more natural riparian wetlands to the north and engineered stormwater treatment wetlands to the south. Both the riparian and treatment wetlands were designed to provide habitats for a broad range of wildlife, but the treatment wetlands were also designed to reduce eutrophication in Newport Bay by removing pollutants – especially nitrogen – from San Diego Creek before they enter the Bay.

The IRWD San Joaquin Marsh is generally characterized by relatively undisturbed riparian and wetland plant communities, including southern black willow forest, southern black willow scrub, mule fat scrub, southern willow scrub, freshwater marsh, riparian herb, and open water habitats.

The project area supports a variety of common wildlife species typically found within the urban environments of Southern California; however, the presence of perennial water sources in Peters Canyon Channel and San Diego Creek, and associated tributaries provides foraging and wading habitat for shorebirds and waterfowl, and breeding habitat for several aquatic wildlife species.

a) ***No Impact***.

Special-Status Plants: **Table 3-1** lists the special-status plant species that have been recorded in the project area or have potential to occur within the project area. Four CNPS special-status plant species were determined to have a moderate or high potential to occur based on the presence of suitable habitat within the project area and adjacent San Diego Creek and previously recorded occurrences (ESA 2015). These special-status plant species include the southern tarplant (*Centromadia parryi* ssp. *australis*), mud nama (*Nama stenocarpum*), white rabbit-tobacco (*Psuedognaphalium leucocephalum*), and Coulter's Matilija poppy (*Romneya coulteri*). While four special-status plant species have a moderate to high potential to occur within the project area, the proposed project would not include construction, and operation of the proposed project would be consistent with existing conditions. Operation of the proposed project is not expected to affect water levels in the ponds in the IRWD San Joaquin Marsh beyond existing conditions, and thus the extent of riparian features and natural communities would not be affected. Therefore, no impacts would occur to special-status plant species.

TABLE 3-1
SPECIAL-STATUS PLANT SPECIES WITH POTENTIAL TO OCCUR

Species	Status[1] Federal/State/ CRPR	Habitat Requirements	Potential to Occur
Coulter's saltbush (*Atriplex coulteri*)	-- / -- / 1B.2	Found on alkaline or clay substrate within coastal bluff scrub, coastal dune, coastal scrub and valley and foothill grassland habitats. Blooms from March to October at elevations from 10 to 1509 feet (3 to 460 meters) amsl.	**Low**. Marginally suitable habitat exists within the project area. .
South Coast saltscale (*Atriplex pacifica*)	-- / -- / 1B.2	Found within chenopod scrub, coastal bluff and coastal scrub habitats. Blooms from March to October at elevations up to 459 feet (140 meters) amsl.	**Low**. Marginally suitable habitat exists within the project area.
Davidson's saltscale (*Atriplex serenana* var. *davidsonii*)	-- / -- / 1B.2	Found on alkaline substrate within coastal bluff scrub and coastal scrub habitats. Blooms from April to October at elevations from 33 to 656 feet (10 to 200 meters) amsl.	**Low**. Marginally suitable habitat exists within the project area.

Species	Status[1] Federal/State/ CRPR	Habitat Requirements	Potential to Occur
thread-leaved brodiaea (*Brodiaea filifolia*)	FT / SE / 1B.1	Found on clay substrate within chaparral, cismontane woodland, coastal scrub, and valley and foothill habitats. Microhabitats for the species include playas and vernal pools. Blooms from March to June at elevations from 82 to 3,675 feet (25 to 1,120 meters) amsl.	**Unlikely.** Suitable habitat for this species is not present within the areas potentially affected by the proposed project.
southern tarplant (*Centromadia parryi* ssp. *australis*)	-- / -- / 1B.1	Found in the margins of marshes and swamps, vernally mesic valley and foothill grasslands, and vernal pool habitats. This species is commonly found in disturbed areas, in relatively close proximity to a seasonal or perennial water source. Blooms from May to November at elevations up to 1,394 feet (425 meters) amsl.	**High**. Suitable habitat is present within the project area. Three occurrences of this species have been previously reported immediately adjacent to Peters Canyon Channel and San Diego Creek.
salt marsh bird's-beak (*Chloropyron maritimum* ssp. *maritimum*)	FE / SE / 1B.2	Found within coastal dune, salt marsh, and swamp habitats. Blooms from May to October, at elevations up to 4,593 feet (1,400 meters).	**Low**. Marginally suitable habitat exists within the project area.
many-stemmed dudleya (*Dudleya multicaulis*)	-- / -- / 1B.2	Found on clay substrate within chaparral, coastal scrub and valley and grassland habitats. Blooms from April to July at elevations from 49 to 2,592 feet (15 to 790 meters) amsl.	**Unlikely**. Suitable habitat for the species is not present within the areas potentially affected by the proposed project.
Laguna beach liveforever (*Dudleya stolonifera*)	FT / ST / 1B.1	Found on rocky substrate within chaparral, cismontane woodland, coastal scrub and valley and grassland habitats. Blooms from May to July at elevations from 33 to 853 feet (10 to 260 meters) amsl.	**Unlikely**. Suitable habitat for the species is not present within the areas potentially affected by the proposed project.
Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*	-- / -- / 1B.1	Found in wetland habitats. Microhabitats include playas and vernal pools. Blooms from February to June at elevations up to 4,002 feet (1,220 meters) amsl.	**Unlikely**. Suitable habitat for the species is not present within the areas potentially affected by the proposed project.
Robinson's pepper-grass (*Lepidium virginicum* var. *robinsonii*)	-- / -- / 1B.2	Found within chaparral and coastal scrub habitats. Blooms from January to July at elevations up to 2,903 feet (885 meters) amsl.	**Unlikely**. Suitable habitat for the species is not present within the areas potentially affected by the proposed project.
mud nama (*Nama stenocarpum*)	-- / -- / 2B.2	Found along freshwater lake margins, riverbanks, marshes and swamps. Blooms from January to July at elevations from 16 to 1,640 feet (5 to 500 meters) amsl.	**High**. Suitable habitat is present within the project area. One occurrence of this species reported that two individuals were observed within the vicinity of the Peters Canyon Project site in 1998.
white rabbit-tobacco (*Psuedognaphalium leucocephalum*)	-- / -- / 2B.2	Found within riparian woodland, coastal scrub and chaparral habitats. Blooms from August to November at elevations up to 4,593 feet (1,400 meters) amsl.	**Moderate**. Suitable habitat is present within the project area. Species was not observed during surveys.
Coulter's Matilija poppy (*Romneya coulteri*)	-- / -- / 4.2	Found within chaparral and coastal scrub habitats. Blooms from March to July at elevations from 66 to 3,937 feet (20 to 1,200 meters) amsl.	**High.** Species was observed within vicinity of the Peters Canyon Project site during surveys, however none were observed within the project area.

Species	Status[1] Federal/State/ CRPR	Habitat Requirements	Potential to Occur
San Bernardino aster (*Symphotrichum defoliatum*)	-- / -- / 1B.2	Found near ditches, streams and springs within cismontane woodland, coastal scrub, lower montane coniferous forest, meadows and seeps, marshes and swamps, and valley and foothill grassland. Blooms from July to November at elevations up to 6,693 feet (2,040 meters) amsl.	**Low**. Marginally suitable habitat exists within the project area.
big-leaved crownbeard (*Verbesina dissita*)	FT / ST / 1B.1	Found within chaparral and coastal scrub habitats. Blooms from April to July at elevations from 148 to 673 feet (45 to 205 meters) amsl.	**Unlikely**. Suitable habitat for the species is not present within the areas potentially affected by the proposed project.

[1] Description of status codes:

FE = Listed as endangered under the FESA

FT = Listed as threatened under the FESA

ST= Listed as threatened under the CESA

SE = Listed as endangered under the CESA

CRPR = California Rare Plant Rank (CNPS 2014)

CRPR 1B.1 = Seriously threatened in California and elsewhere

CRPR 1B.2 = Fairly threatened in California and elsewhere

CRPR 2B.2 = Fairly threatened in California, but more common elsewhere

CRPR 4.2 = Fairly threatened in California, placed on a watch-list due to limited distribution throughout its range

SOURCE: ESA 2015

Special-Status Wildlife: **Table 3-2** lists special-status wildlife species identified as having the potential to occur within the project area and immediate vicinity. Ten species have been determined to have a moderate or high potential to occur in the project area: western pond turtle (*Emys marmorata*), western burrowing owl (*Athene cunicularia*), white-tailed kite (*Elanus leucurus*), southwestern willow flycatcher (*Empidonax traillii extimus*), California horned lark (*Eremophila alpestris actia*), yellow breasted chat (*Icteria virens*), California black rail (*Laterallus jamaicensis coturniculus*), least Bell's vireo (*Vireo bellii pusillus*), Mexican longtongued bat (*Choeronycteris mexicana*), and, western mastiff bat (*Eumops perotis californicus*). While these special-status wildlife species have a moderate to high potential to occur within the project area, the proposed project would not include any construction activities. Operation of the proposed project would be consistent with existing conditions. Operation of the proposed project is not expected to affect water levels in the ponds in the IRWD San Joaquin Marsh beyond existing conditions, and thus the extent of riparian features and natural communities that would provide habitat to wildlife species would not be affected. Therefore, no impacts would occur to special-status wildlife species.

TABLE 3-2
SPECIAL-STATUS WILDLIFE SPECIES WITH POTENTIAL TO OCCUR

Species	Status[1] Federal/State	Habitat Requirements	Potential to Occur
Amphibians			
Coast Range newt (*Taricha torosa*)	-- / SSC	Known to occur in cismontane forest or valley and foothill grassland habitats. Microhabitats include moist areas, commonly near drainages and seeps.	**Low**. Marginal microhabitat is present in small pockets in the vicinity of the project area; however the large-scale habitat requirements are not met.
Crustaceans			
San Diego fairy shrimp (*Branchinecta sandiegonensis*)	FE / --	Known to occur in areas of tectonic swales/earth slump basins in grassland, chaparral and coastal sage scrub. Inhabit seasonally astatic pools filled by winter/spring rains. Hatch in warm water later in the season.	**Unlikely**. Suitable habitat for the species is not present in the project area.
Riverside fairy shrimp (*Streptocephalus woottoni*)	FE / --	Known to occur in areas of tectonic swales/earth slump basins in grassland, chaparral and coastal sage scrub. Inhabit seasonally astatic pools filled by winter/spring rains. Hatch in warm water later in the season.	**Unlikely**. Suitable habitat for the species is not present in the project area.
Gastropods			
mimic tryonia (*Tryonia imitator*)	-- / --	Known to occur in brackish wetland environments.	**Unlikely**. Suitable habitat for the species is not present in the project area.
Reptiles			
orangethroat whiptail (*Aspidoscelis hyperythra*)	-- / SSC	Species requires intact habitat within chaparral, cismontane woodland and coastal scrub plant communities.	**Unlikely**. Suitable habitat for the species is not present in the project area.
red-diamond rattlesnake (*Crotalus ruber*)	-- / SSC	Known to occur in chaparral, Mojavean desert scrub and Sonoran desert scrub communities.	**Unlikely**. Suitable habitat for the species is not present in the project area.
western pond turtle (*Emys marmorata*)	-- / SSC	Known to occur in slow-moving permanent or intermittent streams, ponds, small lakes, reservoirs with emergent basking sites; adjacent uplands used during winter.	**High**. Suitable habitat for this species is present in the project area. In addition, this species has been observed within tributaries converging with Peters Canyon Channel. No western pond turtles were observed during the reconnaissance survey.

Species	Status[1] Federal/State	Habitat Requirements	Potential to Occur
Coast horned lizard (*Phrynosoma blainvillii*)	-- / SSC	Known to occur in sandy washes with within chaparral or coastal scrub habitat. Requires loose soil for burial and abundant supply of harvester ants.	**Unlikely**. Suitable habitat for the species is not present in the project area.
Birds			
Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*)	-- / WL	Known to frequent relatively steep, often rocky hillsides with grass and forb species. Resident in southern California coastal sage scrub and mixed chaparral.	**Unlikely**. Suitable habitat for the species is not present in the project area.
grasshopper sparrow (*Ammodramus savannarum*)	-- / SSC	Known to occur in valley and foothill grassland habitats.	**Low.** Disturbed, marginal habitat for this species is present in the vicinity of the San Joaquin Marsh. One recorded occurrence of the species within upland habitat near the San Joaquin Marsh. Species was not observed during the reconnaissance survey.
great blue heron (*Ardea herodias*)	-- / --	Known to occur in and around freshwater and brackish water bodies.	**Present**. Suitable foraging habitat is present along Peters Canyon Channel and nesting habitat exists adjacent to the channel in ornamental trees. This species was also seen foraging in the project area during surveys.
western burrowing owl (*Athene cunicularia*)	-- / SSC	Known to occur within open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. A subterranean nester dependent upon burrowing mammals, particularly the California ground squirrel.	**Moderate**. Marginal habitat for this species is present in the project area. No sign of this species observed during surveys.
coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*)	BCC / SSC	Known to occur in coastal scrub habitats; often found in habitats with *Opuntia* cactus.	**Low.** Suitable habitat may exist in the upland portions of the San Joaquin Marsh and along the banks of San Diego Creek
white-tailed kite (*Elanus leucurus*)	-- / FP	Rolling foothills and valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland.	**Moderate**. Species has been recorded near the San Joaquin Marsh. Not observed during the reconnaissance survey.
southwestern willow flycatcher (*Empidonax traillii extimus*)	FE / SE	Known to breed in southern California in willow-dominated riparian habitat.	**Moderate**. **S**uitable habitat is present in the project area.
California horned lark (*Eremophila alpestris actia*)	-- / WL	Known to occur within the vicinity of marine intertidal and splash zone communities, meadows and seeps.	**Moderate**. Marginal nesting and foraging habitat is present in the project area.

Species	Status[1] Federal/State	Habitat Requirements	Potential to Occur
yellow-breasted chat (*Icteria virens*)	-- / SSC	Known to occur within riparian forest, scrub and woodland habitats.	**High**. Suitable habitat is present within the San Joaquin Marsh and downstream portions of San Diego Creek. Additionally, the species has been recorded in the project area.
California black rail (*Laterallus jamaicensis coturniculus*)	BCC / ST, FP	Known to occur in brackish and freshwater marshes.	**High**. High quality habitat for the species exists within portions of the San Joaquin Marsh. The species has been previously recorded within Upper Newport Bay.
Belding's savannah sparrow (*Passerculus sandwichensis beldingi*)	-- / SE	Known to occur primarily along the Southern California coast within brackish marsh habitats.	**Low**. The species is not expected to nest in the project area.
coastal California gnatcatcher (*Polioptila californica californica*)	FT / SSC	Species is an obligate, permanent resident of coastal sage scrub in southern California. Low, coastal sage scrub in arid washes, on mesas and slopes.	**Low.** Suitable habitat may exist in the upland portions of the San Joaquin Marsh and along the banks of San Diego Creek.
light-footed clapper rail (*Rallus longirostris levipes*)	FE / SE, FP	Known to occur within Coastal California brackish marshes.	**Low**. While the species has been previously recorded within Upper Newport Bay, the marsh habitat of the project area is freshwater.
California least tern (*Sternula antillarum browni*)	FE / SE, FP	Known to occur in alkali playas and coastal dune and beach habitats.	**Present**. Suitable habitat for foraging for this species is present at the San Diego Creek sediment basins.
least Bell's vireo *(Vireo bellii pusillus*)	FE / SE	Known to occur in riparian forest, scrub, and woodland habitats. Nests primarily in willow riparian habitats.	**High**. Suitable habitat is present within the San Joaquin Marsh and downstream portions of San Diego Creek. Several previously recorded occurrences of the species were identified in the vicinity of the project area.
Mammals			
Mexican long-tongued bat (*Choeronycteris mexicana*)	-- / SSC	Typically restricted to pinyon-juniper woodland, riparian scrub and Sonoran thorn woodland habitats. Not generally associated with concrete bridges.	**Moderate**. Suitable habitat is present within the San Joaquin Marsh and downstream portions of San Diego Creek.
western mastiff bat (*Eumops perotis californicus*)	-- / SSC	Known to occur throughout California and occupies a wide variety of habitats including grasslands, shrublands, cismontane woodland's; most common in open, dry habitats with rocky areas for roosting. Not generally associated with concrete bridges.	**Moderate**. Suitable habitat is present within the San Joaquin Marsh and downstream portions of San Diego Creek. Species has been previously recorded near the San Joaquin Marsh.

Species	Status[1] Federal/State	Habitat Requirements	Potential to Occur
Pacific pocket mouse (*Perognathus longimembris pacificus*)	FE / SSC	Known to occur in coastal scrub habitats.	**Low**. Suitable habitat may exist in the upland portions of the San Joaquin Marsh and along the banks of San Diego Creek.
Southern California saltmarsh shrew (*Sorex ornatus salicornicus*)	-- / SSC	Known to occur in salt marsh habitat within Southern California.	**Low**. The marsh habitat of the project area is freshwater.

[1] Description of status codes:

FE = Listed as endangered under the FESA

FT = Listed as threatened under the FESA

BCC = Bird of Conservation Concern

WL= Watch listed

SE = Listed as endangered under the CESA

SSC = Species of Special Concern

FP = Listed as fully protected under CDFG code

SOURCE: ESA 2015

b) ***No Impact.*** The City of Irvine General Plan includes provisions designed to protect riparian and water resources within Irvine (City of Irvine 2015). Riparian and marsh habitats identified as California Department of Fish and Wildlife (CDFW) Sensitive Natural Communities, including Southern Willow Scrub, Southern Riparian Scrub, Southern Cottonwood Riparian Forest, and Cattail Marsh, were determined to have the potential to occur within the IRWD San Joaquin Marsh. However, the proposed project would not include any construction activities. Operation of the proposed project would have water levels consistent with project area's existing conditions. Therefore, the extent of riparian features and natural communities such as Southern Willow Scrub, Southern Riparian Scrub, Southern Cottonwood Riparian Forest, and Cattail Marsh would not be affected.

c) ***No Impact.*** The City of Irvine General Plan includes provisions designed to protect riparian and water resources within the Irvine (City of Irvine 2015). Riparian and marsh habitats identified as CDFW Sensitive Natural Communities, including southern willow scrub, southern riparian scrub, southern cottonwood riparian forest, and cattail marsh, were determined to have the potential to occur within the IRWD San Joaquin Marsh. However, the proposed project would not include any construction activities. Operation of the proposed project would have water levels consistent with project area's existing conditions. Therefore, the extent of riparian features and natural communities such as southern willow scrub, southern riparian scrub, southern cottonwood riparian forest, and cattail marsh would not be affected.

d) ***No Impact.*** The IRWD San Joaquin Marsh is a recognized stopover location for migratory birds travelling along the Pacific Flyway (ESA 2015). Many of the birds that utilize the Marsh could wade and forage within Peters Canyon Channel and San Diego Creek (and associated tributaries) when water is present. San Diego Creek and Peters

Canyon Channel can be considered movement corridors for these wading bird species, as well as many other common or rare species dependent on water or moisture, such as fish species, amphibians, and certain reptiles (e.g., pond turtles). As described above, no construction activities would occur within the project area. Operation of the proposed project would be consistent with existing conditions. Thus, the ability of the marsh to function as a migratory stopover would be maintained with implementation of the proposed project, and no impacts to wildlife movement would occur.

e) ***No Impact.*** The City of Irvine General Plan and Urban Forestry Ordinance (Irvine Municipal Code, Title 5, Division 7, Chapter 4) calls for the protection of urban forest resources, including eucalyptus trees (City of Irvine 2012). While several trees are located throughout the project area, no construction activities would occur at the project area. With implementation of the proposed project, operation would be consistent with the existing setting. Therefore, the proposed project would not conflict with any local policies or ordinances protecting biological resources including trees. No impact would occur.

f) ***No Impact.*** Portions of the IRWD San Joaquin Marsh are within the Central and Coastal Orange County Natural Community Conservation Planning (NCCP) / Habitat Conservation Plan (HCP), mapped as Non-reserve Open Space (City of Irvine 2012). Specifically, special-status species, including Coulter's Matilija poppy and least Bell's vireo, and plant communities, including riparian and coastal marsh habitats are covered under the NCCP/HCP. As discussed above, no construction activities would occur within the project area. Operation of the proposed project would be consistent with existing conditions. As no direct or indirect impacts would occur with proposed project implementation, the proposed project would not conflict with the provisions of the Orange County NCCP/HCP. Therefore, no impacts would occur

References

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Environmental Science Associates (ESA). 2015. Peters Canyon Channel Water Capture and Reuse Pipeline Project Biological Resources Technical Report, Volume 2. Revised April 2015.

3.5 Cultural Resources

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
5. CULTURAL RESOURCES — Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☐	☐	☒
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☒

Discussion

The analysis provided below is based on the following technical reports**:** *Archaeological Survey Report for the Peters Canyon Channel Water Capture and Reuse Pipeline Project, Irvine and Tustin, Orange County, California* (ESA 2014) and *Paleontological Resource Report: Irvine Ranch Water District Peters Canyon Channel Water Capture and Reuse Pipeline, Cities of Tustin and Irvine, California* (Paleo Solutions 2014). A half-mile search radius was used in the records search for these technical reports, which covers the proposed project area. Therefore, these technical reports provide general information about the presence of cultural resources within the vicinity of the project area.

a) ***No Impact.*** The project area consists of the IRWD San Joaquin Wildlife Sanctuary, which includes the San Joaquin Marsh, Carlson Marsh, and riparian mitigation areas, and the UCNRS Freshwater Marsh Reserve, as shown in Figure 2-2. There are no structures of any type built on the site and there are no known historical resources on the project area (ESA 2014). Further, the proposed project does not include construction activities and would not result in physical changes to the project area. Operation of the proposed project would be consistent with existing conditions. Therefore, the proposed project would not cause a substantial adverse change in the significance of a historical resource, and no impact would occur.

b) ***No Impact.*** The *Archaeological Survey Report for the Peters Canyon Channel Water Capture and Reuse Pipeline Project* identified that 77 cultural resources studies had previously been conducted within the vicinity of the project area and indicated that seven cultural resources have been recorded (ESA 2014). As stated above, the proposed project does not include ground-disturbing or any construction activities and would therefore have no potential to encounter or damage known or unknown buried archaeological resources. Operation of the proposed project would be consistent with existing operating conditions. As such, implementation of the proposed project would have no impact on archaeological resources.

c) ***No Impact.*** The *Paleontological Resource Report: Irvine Ranch Water District Peters Canyon Channel Water Capture and Reuse Pipeline* stated that there are no documented fossil localities within one mile of the project area. Since the proposed project does not include ground-disturbing or any construction activities, the proposed project would therefore have no potential to encounter or damage unknown buried paleontological resources. Operation of the proposed project would be consistent with existing operating conditions. As such, implementation of the proposed project would have no impact on paleontological resources.

d) ***No Impact.*** No human remains are known to exist within or adjacent to the project area. It is unlikely that the proposed project would disturb unknown human remains since the proposed project does not include ground-disturbing or any construction activities. As such, there would be no potential to inadvertently discover buried human remains. Operational activities of the proposed project would be consistent with existing operating conditions. Thus, the proposed project would not impact buried human remains.

References

Environmental Science Associates (ESA). 2014. Peters Canyon Channel Water Capture and Reuse Pipeline Project Cultural Resources Technical Reports. July.

Paleo Solutions. 2014. Paleontological Resources Report for Peters Canyon Channel Water Capture and Reuse Pipeline Project. March 27.

3.6 Geology, Soils, and Seismicity

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
6. GEOLOGY, SOILS, AND SEISMICITY — Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to Division of Mines and Geology Special Publication 42.)	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☒
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☐	☒
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒

Discussion

a.i) ***No Impact.*** The project area is located approximately two miles northeast of a section of the Newport-Inglewood Fault. No known active faults cross the project area, and the project area is not located within or immediately adjacent to an Alquist-Priolo Earthquake Fault Zone, which are regulatory zones that encompass surface traces of active faults that have a potential for future surface fault rupture (City of Irvine 2012). Therefore, the project area would not be subject to surface fault rupture. There would be no impact.

a.ii) ***No Impact.*** The City of Irvine is located within Uniform Building Code Seismic Zone 4, which represents the highest seismic intensity in the United States. The project area is located in Seismic Response Area (SRA) 1, defined by the City of Irvine General Plan as an area with soft or loose soils and high groundwater, indicating a greater potential for liquefaction than the other seismic response areas (City of Irvine 2015). Therefore, the project area would be likely subject to ground shaking. However, the project area is made up of marshland, and does not include any inhabitable buildings or structures. The

proposed project would not include any construction activities, and operational activities would be consistent with existing conditions. Therefore, while seismic shaking could occur within the project area, the proposed project would not change the existing potential for ground shaking to occur in the project area, and no inhabitable structures or people would be at risk of loss, injury, or death. There would be no impacts related to seismic shaking.

a.iii) ***No Impact.*** The proposed project is located in a liquefaction zone as identified by the California Geological Survey, and is located within the City of Irvine designated SRA 1, identified as an area with a higher-than-average risk of liquefaction (City of Irvine 2015, CDC 2001). As discussed above, the project area is made up of marshland, and does not include any inhabitable buildings or structures. The proposed project would not include any construction activities, and operational activities would be consistent with existing conditions. Therefore, while liquefaction could occur within the project area, the proposed project would not change the existing potential for liquefaction to occur in the project area, and no inhabitable structures or people would be at risk to loss, injury, or death. There would be no impacts related to liquefaction.

a.iv) ***No Impact.*** Landslides are mass movements of the ground that include rock falls, relatively shallow slumping and sliding of soil, and deeper rotational or transitional movement of soil or rock. The project area is not located on a hill or adjacent to a hillside. In addition, the proposed project is not located within the City of Irvine SRA 4 or SRA 5, which are the areas most susceptible to slope instability and landslides (City of Irvine 2012). The project area is generally flat, and implementation of the proposed project would not result conditions that could create landslides. As a result, implementation of the proposed project would not result in impacts related to landslides.

b) ***No Impact.*** The project area is comprised of marshland. The proposed project would not include any construction activities, and operational activities would be consistent with existing conditions. Therefore, implementation of the proposed project would not result in substantial soil erosion or the loss of topsoil. Therefore, no impacts would occur.

c) ***No Impact.*** Refer to Response 3.6(a.iii) and (a.iv), regarding liquefaction and landslides. Lateral spreading is associated with landslides on a gentle slope; as stated previously, the proposed project is expected to have no impacts related to landslides and would therefore have no impacts related to lateral spreading. The term “collapse” is most commonly linked to sinkholes in geologic context. The project area is not considered an area prone to collapse sinkholes (USGS 2016). Therefore, there would be no impacts related to unstable soil.

d) ***No Impact.*** Expansive soils are soils that exhibit moderate to high shrink/swell potential and may cause damage to components, including underground utilities, pipelines, foundations, and infrastructure. The project area is composed mainly of Thapto-Histic Fluvaquents, Omni clay, and Chino silty clay loam (NRCS 2017). Soils containing clay tend to have a high expansion potential. As discussed above, the project area is made up

of marshland, and does not include any inhabitable buildings or structures. The proposed project would not include any construction activities, and operational activities would be consistent with existing conditions. Therefore, while expansive soils could occur within the project area, the proposed project would not change the existing potential for expansive soils to affect inhabitable structures or people. There would be no potential impacts related to risk of loss, injury, or death associated with expansive soils.

e) ***No Impact.*** The proposed project consists of marshland; no septic systems are proposed as part of the proposed project. There would be no impact regarding soils incapable of supporting septic systems.

References

California Department of Conservation (CDC). 2001. Seismic Hazard Zones, Tustin Quadrangle. January 17, 2001.

City of Irvine. 2012. City of Irvine CEQA Manual, Volume 2: Technical Guidelines. Available at https://legacy.cityofirvine.org/civica/filebank/blobdload.asp?BlobID=21575.

City of Irvine. 2015. City of Irvine General Plan. Available at http://www.cityofirvine.org/community-development/current-general-plan.

Natural Resources Conservation Service (NRCS). 2017. Web Soil Survey. Available at https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.

United States Geological Survey (USGS). 2016. Sinkholes. Available at https://water.usgs.gov/edu/sinkholes.html.

3.7 Greenhouse Gas Emissions

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
7. GREENHOUSE GAS EMISSIONS — Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☐	☒
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒

Discussion

Gases that trap heat in the atmosphere are referred to as greenhouse gases (GHGs) because they capture heat radiated from the sun as it is reflected back into the atmosphere, much like a greenhouse does. The accumulation of GHGs has been implicated as a driving force for global climate change. Definitions of climate change vary between and across regulatory authorities and the scientific community, but in general can be described as the changing of the earth's climate caused by natural fluctuations and anthropogenic activities, which alter the composition of the global atmosphere.

Prominent GHGs contributing to the greenhouse effect are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), chlorofluorocarbons (CFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Carbon dioxide is the "reference gas" for climate change, meaning that emissions of GHGs are typically reported in "carbon dioxide-equivalent" (CO_2e) measures. There is international scientific consensus that human-caused increases in GHGs have and will continue to contribute to global warming, although there is uncertainty concerning the magnitude and rate of the warming. Potential global warming impacts in California may include, but are not limited to, loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, an increase in large forest fires, and more drought years. Secondary effects are likely to include global rise in sea level, impacts to agriculture, changes in disease vectors, and changes in habitat and biodiversity.

In 2005, in recognition of California's vulnerability to the effects of climate change, Governor Schwarzenegger established Executive Order S-3-05, which sets forth a series of target dates by which statewide emission of GHG would be progressively reduced, as follows:

- By 2010, reduce GHG emissions to 2000 levels;
- By 2020, reduce GHG emissions to 1990 levels; and
- By 2050, reduce GHG emissions to 80 percent below 1990 levels.

In 2006, California passed the California Global Warming Solutions Act of 2006 (Assembly Bill No. 32; California Health and Safety Code Division 25.5, Sections 38500, et seq., or AB 32), which requires CARB to design and implement emission limits, regulations, and other measures,

such that feasible and cost-effective statewide GHG emissions are reduced to 1990 levels by 2020.

On March 18, 2010, the California Office of Planning and Research (OPR) submitted amendments to the *CEQA Guidelines* for GHG emissions, as required by Public Resources Code section 21083.05. These *CEQA Guideline* amendments provide guidance to public agencies regarding the analysis and mitigation of the effects of GHG emissions in draft CEQA documents. The amendments are relatively modest changes to various portions of the existing *CEQA Guidelines*.

a) ***No Impact.*** The proposed project would not involve construction activities, and operational activities of the proposed project would be consistent with existing conditions. Thus, implementation of the proposed project would not generate any additional GHG emissions, and no impact would occur.

b) ***No Impact.*** The proposed project would not generate any additional GHG emissions because the proposed project doesn't include construction activities and operation would be consistent as existing conditions. In addition, since the proposed project only involves modifying IRWD's existing permit, implementation of the proposed project would not result in, or induce, growth in the project area that has not been accounted for by the City of Irvine. Consequently, no growth-inducing development or land use that would generate GHG emissions would occur under the proposed project. Thus, the proposed project would not conflict with the goals from any adopted plans goals related to reducing GHG emissions; no impact would occur.

References

California Air Pollution Control Officers Association (CAPCOA). 2008. CEQA & Climate Change Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act.

3.8 Hazards and Hazardous Materials

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
8. HAZARDS AND HAZARDOUS MATERIALS — Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☒
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☐	☒
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

Discussion

a/b) ***No Impact.*** The proposed project would not include any construction activities, and operation of the proposed project would not involve the routine transport, use, or disposal of hazardous materials. The purpose of the proposed project is to conform the terms of the Permit 20979 to existing San Joaquin Marsh operations. Therefore, no hazardous materials would be transported to and from the project area. Thus, the proposed project would not create a hazard through the routine transport, use, or disposal of hazardous materials, or through accidental release. No impacts would occur.

c) ***No Impact.*** The project area is located adjacent to and east of the University of California, Irvine North Campus and is located approximately 0.4 mile west of Michelson KinderCare. However, the project area consists of marshland which does not emit hazardous emissions. With implementation of the proposed project, no construction

activities would occur, and operation would be consistent with existing conditions. Therefore, the proposed project would not emit hazardous emissions or handle hazardous materials within one-quarter mile of a school. No impact would occur.

d) ***No Impact.*** ESA performed a regulatory agency database search for the project area using the California State Water Resources Control Board (SWRCB) GeoTracker and the California Department of Toxic Substances Control (DTSC) Envirostor databases (SWRCB 2015, DTSC 2017) in addition to review of other hazardous site lists maintained by the State (Cal EPA 2017). The project area is listed as a Leaking Underground Storage Tank (LUST) Cleanup Site. However, the site has been listed as completed case closed as of 2000. There are three LUST sites surrounding the project area: Michelson Water Recycling Plant located adjacent to the project area (listed as case closed since 2004); Fluor Technology Inc. located north of the project area (listed as case closed since 1994); and Prudential located west of Carlson Avenue (listed as open with verification monitoring since 2004). In addition, the Rancho San Joaquin Golf Course, located east of San Diego Creek, is listed as a Cleanup Program Site, which is listed as case closed since 2013. While the proposed project is located on a listed hazardous materials site, the case has been closed since 2000; implementation of the proposed project would not create a significant hazard to the public or the environment. Therefore, no impact would occur.

e) ***No Impact.*** The project area is located approximately one mile east of the John Wayne Airport. However, the project area is not within the airport's Impact Zones, as specified by the Airport Environs Land Use Plan (AELUP) for John Wayne Airport (ALUC 2008). Further, the proposed project consists of marshland used for wildlife and water quality enhancement and would not increase the amount of people living or working in the vicinity of the airport. The proposed project would therefore not result in a safety hazard for people living or working in the vicinity of the airport. No impact would occur.

f) ***No Impact.*** There are no private airstrips in the vicinity of the proposed project. Further, the proposed project consists of marshland used for wildlife and water quality enhancement and would not increase the amount of people living or working in the area. The proposed project would therefore not result in a safety hazard for people living or working in the vicinity. No impact would occur.

g) ***No Impact.*** The City of Irvine has a Natural Hazards Mitigation Plan that addresses a variety of ways to lessen the impact of disasters locally (City of Irvine 2017). In addition, the City of Irvine participates in the Federal Emergency Management Agency's (FEMA) Community Emergency Response Training (CERT) program, a series of classes that educate people about disaster preparedness for hazards that may impact their area and trains them in disaster response skills (City of Irvine 2017). The proposed project would not interfere with the goals of the Irvine Natural Hazards Mitigation Plan nor with implementation of CERT. No construction activities would occur, and operation of the

proposed project would be consistent with existing conditions. Therefore, no impacts would occur in regards to impairing an emergency response plan.

h) ***No Impact.*** The project area is located in an area of Irvine that is relatively urbanized. The project area is not located within a City of Irvine-designated fire hazard area (City of Irvine 2015), and the entire project area is not in a CAL FIRE very high fire hazard severity zone (CAL FIRE 2011). The proposed project would not include flammable structures such as residences that could be threatened from wildfires nor would the proposed project generate a large number of people that could be threatened by a wildfire. Therefore, no impacts would occur with regard to wildfire.

References

Airport Land Use Commission (ALUC). 2008. Airport Environs Land Use Plan for John Wayne Airport. April 17. Available at http://www.ocair.com/commissions/aluc/docs/JWA_AELUP-April-17-2008.pdf.

California Department of Forestry and Fire Protection (CAL FIRE). 2011. Orange County Very High Fire Hazard Severity Zones in LRA. Available at http://frap.fire.ca.gov/webdata/maps/orange/fhszl_map.30.pdf.

California Department of Toxic Substances Control (DTSC). EnviroStor Database. Available at https://www.envirostor.dtsc.ca.gov/public/.

California Environmental Protection Agency (Cal EPA). 2017. Cortese List Data Resources. Available at http://calepa.ca.gov/sitecleanup/corteselist/.

City of Irvine. 2015. City of Irvine General Plan. Available at http://www.cityofirvine.org/community-development/current-general-plan

City of Irvine. 2017. City of Irvine Emergency Preparedness. Available at http://legacy.cityofirvine.org/services/categoryqna.asp?id=186.

State Water Resources Control Board (SWRCB). 2015. GeoTracker. Irvine Ranch Water District, 3512 Michelson Irvine CA.

3.9 Hydrology and Water Quality

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
9. HYDROLOGY AND WATER QUALITY — Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☐	☒
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of a site or area through the alteration of the course of a stream or river, or by other means, in a manner that would result in substantial erosion or siltation on- or off-site?	☐	☐	☐	☒
d) Substantially alter the existing drainage pattern of a site or area through the alteration of the course of a stream or river, or by other means, substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?	☐	☐	☐	☒
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☒
f) Otherwise substantially degrade water quality?	☐	☐	☐	☒
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures that would impede or redirect flood flows?	☐	☐	☐	☒
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☒
j) Expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒

Discussion

a/f) ***No Impact***. The project area consists of the IRWD San Joaquin Wildlife Sanctuary, which includes the San Joaquin Marsh, Carlson Marsh, and riparian mitigation areas, and the UCNRS Freshwater Marsh Reserve, as shown in Figure 2-2. The project area is located within the San Diego Creek/Newport Bay watershed, which drains to Newport Bay. San Diego Creek and Newport Bay have been designated as water quality limited by the State of California as water quality has been affected by excessive sediment and nutrient levels (primarily nitrate from fertilizers), elevated levels of pesticides, fecal

coliform bacteria, selenium from natural sources, and heavy metals (Stetson 2017). Currently, the project area plays an integral role in the implementation plan for meeting water quality objectives in the Santa Ana Regional Water Quality Control Board's (RWQCB) Basin Plan, is a critical component of the MS4 Permit Best Management Practice (BMP) requirement, and is the model upon which the IRWD Natural Treatment System (NTS) Plan is based (Stetson 2017). The project area also functions as a nitrogen offset for the dewatering discharge from IRWD's Michelson Water Recycling Plant (MWRP), as nutrients and other constituents are removed through natural processes as the water moves through the project area (Stetson 2017).

The proposed project consists of IRWD modifying its current SWRCB Permit 20979 and does not include any physical changes to the landscape with the potential to impact water quality, such as construction activities. Since no physical changes or construction activities are proposed, there would be no potential construction-related impacts to water quality.

Operation of the proposed project would be consistent with existing conditions and would not discharge additional water with the potential for violating water quality standards or waste discharge requirements. Further, implementation of the proposed project would continue to provide beneficial impacts to water quality, as the diversion and cycling of water through the San Joaquin Marsh complex provides pollutant removal/transformation via a number of physical (e.g., adsorption, sedimentation) and biogeochemical (e.g., nitrogen cycle, carbon cycle) processes. The proposed project would continue to provide water quality treatment, which benefits the water quality of San Diego Creek and Newport Bay once wetland effluent is discharged back to the creek. Therefore, implementation of the proposed project would not violate any water quality standards or waste discharge requirements, and no impacts would occur.

b) ***No Impact***. The project area is located within the San Diego Creek/Newport Bay watershed, which overlies a groundwater basin designated as "Coastal Plain of Orange County" by the Department of Water Resources (Stetson 2017). This groundwater basin also underlies the lower Santa Ana River and encompasses approximately 350 square miles (Stetson 2017). The existing water sources for the project area include diverted water from San Diego Creek and dewatered groundwater and recycled water from IRWD's MWRP (Stetson 2017); the sources and volumes of water used would not change under the proposed project, and no changes to existing groundwater pumping operations are proposed. Further, no construction activities would occur with implementation of the proposed project and operation would be consistent with existing conditions. The proposed project would not introduce new impervious surfaces, which could affect groundwater recharge. Therefore, no impacts related to groundwater recharge or supplies would occur.

c) ***No Impact***. Currently, IRWD is operating under the existing SWRCB Permit 20979, which allows for IRWD to divert an annual maximum of 3,600 AFY from San Diego Creek and authorizes a maximum diversion rate of 5 cfs between January 1 and December 31 of each year. Implementation of the proposed project would modify the existing SWRCB Permit 20979 to increase the Place of Use to fully encompass the entirety of IRWD's San Joaquin Marsh and Wildlife Sanctuary east of Campus Drive and the UCNRS Freshwater Marsh Reserve west of Campus Drive, as well as increase the Rate of Diversion from 5 cfs to 13.3 cfs, the latter being the maximum rate of diversion currently implemented under existing operations. However, implementation of these permit modifications would not change the total volume of water permitted for diversion, as the permit would still allow for an annual maximum of 3,600 AFY. Further, the proposed project does not include any construction or ground-disturbing activities. Operation of the proposed project would not change from existing conditions with respect to drainage patterns. Therefore, the proposed project would not alter the existing drainage pattern of the site, including San Diego Creek, and no subsequent impacts related to erosion or siltation would occur.

d) ***No Impact***. As stated above in Response 3.9(c), the proposed project would not alter the existing drainage pattern of the project area, including San Diego Creek. The proposed modifications to the existing SWRCB Permit 20979 would increase the Place of Use and Rate of Diversion specified in the permit such that these terms reflect existing operations, and the proposed project would still allow for the maximum annual diversion of 3,600 AFY from San Diego Creek. Therefore, the proposed project would not increase the amount of surface runoff discharged into the project area or otherwise affect drainage patterns and flooding on- and off-site, and there would be no project impacts related to flooding.

e) ***No Impact***. The proposed project would allow IRWD to continue diverting water from San Diego Creek consistent with existing operations; no changes to drainage patterns, discharge rates, or impervious surfaces are proposed as part of the proposed project. Urban runoff is an existing source of water in San Diego Creek which is already being diverted to and/or cycled through the San Joaquin Marsh and UCNRS Freshwater Marsh Reserve. The proposed project would not create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems, or provide an additional source of polluted runoff. Rather, the proposed project would continue to have a positive effect on water quality as the San Joaquin Marsh and UCNRS Freshwater Marsh Reserve provide natural water quality treatment to the water being diverted to these systems. Therefore, the proposed project would have no impacts on surface runoff or water quality.

g/h) ***No Impact***. San Diego Creek and the project area are identified as Zone A on the FEMA Flood Insurance Rate Maps (FIRM Map #06059C0286J) (FEMA 2009). Zone A represents the 100-year flood zone. However, the proposed project does not include the construction of any housing units and thus would not result in flood hazards associated with housing. Further, no construction activities would occur with implementation of the proposed project and the project area would remain the same as in existing conditions. No structures would be built which would impede or redirect flood flows. Therefore, impacts related to hazards associated with flooding would not occur.

i) ***No Impact.*** As stated above, San Diego Creek and the project area are identified as Zone A on the FEMA Flood Insurance Rate Maps, where Zone A represents the 100-year flood zone (FEMA 2009). A levee is located along the San Diego Creek channel and represents the boundary of this 100-year flood zone, such that a 100-year flood would be contained within the channel. No changes to drainage patterns, discharge rates, or impervious surfaces are proposed as part of the proposed project. The proposed project would not modify the existing levee or otherwise expose people or habitable structures to a significant risk of loss, injury, or death involving flooding as a result of the failure of a levee, and thus no impact would occur.

j) ***No Impact***. The project area is located approximately five and a half miles inland from the Pacific Ocean and hazards associated with tsunamis would be extremely rare. In addition, the project area is relatively flat and not located near a large body of water, and thus would not be susceptible to mudflows or seiche. The proposed project would not install any structures nor involve construction activities or otherwise considerably alter any ground elevations or locations of existing structures. Therefore, impacts related to exposing people or structures to hazards associated with tsunami, sieche, or mudflows would not occur.

References

Federal Emergency Management Agency (FEMA). Flood Insurance Rate Map for Orange County and Incorporated Areas: Map Number 06059C0286J. Available at http://map1.msc.fema.gov/idms/IntraView.cgi?ROT=0&O_X=7200&O_Y=5175&O_ZM=0.077294&O_SX=1113&O_SY=799&O_DPI=400&O_TH=50618505&O_EN=50653211&O_PG=1&O_MP=1&CT=0&DI=0&WD=14400&HT=10350&JX=1672&JY=976&MPT=0&MPS=0&ACT=1&KEY=50618250&ITEM=1&PICK_VIEW_CENTER.x=796&PICK_VIEW_CENTER.y=588&R1=VIN

Stetson Engineers, Inc. (Stetson). 2017. Assessment of Permit 20979 and San Joaquin Marsh Operations. January 13.

3.10 Land Use and Land Use Planning

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
10. LAND USE AND LAND USE PLANNING — Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒

Discussion

a) ***No Impact.*** The project area consists of the IRWD San Joaquin Wildlife Sanctuary, which includes the San Joaquin Marsh, Carlson Marsh, and riparian mitigation areas, and the UCNRS Freshwater Marsh Reserve, as shown in Figure 2-2. The project area is designated as Preservation land use in the City of Irvine General Plan and is not a part of a designated community (City of Irvine 2015). In addition, the proposed project would not include construction activities, and operation would be consistent with existing conditions and would maintain existing community boundaries. For these reasons, the proposed project would not physically divide an established community.

b) ***No Impact.*** As stated above, the project area is designated as Preservation land use in the General Plan Land Use Element and is zoned as Conservation Open Space Reserve (City of Irvine 2015; City of Irvine 2014). The proposed project would not include construction activities, and operation would be consistent with existing conditions. Additionally, the proposed project would maintain the existing land uses in the project area and no long-term conflicts with land use would occur. Therefore, the proposed project would not conflict with any applicable land use plans, policies or regulations. No impact would occur.

c) ***No Impact.*** As discussed in Section 3.4, Biological Resources, portions of the San Joaquin Marsh are within the Orange County NCCP/HCP, mapped as Non-Reserve Open Space (City of Irvine 2015). However, no construction activities would occur within the project area. Operation of the proposed project would be consistent with existing conditions. As no direct or indirect impacts would occur with implementation of the proposed project, the proposed project would not conflict with the provisions of the Orange County NCCP/HCP. Therefore, no impact would occur.

References

City of Irvine. 2014. City of Irvine Zoning Map. Accessed June 2017. Available at https://legacy.cityofirvine.org/civica/filebank/blobdload.asp?BlobID=13672bv

City of Irvine. 2015. City of Irvine General Plan. Accessed June 2017. Available at http://www.cityofirvine.org/community-development/current-general-plan.

3.11 Mineral Resources

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
11. MINERAL RESOURCES — Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

Discussion

a/b) ***No Impact.*** There are no County-identified mineral resources near the project area (Orange County 2005). Implementation of the proposed project would not result in the loss of availability of an important mineral resource or mineral resource recovery site. There would be no impact.

References

Orange County. 2005. Orange County General Plan: Resources Element. Figure VI-3. Accessed at http://ocplanning.net/civicax/filebank/blobdload.aspx?blobid=8625

3.12 Noise

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
12. NOISE — Would the project:				
a) Result in exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☐	☒
b) Result in exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☒
c) Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒
d) Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒
e) For a project located within an airport land use plan area, or, where such a plan has not been adopted, in an area within two miles of a public airport or public use airport, would the project expose people residing or working in the area to excessive noise levels?	☐	☐	☐	☒
f) For a project located in the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

Discussion

Noise is generally defined as unwanted sound. Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) that is measured in decibels (dB), which is the standard unit of sound amplitude measurement. The dB scale is a logarithmic scale that describes the physical intensity of the pressure vibrations that make up any sound, with 0 dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of pain. Pressure waves traveling through air exert a force registered by the human ear as sound.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude. When all the audible frequencies of a sound are measured, a sound spectrum is plotted consisting of a range of frequency spanning 20 to 20,000 Hz. The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the sound frequency/sound power level spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that deemphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to extremely low and extremely high frequencies. This method of frequency weighting is referred to as A-weighting and is expressed

in units of A-weighted decibels (dBA). A-weighting follows an international standard methodology of frequency deemphasis and is typically applied to community noise measurements.

An individual's noise exposure is a measure of noise over a period of time. While a noise level is a measure of noise at a given instant in time, community noise varies continuously over a period of time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic. What makes community noise variable throughout a day, besides the slowly changing background noise, is the addition of short-duration, single-event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual.

These successive additions of sound to the community noise environment change the community noise level from instant to instant, requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

L_{eq}: The L_{eq}, or equivalent sound level, is used to describe noise over a specified period of time in terms of a single numerical value; the L_{eq} of a time-varying signal and that of a steady signal are the same if they deliver the same acoustic energy over a given time. The L_{eq} may also be referred to as the average sound level.

L_{max}: The maximum, instantaneous noise level experienced during a given period of time.

L_{min}: The minimum, instantaneous noise level experienced during a given period of time.

L_{dn}: Also termed the DNL, the L_{dn} is the average A-weighted noise level during a 24-hour day, obtained after an addition of 10 dBA to measured noise levels between the hours of 10:00 P.M. to 7:00 A.M. to account nighttime noise sensitivity.

CNEL: CNEL, or Community Noise Equivalent Level, is the average A-weighted noise level during a 24-hour day that is obtained after an addition of 5 dBA to measured noise levels between the hours of 7:00 P.M. to 10:00 P.M. and after an addition of 10 dBA to noise levels between the hours of 10:00 P.M. to 7:00 A.M. to account for noise sensitivity in the evening and nighttime, respectively.

An important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted (i.e., comparison to the ambient noise environment). In general, the more a new noise level exceeds the previously existing ambient noise level, the less acceptable the new noise level will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships generally occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;

- Outside of the laboratory, a 3 dBA change in noise levels is considered to be a barely perceivable difference;
- A change in noise levels of 5 dBA is considered to be a readily perceivable difference; and
- A change in noise levels of 10 dBA is subjectively heard as doubling of the perceived loudness.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. The human ear perceives sound in a non-linear fashion; hence the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, but rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Noise levels from a particular source generally decline as distance to the receptor increases. Other factors, such as the weather and reflecting or barriers, also help intensify or reduce the noise level at any given location. A commonly used rule of thumb for roadway noise is that for every doubling of distance from the source, the noise level is reduced by about 3 dBA at acoustically "hard" locations (i.e., the area between the noise source and the receptor is nearly complete asphalt, concrete, hard-packed soil, or other solid materials) and 4.5 dBA at acoustically "soft" locations (i.e., the area between the source and receptor is normal earth or has vegetation, including grass). Noise from stationary or point sources is reduced by about 6 to 7.5 dBA for every doubling of distance at acoustically hard and soft locations, respectively. Noise levels may also be reduced by intervening structures – generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA.

a/c/d) ***No Impact.*** A significant impact may occur if the proposed project would generate excessive noise that exceeds the noise level standards set forth in the City of Irvine General Plan Noise Element and Noise Ordinance. A significant impact may also occur if the proposed project results in permanent or temporary increases in ambient noise levels above levels existing without the proposed project. The proposed project would not include any construction activities. Operation of the proposed project would be consistent with existing operations at the San Joaquin Marsh. The proposed project would not introduce any new sources of noise, and noise levels at the project area would not change compared to existing conditions. Therefore, no impacts would occur with regard to exposure to excessive noise levels and temporary and permanent increases in ambient noise levels.

b) ***No Impact.*** Vibration can be interpreted as energy transmitted in waves through the ground or man-made structures. These energy waves generally dissipate with distance from the vibration source. Because energy is lost during the transfer of energy from one particle to another, vibration becomes less perceptible with increasing distance from the source.

As described in the Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment (FTA 2006), groundborne vibration can be a serious concern for nearby neighbors of a transit system route or maintenance facility, causing buildings to shake and rumbling sounds to be heard. In contrast to airborne noise, ground-borne vibration is not a common environmental problem. It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of groundborne vibration are trains, buses on rough roads, and construction activities such as blasting, pile-driving, and operation of heavy earth-moving equipment.

The effects of groundborne vibration include movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. Building damage is not a factor for most projects, with the occasional exception of blasting and pile-driving during construction. Annoyance from vibration often occurs when the vibration levels exceed the threshold of perception by only a small margin. A vibration level that causes annoyance will be well below the damage threshold for normal buildings. The FTA measure of the threshold of architectural damage for conventional sensitive structures is 0.2 inches per second (in/sec) PPV (FTA 2006).

With regard to the proposed project, no construction activities would take place, and therefore there would be no potential for groundborne vibration to be generated from the operation of heavy construction equipment. In addition, the proposed project, which would conform the terms of Permit 20979 to existing operations, would not include any operational sources of groundborne vibration. Thus, no impact with respect to groundborne vibration would occur.

e) ***No Impact.*** The project area is located approximately one mile east of the John Wayne Airport. However, the project area is not within the airport's Impact Zones, as specified by the Airport Environs Land Use Plan (AELUP) for John Wayne Airport (ALUC 2008). Further, the proposed project consists of marshland used for wildlife and water quality enhancement and would not increase the amount of people living or working in the vicinity of the airport. The proposed project would therefore not expose people residing or working in the area to excessive noise levels. No impact would occur.

f) ***No Impact.*** There are no private airstrips in the vicinity of the proposed project. Further, the proposed project consists of marshland used for wildlife and water quality enhancement and would not increase the amount of people living or working in the area. The proposed project would therefore not expose people residing or working in the area to excessive noise levels. No impact would occur.

References

Airport Land Use Commission (ALUC). 2008. Airport Environs Land Use Plan for John Wayne Airport. April 17. Available at http://www.ocair.com/commissions/aluc/docs/JWA_AELUP-April-17-2008.pdf.

Federal Transit Administration (FTA). 2006. Transit Noise and Vibration Impact Assessment. May. Available at https://www.transit.dot.gov/regulations-and-guidance/environmental-programs/noise-and-vibration.

3.13 Population and Housing

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
13. POPULATION AND HOUSING — Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing housing units, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Discussion

a) ***No Impact.*** The proposed project consists of IRWD modifying its current SWRCB Permit 20979 and does not include construction activities within the project area. Operation of the proposed project would be consistent with existing conditions. The proposed project would not directly induce population growth in the region because the proposed project does not involve construction of new homes or businesses. The proposed project would not require additional full-time employees for operation and maintenance of the new facilities. Further, the proposed project would not remove an obstacle to growth, such as constraint on a required public service, such as water supply or wastewater treatment capacity. The proposed project is not a water supply project and would not provide any resources to support or accommodate population growth. Therefore, the proposed project would not directly or indirectly induce population growth. No impact would occur.

b/c) ***No Impact.*** The proposed project would not directly affect existing housing and thus would not displace housing or people. Construction of replacement housing would not be necessary. No impact would occur.

3.14 Public Services

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
14. PUBLIC SERVICES — Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of, or the need for, new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services:				
i) Fire protection?	☐	☐	☐	☒
ii) Police protection?	☐	☐	☐	☒
iii) Schools?	☐	☐	☐	☒
iv) Parks?	☐	☐	☐	☒
v) Other public facilities?	☐	☐	☐	☒

Discussion

a.i) ***No Impact.*** The City of Irvine is provided regional fire protection and emergency services from the Orange County Fire Authority (OCFA) (City of Irvine 2015). No construction activities would occur within the project area with implementation of the proposed project. Operation of the proposed project would be consistent with existing conditions. Additionally, as discussed above, the proposed project would not directly or indirectly induce population growth and as such no additional fire protection services or facilities would be needed. Therefore, no impact with regard to fire protection services would occur.

a.ii) ***No Impact.*** The City of Irvine is provided police services by the City of Irvine Public Safety Department (City of Irvine 2015). No construction activities would occur within the project area with implementation of the proposed projcet. Operation of the proposed project would be consistent with existing conditions. Additionally, as discussed above, the proposed project would not directly or indirectly induce population growth and as such no additional police protection services or facilities would be needed. Therefore, no impact with regard to fire protection services would occur.

a.iii) ***No Impact.*** As discussed above in Section 3.13, Population and Housing, the proposed project would not result in direct or indirect population growth. Therefore, the proposed project would not affect population-based school enrollment within the surrounding areas of the city. Implementation of the proposed project would not require additional school facilities. Therefore, no impact to schools would occur.

a.iv) ***No Impact.*** As discussed above in Section 3.13, Population and Housing, the proposed project would not result in direct or indirect population growth. Since the proposed project would not result in population growth, there would be no need to provide additional parkland or recreational facilities within the city. Further, the proposed project does not include construction activities that could temporarily delay or restrict access to existing parks. Therefore, no impact to parks would occur.

a.v) ***No Impact.*** As discussed above in Section 3.13, Population and Housing, the proposed project would not result in direct or indirect population growth. The proposed project would not cause an increased demand in public services and is not expected to cause significant environmental impacts to the service levels of any other public service providers. Thus, the proposed project would not impact any other public services.

References

City of Irvine. 2015. City of Irvine General Plan. Accessed June 2017. Available at http://www.cityofirvine.org/community-development/current-general-plan.

3.15 Recreation

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
15. RECREATION — Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated?	☐	☐	☐	☒
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☐	☒

Discussion

a) ***No Impact***. The San Joaquin Marsh includes 12 miles of trails with observation/bench areas spread throughout. As discussed above in Section 3.13, Population and Housing, the proposed project would not result in direct or indirect population growth. Therefore, the proposed project would not generate an increased demand for parks or other recreational facilities. Existing surrounding parks and the San Joaquin Marsh would not experience increased use or physical deterioration due to the proposed project. No impact to existing parks or recreational facilities would occur.

b) ***No Impact***. As discussed above, the San Joaquin Marsh includes a trail system and observation/bench areas for visitors. The proposed project would not include or affect park facilities as no construction activities are included in the proposed project. Operation of the proposed project would be consistent with existing conditions. The proposed project would not require construction of new, or expansion of existing, recreational facilities such as bikeways and trails. There would be no resulting long-term impact on the environment. For these reasons, no impact would occur.

3.16 Transportation and Traffic

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
16. TRANSPORTATION AND TRAFFIC — Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☐	☒
b) Conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☒
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location, that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☐	☒
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒

Discussion

a) ***No Impact.*** The proposed project consists of IRWD modifying its current SWRCB Permit 20979 and does not include construction activities within the project area. Operation of the proposed project would be consistent with existing conditions. As such, implementation of the proposed project would not generate new vehicle or truck trips on the surrounding circulation system. Since implementation of the proposed project would not change the existing performance of the circulation system, conflicts to applicable traffic plans, ordinances, or policies would not occur. For these reasons, impacts to the existing circulation system would not occur.

b) ***No Impact***. The Orange County Transportation Authority (OCTA) is the designated Congestion Management Agency for Orange County. The OCTA prepares the Orange County Congestion Management Program (CMP), the goals of which are to reduce traffic congestion and provide a mechanism for coordinating land use and development decisions. As stated above in Response 16(a), since the proposed project does not include construction activities and operational activities would be the same as in existing conditions, implementation of the proposed project would not generate new vehicle or truck trips on the surrounding circulation system. Since implementation of the proposed

projcet would not generate additional truck or vehicle trips, the project would not conflict with the Orange County CMP. Thus, no impact would occur.

c) ***No Impact.*** The closest airport is John Wayne Airport, located approximately one mile west of the project area. However, the project area is not within the airport's Impact Zones, as specified by the Airport Environs Land Use Plan (AELUP) for John Wayne Airport and as such wouldn't affect airport operations (ALUC 2008). Further, the proposed project does not include construction activities and operational activities would be consistent with existing conditions. Thus, implementation of the proposed project would not change air traffic patterns, and no impact would occur.

d) ***No Impact.*** The proposed project consists of IRWD modifying its current SWRCB Permit 20979 and would not include construction activities within the project area. Operation of the proposed project would be consistent with existing conditions. Implementation of the proposed project would not cause any physical changes within the project area or in the vicinity that would result in increased hazards due to design features. Therefore, no impact would occur.

e) ***No Impact.*** The proposed project would not include construction activities within the project area. Operation of the proposed project would be consistent with existing conditions. Implementation of the proposed project would not cause any physical changes within the project area or in the vicinity which would affect emergency access to the project area. Therefore, no impact related to inadequate emergency access would occur.

f) ***No Impact.*** As stated above in Response 16(a), the proposed project would not generate new vehicle or truck trips as no construction activities would occur and operation would be consistent with existing conditions. Thus, implementation of the proposed project would not affect existing alternative transportation systems or facilities, and no impact would occur.

References

Airport Land Use Commission (ALUC). 2008. Airport Environs Land Use Plan for John Wayne Airport. April 17. Available at http://www.ocair.com/commissions/aluc/docs/JWA_AELUP-April-17-2008.pdf.

Orange County Transportation Authority (OCTA). 2013. Orange County Congestion Management Plan. November 2013.

3.17 Tribal Cultural Resources

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
17. Tribal Cultural Resources — Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☐	☐	☒
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☐	☐	☒

Discussion

Per recent revisions to CEQA required by Assembly Bill (AB) 52, IRWD notified the designated contact of, or a tribal representative of, the traditionally and culturally affiliated California Native American tribes that have requested notification of projects within IRWD's service area, pursuant to Public Resources Code Section 21080.3.1. Letters were sent by certified mail on June 28, 2017 to Mr. Andrew Salas, Chairman of the Gabrieleño Band of Mission Indians – Kizh Nation; Ms. Joyce Stanfield, Tribal Manager of the Juaneño Band of Mission Indians – Acjachemen Nation; and Mr. Michael Mirelez, Cultural Resources Coordinator of the Torres Martinez Desert Cahuilla Indians. The letters included a description of the proposed project, a map depicting the project location, and contact information for the IRWD. Recipients were requested to respond within 30 days of receipt of the letter if they wished to engage in government-to-government consultation per AB 52. No responses were received within the 30-day period.

Also, as reported in *Archaeological Survey Report for the Peters Canyon Channel Water Capture and Reuse Pipeline Project, Irvine and Tustin, Orange County, California* (ESA 2014), a technical study prepared for a recent project that covers the same area as the proposed project, the Native American Heritage Commission (NAHC) was contacted on January 10, 2014 to conduct a search of the Sacred Lands File (SLF). The SLF search did not identify any Native American cultural resources within the project area.

a) ***No Impact.*** The project area consists of the IRWD San Joaquin Wildlife Sanctuary, which includes the San Joaquin Marsh, Carlson Marsh, and riparian mitigation areas, and the UCNRS Freshwater Marsh Reserve, as shown in Figure 2-2. Letters were sent to the three California Native American tribes on IRWD's AB52 contact list. No responses were received within the 30-day comment period, and no tribal cultural resources as defined under Impact 3.17(a) have been identified within the project area. Further, the proposed project does not include construction activities and would not result in physical

changes to the project area. Operation of the proposed project would be consistent with existing conditions. Therefore, the proposed project would not cause a substantial adverse change in the significance of a tribal cultural resource, and no impact would occur.

b) ***No Impact.*** As discussed above, letters were sent to the California Native American tribes on IRWD's AB52 contact list. No responses were received within the 30-day comment period, and no tribal cultural resources as defined under Impact 3.17(b) have been identified within the project area. Further, the proposed project does not include construction activities and would not result in physical changes to the project area. Operation of the proposed project would be consistent with existing conditions. Therefore, the proposed project would not cause a substantial adverse change in the significance of a tribal cultural resource, and no impact would occur.

References

Environmental Science Associates (ESA). 2014. Peters Canyon Channel Water Capture and Reuse Pipeline Project Cultural Resources Technical Reports. July.

3.18 Utilities and Service Systems

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
17. UTILITIES AND SERVICE SYSTEMS — Would the project:				
a) Conflict with wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
c) Require or result in the construction of new storm water drainage facilities, or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☒
e) Result in a determination by the wastewater treatment provider that would serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☒
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒

Discussion

a) ***No Impact.*** The proposed project would conform the terms of Permit 20979 to existing operations. The project area consists of marshland for wildlife and water quality enhancement. The proposed project would not install any infrastructure for the collection or transport of wastewater. Operation of the proposed project would not require connection to a wastewater treatment facility. Therefore, the proposed project would not conflict with wastewater treatment requirements of the Regional Water Quality Control Board, and no impact would occur.

b/d/e) ***No Impact.*** The proposed project would conform the terms of Permit 20979 to existing operations. The proposed project would not require new water or wastewater treatment facilities or expansion of existing facilities. In addition, no new or expanded water supply entitlements would be needed; the proposed project would not change the permit's face value of 3,600 AFY. Wastewater treatment providers would not need capacity to serve the proposed project. Therefore, no impacts would occur.

c) ***No Impact.*** The proposed project would conform the terms of Permit 20979 to existing operations. No flows would be diverted into storm water drainage infrastructure outside the project area. Similar to existing conditions, using existing infrastructure, surface

water would be diverted from San Diego Creek into the marsh, and then effluent would be discharged back to San Diego Creek. Similar to existing conditions, stormwater would be diverted from San Joaquin Marsh to UCNRS Freshwater Marsh Reserve, when available, using existing infrastructure. Therefore, the proposed project would not require new or expanded storm water drainage facilities. No impact would occur.

f/g) ***No Impact.*** As previously discussed, the proposed project would not include any construction activities, and operation would conform the terms of Permit 20979 to existing conditions. No solid waste would be generated, and no waste would be required to go to a landfill. Therefore, no impact would occur regarding sufficient capacity at the nearest landfill or compliance with regulations related to solid waste.

3.19 Energy

Issues (and Supporting Information Sources):		*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
	ENERGY — Would the project:				
a)	Result in a substantial increase in overall or per capita energy consumption?	☐	☐	☐	☒
b)	Result in wasteful or unnecessary consumption of energy?	☐	☐	☐	☒
c)	Require or result in the construction of new sources of energy supplies or additional energy infrastructure capacity the construction of which could cause significant environmental effects?	☐	☐	☐	☒
d)	Conflict with applicable energy efficiency policies or standards?	☐	☐	☐	☒

Discussion

a/b) ***No Impact.*** The proposed project consists of IRWD modifying its current SWRCB Permit 20979 and does not include construction activities within the project area. Operation of the proposed project would be consistent with existing conditions. Since the proposed project does not include construction activities and operational activities would be the same as in existing conditions, implementation of the proposed project would not require electricity or any other form of energy, and no additional energy consumption would occur relative to existing conditions. Thus, the proposed project would not increase energy consumption or result in the wasteful consumption of energy. No impacts would occur.

c) ***No Impact.*** Implementation of the proposed project would not result in an increase in energy consumption as no construction activities would occur on the project area. Operational activities of the proposed project would be consistent with existing conditions and would not require any additional energy power. Thus, implementation of the proposed project would not require the construction or installation of new energy infrastructure or cause an increased demand for energy supplies. No impacts would occur.

d) ***No Impact.*** The proposed project would conform the terms of Permit 20979 to existing operations, and would not require any construction activities. Operation of the proposed project would not require any new energy supplies. Thus, the proposed project would not conflict with energy efficiency policies or standards as the proposed project would not require any additional energy supplies. No impact would occur.

3.20 Mandatory Findings of Significance

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
18. MANDATORY FINDINGS OF SIGNIFICANCE — Would the project:				
a) Have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☐	☒
b) Have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☐	☒
c) Have environmental effects that would cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☒

Discussion

a) ***No Impact.*** As discussed in Sections 3.4 and 3.5 of this Initial Study, no impacts would occur in regards to biological and cultural resources, including special-status plant and wildlife species. Therefore, the proposed project would not have the potential to degrade the quality of the environment, and no impact would occur.

b) ***No Impact.*** A cumulative impact could occur if the proposed project would result in an incrementally considerable contribution to a significant cumulative impact in consideration of past, present, and reasonably foreseeable future projects for each resource area. No direct or indirect significant impacts were identified for the proposed project, and no mitigation would be required. The proposed project would have no effect on aesthetics, agriculture/forestry, air quality, biological resources, cultural resources, geology and soils, greenhouse gas emissions, hazards and hazardous materials, hydrology, land use and planning, mineral resources, noise, population and housing, public services, recreation, transportation, tribal cultural resources, utilities, and energy. As a result, cumulative impacts related to these resources would not occur. The proposed project would not result in any impacts that would be cumulatively considerable resulting from the proposed project.

c) ***No Impact.*** No direct or indirect significant impacts were identified for the proposed project, and no mitigation would be required. Therefore, the proposed project would not cause substantial adverse effects on human beings, either directly or indirectly. No impact would occur.

APPENDIX A

Assessment of Permit 20979 and San Joaquin Marsh Operations

ESA

TECHNICAL MEMORANDUM 1.0

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TEL: (760) 730-0701 FAX: (415) 457-1638 e-mail: stever@stetsonengineers.com

TO:	Irvine Ranch Water District	DATE:	January 13, 2017
FROM:	Stetson Engineers Inc.	JOB NO:	2478-003

RE: Assessment of Permit 20979 and San Joaquin Marsh Operations

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

APPENDICES

KEY WATER RIGHTS DEFINITIONS[1]

Beneficial Use. Specific types of water uses defined in the California Code of Regulations (CCR) in Sections 659 through 672, title 23. Water uses include those for Domestic Use, Irrigation, Power Use, Frost Protection Use, Heat Protection Use, Municipal Use, Mining Use, Industrial Use, Fish and Wildlife Protection and Enhancement, Aquaculture Use, Recreational Use, Water Quality Use, and Stockwatering Use.

Consumptive Use. The amount of water which has been consumed through use by evapotranspiration, percolated underground, or been otherwise removed from use in the downstream water supply as a result of direct diversion or diversion to storage.

Direct Diversions. Water taken from a water source and used without being placed into storage.

Diversions. Water taken by gravity or pumping from a surface stream or subterranean stream flowing through a known and definite channel, or other body of surface water, into a canal, pipeline, or other conduit, including impoundment of water in a reservoir (Water Code Section 5100).

Face Value. The total annual volume that may be diverted under a permit or license; usually expressed in units of acre-feet.

Instantaneous Diversion Rate. A measure of the rate of flow at one point in time; usually expressed in units of cubic feet per second.

License. A document issued by the State Water Resources Control Board which represents the final confirmation of an appropriative water right. A license is issued after a project is completed and after water under a permit is put to beneficial use.

Permit. A document issued by the State Water Resources Control Board allowing an applicant an appropriative water right to construct a project and begin diverting water. A permit is issued only after the SWRCB finds that unappropriated water is available and that the appropriation is in the public interest.

Place of Use. The location specified in a permit or license where water is put to beneficial use.

Point of Diversion. The location on a water source at which a diversion is taken.

Use. See 'Beneficial Use'.

[1] Sources:
California Code of Regulations, Title 23, Divisions 2-5.
California Code of Regulations, Title 23, Excerpts of Divisions 3-5 Applicable to the Administration of Water Rights, SWRCB, April 1, 2016
SWRCB Definitions of Key Water Rights Terms.
http://www.waterboards.ca.gov/waterrights/water_issues/programs/diversion_use/wm_keyterms.shtml

EXECUTIVE SUMMARY

Irvine Ranch Water District (IRWD) diverts surface water from San Diego Creek to the San Joaquin Marsh under Permit 20979, a water right issued by the State Water Resources Control Board (SWRCB) in 1998. Surface water is diverted for the purpose of wildlife enhancement of the San Joaquin Marsh. The purpose of this memorandum is to assess the historical performance of both Permit 20979 and the San Joaquin Marsh based on operations that occurred between 1998 and 2015; and assess whether Permit 20979 may be used for other beneficial uses, change the permit conditions to meet existing operations, or seek a new permit. Additionally, future diversions to the San Joaquin Marsh are assessed based on hydrology and implementation of other upstream projects that may impact water availability.

The San Joaquin Marsh is a complex system of constructed treatment wetlands, ponds and streams, riparian mitigation areas, and natural riparian marshes owned and operated by IRWD. In addition to the 140 acres of constructed wetland, the greater San Joaquin Marsh area is 500 acres in area, including the University of California Natural Reserve System (UCNRS) and the San Joaquin Marsh and Wildlife Sanctuary. The greater San Joaquin Marsh plays an integral role in meeting the Santa Ana Regional Water Quality Control Board's (RWQCB) Basin Plan water quality objectives, is a critical component of the Municipal Separate Storm Sewer System Permit (MS4 Permit) Best Management Practice (BMP) requirement, and is the model upon which the IRWD Natural Treatment System (NTS) Plan is based. The San Joaquin Marsh also functions as a nitrogen offset for the dewatering discharge from IRWD's Michelson Water Recycling Plant (MWRP).

The primary facilities of the San Joaquin Marsh include a diversion structure, pumps, pipelines, and an interconnected series of two settling ponds (Ponds A and B) and six constructed treatment wetlands (Ponds 1-6) totaling 140 acres in area. Water impounded in San Diego Creek is diverted to the wetlands using two primary pumps with a combined capacity of 6,000 gallons per minute (8.6 million gallons per day or 13.4 cubic feet per second). Water then flows through the series of constructed wetlands, which remove nutrients and other constituents through natural processes. Effluent water from the last treatment pond is then returned to the creek or used to irrigate mitigation lands adjacent to the six primary treatment ponds. In addition to the

diversion, treatment, and discharge of water from San Diego Creek, stormwater from adjacent land and pumped groundwater from the MWRP affects the operation of the San Joaquin Marsh.

Permit 20979 has a face value, or annual maximum diversion volume, of 3,600 acre-feet per year (AFY) for the prescribed beneficial use of "Wildlife Enhancement", at a rate not to exceed 5 cubic feet per second (cfs). In eleven out of the last eighteen years, annual diversions to San Joaquin Marsh have met or exceeded 3,600 AFY. As such, Permit 20979 has been maximized by putting the full face value of the Permit to beneficial use. Review of mandatory progress reports filed with the SWRCB by IRWD show some inconsistencies in how operations have been reported. However, the most recent progress report filed in 2015 correctly reflects how San Joaquin Marsh operations should be reported to the SWRCB.

Water quality monitoring data show that IRWD effectively manages the San Joaquin Marsh in a manner that balances water quality objectives and natural resource management. Specifically, water quality data show that the San Joaquin Marsh is effective at removing ortho-phosphate, total nitrogen, and selenium. Overall, the water quality data show reductions in nutrients and metals through active management of hydraulic residence time in the constructed wetlands.

Because construction of the San Joaquin Marsh is complete and the Permit has been maximized by putting 3,600 AFY to beneficial use, IRWD may proceed to licensing with the SWRCB. However, Stetson recommends that IRWD consider modifying the following Permit terms prior[2] to licensing:

- Permit Term 4, Place of Use: The current place of use is 140 acres, but the total San Joaquin Marsh area, including the University of California Natural Reserve System and adjacent mitigation lands, is 500 acres. IRWD should consider including additional areas of the greater San Joaquin Marsh in the Permit's place of use if those additional areas consistently use water from San Diego Creek. An analysis should be completed to assess seasonal flooding and dewatering procedures to determine if areas outside the permitted place of use are receiving water from San Diego Creek.
- Permit Term 5, Rate of Diversion: Review of pump records show that the permitted maximum diversion rate of 5 cfs is often exceeded. IRWD should consider amending

[2] Request for changes to Permit 20979 may occur concurrently with request for licensure from the SWRCB.

the permit so there is consistency between the operations and the permitted diversion rate.

- Permit Term 9, Complete Application of Water to Authorized Use: The complete application of the water to the authorized use shall be made by December 31, 2007. Consideration of facilities or diversions performed under Permit 20979, after that date, may require a request for time extension.

The hydrology of San Diego Creek was assessed for both baseflows and stormflows under existing and future conditions. Review of available data and future projects indicate that implementation of the Peters Canyon Channel Water Capture and Reuse Pipeline Project - a multi-agency project construction upstream of San Diego Creek - will reduce available diversions to the San Joaquin Marsh by as much as 250 AFY during below normal hydrologic conditions. The Peters Canyon Project will likely impact IRWD's ability to divert 3,600 AFY in dry and normal years and have little to no impact during above normal hydrologic conditions.

If IRWD seeks to divert more than 3,600 AFY in future years, an application for a new water right would be required. Or, if IRWD seeks to divert San Joaquin Marsh effluent to the MWRP in-lieu of release to San Diego Creek, an application for a new water right would also be required. In either case, changes to downstream flow in San Diego Creek would trigger the need to perform a water availability analysis of the creek and be subject to public review.

In order to assess water requirements at the San Joaquin Marsh under future hydrologic conditions, a series of water supply management scenarios are outlined in this memorandum. These scenarios should be assessed to confirm how much water would be available for an additional water right permit and what the impact would be to downstream water availability. In addition, IRWD should assess water used by other planned Natural Treatment System wetlands upstream of the project for their potential impact on water availability at San Joaquin Marsh.

Additional water supply may be available from the San Joaquin Marsh or the MWRP dewatering operations to supplement inflows at the MWRP without exceeding the plant's permitted capacity. In addition to constraints from the SWRCB and other regulatory agencies to the use of these waters, water quality may be a limiting factor. If water quality concerns are met, additional water supply treated at the MWRP could be used to meet recycled water demand during the spring, summer and fall months. If storage reservoir capacity existed, it could also be used to meet wintertime storage objectives.

1.0 INTRODUCTION

The State Water Resources Control Board (SWRCB) Permit Number 20979 (Permit) assigned a water right to the Irvine Ranch Water District (IRWD) for the diversion of water from San Diego Creek of up to 5 cfs, not to exceed 3600 Acre-Feet per Year (AFY), for wildlife enhancement in the San Joaquin Marsh and Wildlife Sanctuary (San Joaquin Marsh) and riparian area mitigation site adjacent to the Michelson Water Recycling Plant (MWRP). The purpose of this memorandum is to assess the historical performance of both Permit 20979 and the San Joaquin Marsh based on operations that occurred between 1998 and 2015; and assess whether Permit 20979 may be used for other beneficial uses, change the permit conditions to meet existing operations, or seek a new permit. Additionally, future diversions to the San Joaquin Marsh are assessed based on hydrology and implementation of other upstream projects that may impact water availability.

This investigation was performed by evaluating the historical use of Permit 20979, characterizing the water supply available, and reviewing the operational constraints and procedures for San Joaquin Marsh operations. Ultimately, the intent was to determine whether the San Joaquin Marsh is operating at its fully designed capacity, and whether water diversions were being conducted in a manner consistent with the Permit. Then, by conducting an analysis of the water supply and demand, along with assessing the other water quality initiatives in the basin, recommendations were made regarding availability and optimization of the Permit. Furthermore, Permit compliance was evaluated regarding operational compliance, Permit modifications, and/or pursuit of licensure.

During the course of this investigation, the following were reviewed: the Permit and its associated application, all available staff files from the SWRCB associated with the Permit, the available original environmental documents, all available Progress Reports by Permittee, the existing National Pollutant Discharge Elimination System (NPDES) permit for the MWRP, the Region 8 General Permit for Groundwater Dewatering to Surface Waters in the San Diego Creek/Newport Bay Watershed, the San Joaquin Marsh Operating Guidelines, the Regional Water Quality Control Board (RWQCB) Region 8 Basin Plan, the San Diego Creek Natural Treatment System (NTS) Master Plan and its associated Environmental Assessment (EA), the

Mitigated Negative Declaration (MND) for the San Joaquin Marsh Small Area Mitigation Site-1 (SAMS-1), the Peters Canyon Channel Water Capture and Reuse Pipeline Project Reduced Discharge Technical Study, and available hydrologic and water quality data for San Diego Creek maintained by Orange County Public Works (OCPW).

This Technical Memorandum is organized into four sections: Introduction, Permit 20979 Performance and Use, Marsh Performance, and Conclusions and Recommendations. The Introduction contains a brief description of the physical characteristics of the basin and the regulatory and master planning documents that include the San Joaquin Marsh. Permit 20979 Performance and Use is an analysis of historical Permit compliance. Marsh Performance characterizes water supply availability, describes marsh operations, and analyzes water quality/operational performance. The Conclusions and Recommendations section summarizes our findings, and recommends the next steps to take to enhance Permit compliance and pursue Permit modification or licensure.

1.1 Location and Hydrology

The San Joaquin Marsh is located in the City of Irvine, Orange County, California. The Marsh is adjacent to San Diego Creek and the IRWD Michelson Water Recycling Plant, located northeast of Highway 73 and south of Interstate 405, approximately five miles upstream of Newport Bay. The San Joaquin Marsh and other nearby features are shown in Figure 1.

The San Joaquin Marsh is within the San Diego Creek Watershed, which drains to Newport Bay (Figure 2). Together, they are grouped by the United States Geological Survey (USGS) as Hydrologic Unit Code (HUC) number 18070204. The headwaters of San Diego Creek are in the Santiago and San Joaquin Hills on the northeast and southern areas of the watershed, respectively. Peters Canyon Wash joins San Diego Creek from the north. The total drainage area of Newport Bay is about 193 square miles. San Diego Creek, at its point of discharge to Newport Bay, drains about 140 square miles, including 35 square miles drained by Peters Canyon Wash.

There are three long-term precipitation stations in or near the San Diego Creek watershed: Newport Beach Harbor, Santa Ana Fire Station, and Tustin Irvine Ranch (Table 1). All three are part of the National Weather Service (NWS) cooperative network. The Tustin

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STETSON ENGINEERS INC.

DRAFT

Background: NAIP 2014

PROJECT LOCATION MAP

0 0.7 1.4 Miles

N

FIGURE 1

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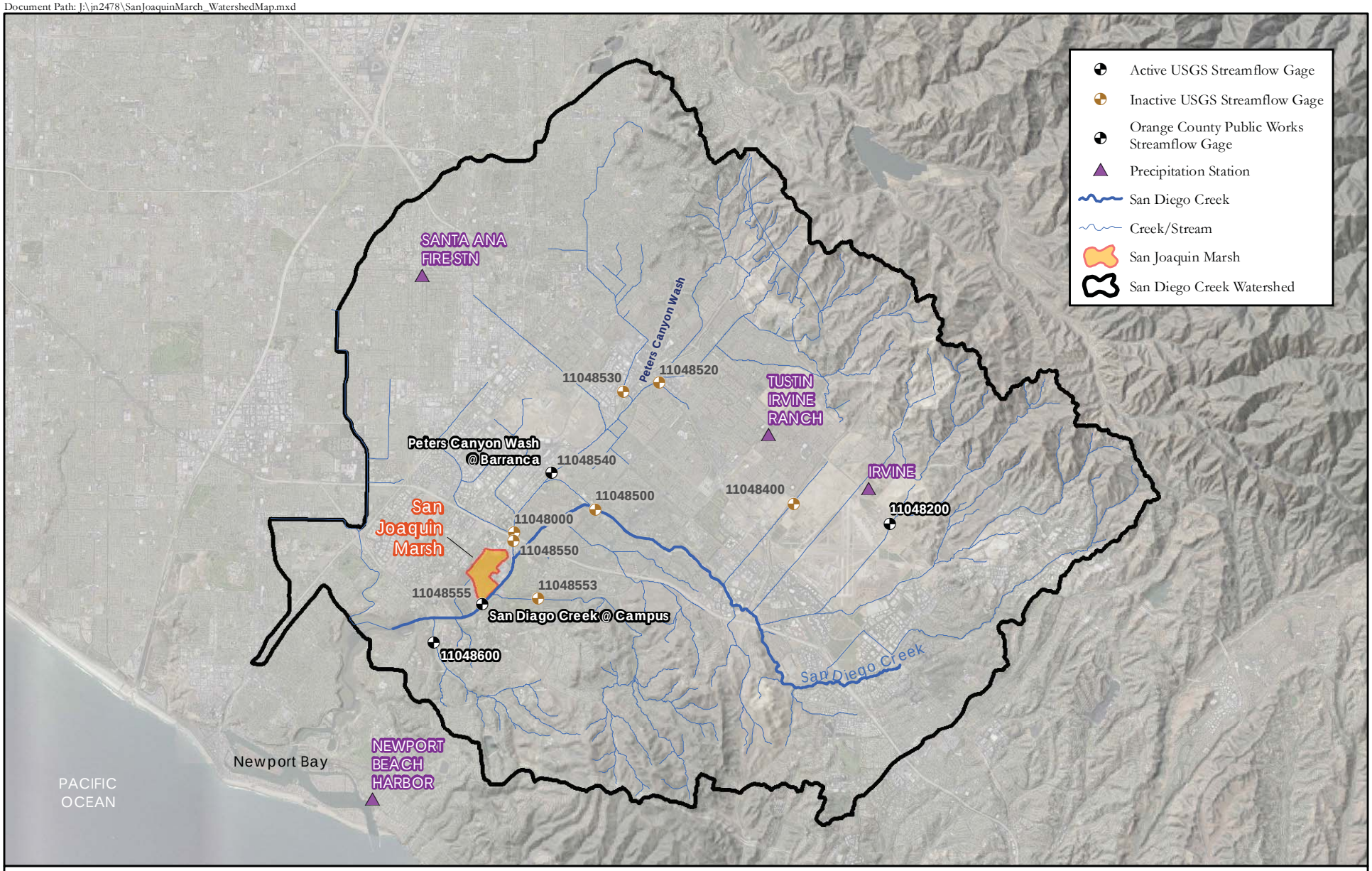

STETSON ENGINEERS INC.

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NEWPORT BAY/SAN DIEGO CREEK WATERSHED

0 1 2 Miles

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Background: NAIP 2014
Sources: National Climate Data Center; Orange County Public Works; USGS; California Irrigation Management Information System

FIGURE 2

Irvine Ranch station has data available for 1902 through 2003, though some data are sporadic. In addition to these three stations, there is an active weather station located in Irvine at the University of California South Coast Field Station. This station is part of the California Irrigation Management Information System (CIMIS) network (Station No. 75) and is located about two miles southeast of the Tustin Irvine Ranch station. Precipitation data are available at the Irvine station for 1987 through the present.

TABLE 1. PRECIPITATION STATIONS NEAR SAN JOAQUIN MARSH

Station Name	Station ID[1]	Latitude, Longitude (Decimal Degrees)[2]	Elevation (feet, MSL)	Period of Record
Irvine	75	33.68845, -117.72118	410	1987-present
Newport Beach Harbor	046175	33.6025, -117.8803	10	1921-present
Santa Ana Fire Station	047888	33.7442, -117.8667	135	1906-present
Tustin Irvine Ranch	049087	33.7025, -117.75389	235	1902-2003

Notes:
1. Irvine station part of the CIMIS network (CIMIS, 2016); All other stations are part of the NWS cooperative network (WRCC, 2016a)
2. Latitude and longitude in North American Datum of 1983 (NAD83) coordinates.

Annual precipitation at the Tustin Irvine Ranch weather station (blue bars) is shown in Figure 3. Missing data in the record at the Tustin Irvine Ranch station were filled using data from the three other stations listed in Table 1, using mean annual precipitation from the 1981-2010 monthly data to adjust for differences between the locations (CIMIS, 2016; WRCC, 2016a). Figure 3 also shows cumulative departure from mean (black line). This type of curve is used to depict wet and dry cycles over an extended period of record. The black line shows the hydrologic trend, where a downward slope indicates a trend to dry conditions and an upward slope indicates a trend to wetter conditions. The constant pink line shows the long-term average annual precipitation at Tustin Irvine Ranch (12.7 in/yr). Since 2005, the graph shows a drying trend: eight out of ten years have had precipitation less than average; only 2005 and 2011 were above average.

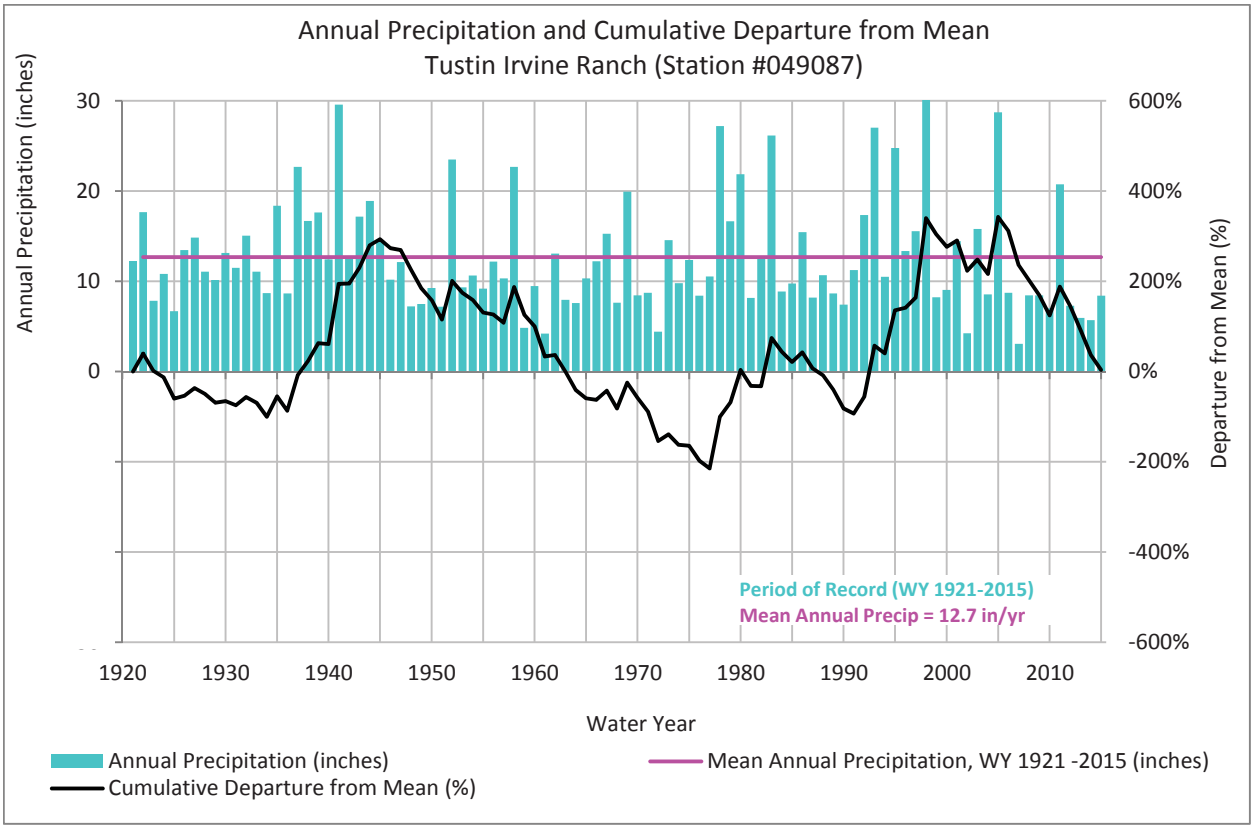


FIGURE 3. ANNUAL PRECIPITATION AND CUMULATIVE DEPARTURE FROM MEAN AT TUSTIN IRVINE RANCH STATION, WY 1922-2015.

There are eleven USGS streamflow gages in the Newport Bay watershed that have been historically or presently operated. Of the eleven USGS gages, two USGS gages are currently active. In addition, at the locations of two inactive USGS gages, the Orange County Public Works Department (OCPW) maintains two active streamflow gages. Streamflow gages in the watershed are shown in Table 2.

TABLE 2. STREAMFLOW GAGING STATIONS IN SAN DIEGO CREEK WATERSHED

Station ID[1]	Station Name	Latitude, Longitude[2]	Operating Agency	Drainage Area (square miles)[3]	Streamflow Period of Record (water years)
11048000	*Peters Cyn Wash Nr Tustin*	*33.67502, -117.83561*	*USGS*	*92*	*1931-1940*
11048200	**Agua Chinon Wash Nr Irvine**	**33.67891, -117.71422**	**USGS**	**2.85**	**2008-2016**
11048400	*Marshburn Channel Nr Irvine*	*33.68391, -117.74533*	*USGS*	*n/a*	*2003-2014*
11048500	*San Diego C At Culver Drive Nr Irvine*	*33.68169, -117.80950*	*USGS*	*41.8*	*1950-1985*
11048520	*Central Irvine Channel Nr Tustin*	*33.71611, -117.78944*	*USGS*	*n/a*	*2011-2015*
11048530	*El Modina-Irvine Ch A Myford Rd Nr Tustin*	*33.71363, -117.80117*	*USGS*	*n/a*	*1975-1979*
11048540	*Peters Cyn Wash A Barranca Rd Nr Irvine*	*33.69141, -117.82394*	*USGS*	*n/a*	*1983-1985*
PCW @ Barranca	**Peters Cyn Wash A Barranca Rd Nr**	**33.69141, -117.82394**	**OCPW**	***n/a***	**1998-2016**
11048550	*San Diego C A Lane Rd Nr Irvine Ca*	*33.67280, -117.83589*	*USGS*	*n/a*	*1973-1977*
11048553	*Sand Cyn C A Irvine Ca*	*33.65724, -117.82756*	*USGS*	*7.06*	*2008-2014*
11048555	*San Diego C A Campus Drive Nr Irvine*	*33.65558, -117.84561*	*USGS*	*111*	*1978-1985*
SDC @ Campus	**San Diego C A Campus Drive Nr Irvine**	**33.65558, -117.84561**	**OCPW**	**111**	**1998-2016**
11048600	**Bonita C A Irvine**	**33.64502, -117.86117**	**USGS**	**5.39**	**2002-2016**

Notes:
1. Stations in italics are inactive. Active stations are in bold print.
2. Latitude and longitude in North American Datum of 1983 (NAD83) coordinates.
3. n/a = drainage area not given in USGS site information or information not known.

Gaged streamflow records from the USGS and OCPW were used for this study to describe hydrologic conditions on San Diego Creek. The San Diego Creek at Campus Drive gage was used in combination with San Joaquin Marsh flow records. The gage at Campus Drive is located just downstream of the San Joaquin Marsh outlet. Records were combined from the

USGS and OCPW to create a daily streamflow record from Water Year[3] (WY) 1978 through 2015. The record is not continuous and there are no measurements for WY 1980 through 1982 and for WY 1985 through 1991. A monthly hydrograph of flows on San Diego Creek at Campus Drive is depicted in Figure 4. Low flows in the summertime typically range from 200 to 600 acre-feet per month (AFM), while winter months with precipitation events have streamflow in excess of 5,000 AFM. The peak monthly streamflow of 40,000 AFM occurred in February of 1998, a month which saw 15 inches of rainfall recorded at the Tustin Irvine Ranch station.

The San Diego Creek watershed overlies a groundwater basin designated as "Coastal Plain of Orange County" by the Department of Water Resources (Basin No. 8-1). The area of the groundwater basin is 350 square miles. In addition to San Diego Creek, this basin also underlies the lower Santa Ana River.

[3] Water year is defined here as the period from October 1 of the previous year through September 30 of the current year

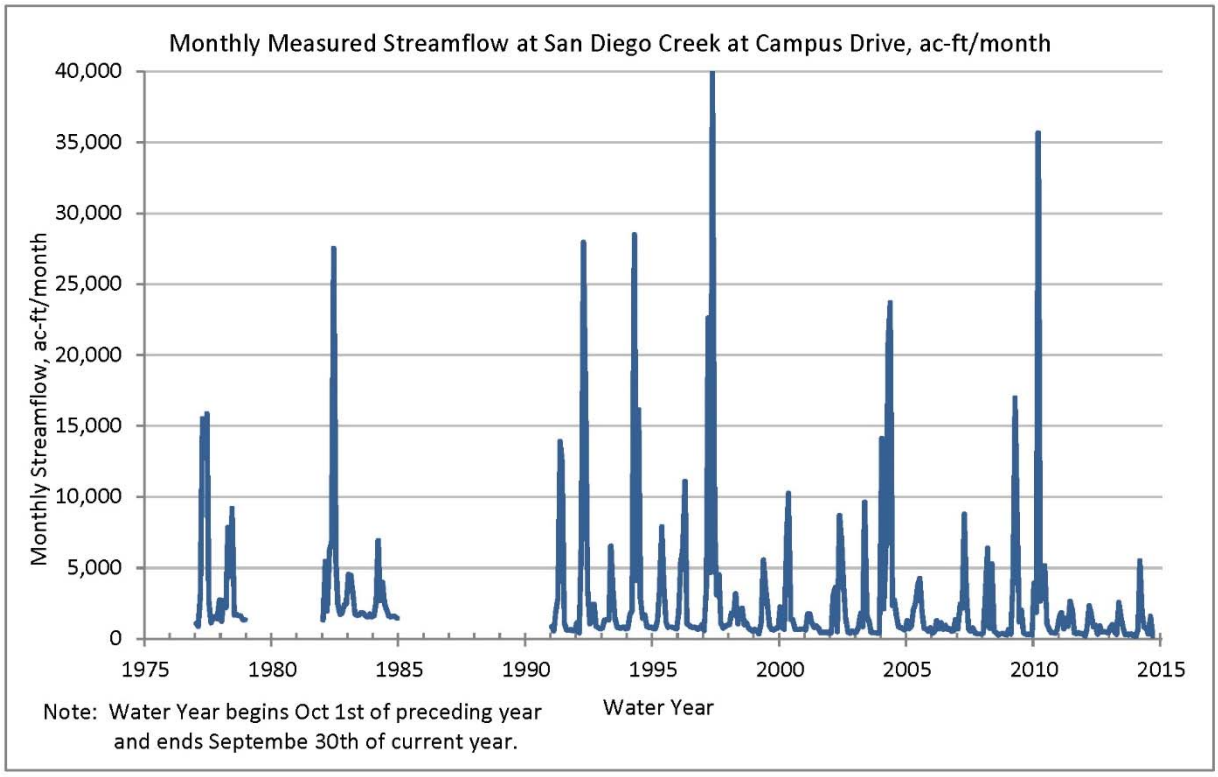


FIGURE 4. MONTHLY HYDROGRAPH: MEASURED STREAMFLOW AT SAN DIEGO CREEK AT CAMPUS DRIVE (WYS 1978-79; 1982-1983; 1992-2015)

1.2 San Joaquin Marsh Description

The broader 500-acre San Joaquin Marsh area is a remnant of an extensive marsh and riparian system that historically existed along the Santa Ana River and San Diego Creek prior to development. Campus Drive bisects the footprint of the historic marsh. The area west of Campus Drive is the San Joaquin Marsh Reserve, managed by the University of California Natural Reserve System (UCNRS). The remaining acreage is owned by IRWD, and designated as the San Joaquin Marsh and Wildlife Sanctuary.

Historically, what are now the six wetland ponds, were duck ponds operated by two private clubs on leased land, under a permit from the California Department of Fish and Game[4], and a City of Irvine firearms permit. When the MWRP was constructed in 1961, the club obtained primary user permits for recycled water from the RWQCB. One month prior to duck season, the ponds were filled to a depth of 2 feet with recycled water, and the water levels were

[4] The State Legislature changed the Department's name to the Department of Fish and Wildlife on January 1, 2013.

maintained, as required, with recycled water. After duck season, the ponds were drained to the UCNRS wetlands to the northwest, ultimately draining into San Diego Creek.

In October 1985, the San Joaquin Marsh was prioritized as the number one open space area in the City of Irvine. The City submitted the General Plan Amendment for San Joaquin Marsh to the voters for approval in 1988. Subsequently, the City of Irvine and The Irvine Company entered into a Memorandum of Understanding, and the City revised the General Plan and Zoning Ordinance in October 1988 in order to accommodate changes in land use for conservation and open space designations. The City of Irvine initiated the formation of the San Joaquin Marsh Working Group to coordinate maintenance, preservation and enhancement activities in the San Joaquin Marsh Area. In 1989, the City of Irvine, in collaboration with the California State Coastal Conservancy, authorized a study to provide an overview of proposed marsh habitats and management practices. The 1989 study proposed a comprehensive plan for the enhancement of the ponds and future management of the San Joaquin Marsh.

When the lease to the duck clubs expired, IRWD spearheaded efforts to maintain and enhance wildlife habitats and open space through the Wetlands Supply Project. The project originally planned to use recycled water to fill the ponds in the winter months. However, through the 1996 Intertie Agreement between IRWD, the City of Newport Beach and the Orange County Water District (OCWD), the Basic Integrated Reuse Project was constructed to create a recycled water intertie from the MRWP to the OCWD Green Acres Project (GAP). As a result, IRWD applied for a permit to use San Diego Creek as supply water for the ponds in lieu of recycled water. IRWD's water right permit application for the San Joaquin Marsh was submitted in 1997, requesting to divert at a rate of 5 cfs from San Diego Creek for wildlife enhancement and a nitrogen removal demonstration project. IRWD proposed reconfiguring the duck ponds into a system of engineered water treatment wetlands that were designed to improve water quality and provide wildlife habitat. Additionally, the project included using wetland effluent as irrigation water for riparian mitigation areas adjacent to the ponds, prior to discharge back into San Diego Creek. Ultimately, IRWD and The Irvine Company jointly restored and enhanced 150 acres as part of a six million dollar project that was completed in 1998.

The benefit of constructed wetlands for nutrient removal of base flows and urban runoff became apparent through the course of the San Joaquin Marsh operation. Building upon the

success of the San Joaquin Marsh for treatment of urban runoff and nutrient removal, Section 35539.12 of the California Water Code granted IRWD the authority to construct, maintain and operate urban runoff treatment facilities within its service area. Using constructed wetlands as Best Management Practices (BMPs) to voluntarily help achieve Basin Plan water quality objectives is the cornerstone of what evolved into IRWD's Natural Treatment System (NTS) Master Plan, as discussed in Section 1.3.5.

1.3 RWQCB Basin Plan and other Regulatory Constraints

Over the past 30 years, water quality in San Diego Creek and Newport Bay has been affected by excessive sediment and nutrient levels, primarily nitrate from fertilizers, elevated levels of pesticides, fecal coliform bacteria, selenium from natural sources, and heavy metals. Because of these water quality problems, San Diego Creek and Newport Bay have been designated as water quality limited by the State of California. The San Joaquin Marsh, which plays an integral role in the implementation plan for providing treatments to help meet water quality objectives in the Basin Plan, is a listed wetland in the Basin Plan and subject to water quality objectives. The San Joaquin Marsh is a critical component of the Municipal Separate Storm Sewer System Permit (MS4 Permit) BMP requirement, and is the model upon which the Natural Treatment System (NTS) Plan is based. The San Joaquin Marsh also functions as a nitrogen offset for the MWRP dewatering discharge under the RWQCB Region 8 General Dewatering Discharge Permit.

1.3.1 RWQCB Region 8 Basin Plan for the Santa Ana River Basin

The SWRCB and the nine RWQCBs are responsible for the protection and, where possible, the enhancement of the quality of the State's waters. The SWRCB sets statewide policy, and together with the RWQCBs, implements state and federal laws and regulations through a Water Quality Control Plan, also called a Basin Plan. San Diego Creek and the San Joaquin Marsh are part of the RWQCB Region 8 Basin Plan for the Santa Ana River Basin, which was updated in February 2016.

Within the Basin Plan, there are 24 categories of beneficial uses, including water contact recreation, non-water contact recreation, municipal water supply, and more. Each body of water in the state has a set of beneficial uses it supports that may or may not include all 24 categories.

Different beneficial uses require different water quality control. Therefore, each beneficial use has a set of water quality objectives designed to protect that beneficial use. Reach 1 of San Diego Creek, which includes the San Joaquin Marsh, is listed in the Inland Surface Streams section of the Beneficial Use Table, and lists the following beneficial uses for San Diego Creek: Water Contact[5] Recreation (REC1), Non-contact Recreation (REC2), Warm Freshwater Habitat (WARM) and Wildlife Habitat (WILD).

Additionally, as part of an overall effort to protect the Nation's wetland resources, the US Environmental Protection Agency (USEPA) has called for states to adopt water quality standards for wetlands. The Basin Plan lists certain wetlands under a "Wetlands" category of beneficial uses, and identifies three types of wetland: naturally occurring, created, and constructed wetlands. The San Joaquin Marsh is listed as a "created wetland", which was created for development mitigation purposes. The Basin Plan lists the following existing or potential beneficial uses for the San Joaquin Marsh created wetland: Water Contact Recreation (REC1), Non-contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), Preservation of Biological Habitats of Special Significance (BIOL), Wildlife Habitat (WILD), and Rare, Threatened or Endangered Species (RARE) habitat support.

Water quality objectives in the Basin Plan are specified according to waterbody type and established at levels that ensure reasonable protection of beneficial uses, consider historic and present water quality and adhere to antidegradation policies. The San Joaquin Marsh is considered an inland surface water for the purposes of water quality objectives, and subject to the water quality objectives listed in the Basin Plan. Additionally, the Basin Plan designates San Diego Creek as the region's pilot nonpoint source watershed project for impairment by excessive sedimentation, nitrates, pesticides and metals.

1.3.2 National Pollutant Discharge Elimination System (NPDES) Permit for the Michelson Water Recycling Plant (MWRP) (Order No. R8-2015-0024, NPDES No. CA8000326)

The discharge of recycled water by the MWRP into San Diego Creek or its tributaries in any manner is prohibited, unless specifically authorized by a separate action by the RWQCB. Stormwater discharges in excess of 1 milligram per liter (mg/L) total nitrogen from the MWRP

[5] Use of water for recreational activities involving bodily contact with water where ingestion of water is reasonably possible. (RWQCB Region 8 Basin Plan, updated Feb 2016)

to San Diego Creek are offset by nitrogen reductions as a result of the diversion and treatment of San Diego Creek flows in the San Joaquin Marsh. Order R8-2015-0024 also specifies a limit of 720 mg/L Total Dissolved Solid (TDS) concentration for discharge to surface water bodies, including IRWD recycled water reservoirs. The TDS limitation is applied on a 12-month flow weighted average that would allow for exceedance during some months as recycled water quality varies seasonally between drier and wetter months.

1.3.3 National Pollutant Discharge Elimination System (NPDES) General Discharge Permit for Discharges to Surface Waters of Groundwater Resulting from Groundwater Dewatering Operations (Order No. R8-2007-0041, NPDES No. CAG918002)

Because of high groundwater elevation at the MWRP, dewatering of the shallow groundwater zone is necessary to protect in-ground facilities. The area is dewatered through a network of shallow zone wells that ultimately convey flows into the San Joaquin Marsh through the dewatering channel. The San Joaquin Marsh, as a tributary to San Diego Creek, is considered a water of the United States (WOTS). The RWQCB regulates the groundwater dewatering discharge from MWRP under the General Discharge Permit, under which IRWD has obtained coverage. Order R8-2007-0041 also implements relevant Total Maximum Daily Load (TMDL) requirements for sediment, nutrients, selenium, metals and organochlorine compounds, as they pertain to dewatering operations (see paragraph 1.3.4).

Order R8-2007-0041 acknowledges that while current groundwater levels exceeded the California Toxics Rule (CTR) limit of 5 micrograms per liter (µg/L) for selenium, a feasible treatment technology does not exist to lower the levels in the discharges to the CTR standard. Therefore, the Order incorporated an alternative compliance approach by authorizing the formation of a Nitrogen and Selenium Management Program (NSMP) Working Group and the implementation of a Work Plan to develop a comprehensive understanding of and management plan for groundwater-related selenium and nitrogen discharges in the Watershed.

1.3.4 Total Maximum Daily Loads (TMDLs) and Municipal Separate Storm Sewer System Permit (MS4)

The SWRCB 2010 Integrated Report (Clean Water Act Section 303(d) List/305(b) Report), maintains San Diego Creek as water quality limited because of nutrients, sedimentation, fecal coliform bacteria, pesticides, selenium, and organochlorine compounds. Newport Bay watershed TMDLs have been established for: nutrients, sedimentation, fecal coliform, and a

number pollutants, including: selenium; several heavy metals; and a several organochloride compounds.

The Orange County Municipal NPDES Stormwater Permit (Stormwater Permit; Order No. R8-2009-0030, NPDES No. CAS618030 as Amended by Order No. R8-2010-0062) regulates the discharges from the MS4 System for Central and Northern Orange County areas. The Stormwater Permit includes provisions for contributing to the compliance with TMDLs, as well as for meeting the overall requirement of the Clean Water Act (CWA) for such permits to reduce pollutants to the "maximum extent practicable." The goal of the state stormwater management program is to achieve water quality objectives in receiving waters. The Stormwater Permit requires permittees to comply with established TMDL Waste Load Allocations (WLA) specified for urban runoff and/or stormwater by implementing the necessary Best Management Practices (BMPs). The San Joaquin Marsh is listed as a receiving water in the Stormwater Permit, and the County of Orange is leading and coordinating watershed activities to address the requirements of the MS4 Permit.

1.3.5 Natural Treatment System (NTS) Master Plan

IRWD, in cooperation with County of Orange and the Cities of Irvine, Lake Forest, Newport Beach, Orange, Santa Ana and Tustin, has developed a Natural Treatment System Master Plan (NTS Plan) to address regional water quality treatment needs (GeoSyntec 2005). The goals of the NTS Plan are to improve water quality in San Diego Creek, its tributaries, and to complement the County- and Cities-led watershed activities for compliance with TMDL targets. Secondary benefits include habitat creation and enhancement, aesthetics, recreation, and education. The NTS Plan consists of a network of created Water Quality Treatment (WQT) wetlands for improving water quality in San Diego Creek. Under the NTS Plan, the San Joaquin Marsh (Site 46 in the NTS Plan) throughput was increased to 10 cfs, and an adjacent site, Small Area Mitigation Site 1 (SAMS-1) was created (Site 62 in the NTS Plan) to modify/enhance SAMS-1.

1.4 Water Right Permit 20979

IRWD submitted an application for a water right with an effective date of April 22, 1997 (Application No. 30618). A permit was subsequently issued by the SWRCB on November 6, 1998 (Permit 20979). The face value of the Permit is 3,600 AFY. Two points of diversion (PODs) are included in the Permit:

- POD 1 at North 546,900 feet , East 1,515,800 feet; and
- POD 2 at North 547,552 feet, East 1,512,995 feet (California Coordinate System, Zone 6)

The purpose of use of the Permit is "Wildlife Enhancement", and the place of use is 140 acres located in Sections 8 and 17 of Township 6S, Range 9W (San Bernardino Base and Meridian). Permit term No. 5 describes the diversion season, diversion rate, and maximum amount diverted:

> *"5. The water appropriated shall be limited to the quantity which can be beneficially used and shall not exceed 5 cubic feet per second to be diverted from January 1 to December 31 of each year. The maximum amount diverted under this Permit shall not exceed 3600 acre-feet per year."*

The Permit states that construction work will be completed by December 31, 2003 (Permit Term 8), with complete application of the water made by December 31, 2007 (Permit Term 9).

Project permittees are required to submit progress reports describing water used by the project. Progress reports require information on monthly diversions and water use, maximum rates of diversion, and the status of the project with regard to construction and full beneficial use. Reporting for progress reports is done on a calendar year basis.

Once a project is complete and water has been put to full beneficial use, a project permittee should notify the SWRCB of the project completion and request a license. California Water Code section 1605 outlines the procedures that the SWRCB will undertake once notified a project is complete:

> *"The board shall as soon as practicable after receiving the report of completion cause to be made a full inspection and examination of the works constructed and the use of water therefrom. The permittee shall furnish the*

> *board with such records, data, and information as may be required to enable the board to determine the amount of water that has been applied to beneficial use and whether the construction of the works and the use of the water therefrom is in conformity with law, the rules and regulations of the board, and the Permit."* (California Water Code § 1605)

Once a license is issued, the licensee will be required to submit an annual "Report of Licensee" which is similar to permittee progress reports, and describes water used by the project within a calendar year. IRWD has not notified the SWRCB that the Permit 20979 project is complete, so an inspection for licensing has not yet occurred, nor has a license been issued.

IRWD has filed progress reports for Permit 20979 with the SWRCB; the diversion and use amounts reported on these progress reports are summarized in Table 3. In four years (2009 through 2012) reported diversions exceeded the 3,600-AFY face value of the Permit. No progress reports could be located for 2000 through 2008.

TABLE 3. DIVERSION AND USE REPORTED ON PROGRESS REPORTS, ANNUAL SUMMARY, 1998-2015

Year	Reported Amounts (million gallons)		Amounts Converted to acre-feet	
	Amount directly diverted or collected to storage	Amount used	Amount directly diverted or collected to storage	Amount used
1998	n/a[1]	611	n/a[1]	1,875
1999	n/a[1]	336	n/a[1]	1,030
Note: no progress reports appear to have been filed for 2000 through 2008				
2009	1,305	182	4,005	558
2010	1,305	117	4,004	360
2011	1,254	10	3,848	32
2012	1,261	0	3,870	0
2013	3200 gpm[2]	3200 gpm[2]	n/a [2]	n/a [2]
2014	3000 gpm[3]	3000 gpm[3]	n/a [3]	n/a [3]
2015	n/a[4]	n/a[4]	3,032	3,032

Notes:
1. The 1998 and 1999 progress report forms did not have a space to enter 'amount directly diverted'. The requested information was called 'amount of water used'.
2. On the 2013 progress report, IRWD reported a constant diversion rate of 3,200 gpm in each month, rather than total volume diverted per month. This amount was reported for both "amount directly diverted" and "amount used".
3. On the 2014 progress report, IRWD reported a constant diversion rate of 3,000 gpm in each month, rather than total volume diverted per month. This amount was reported for both "amount directly diverted" and "amount used".
4. In 2015, IRWD reported diversion amounts in acre-feet.

1.5 San Joaquin Marsh and Wildlife Sanctuary Operations

IRWD has an operations and maintenance manual for the San Joaquin Marsh that provides operating guidelines to ensure water management and water quality objectives are being met. Over time, the guidelines have been further refined by the IRWD's Natural Resources and Marsh operational management staff through an informal adaptive management process that capitalizes on monitoring data and operational experience to maximize performance and maintain habitat across changing environmental and regulatory conditions. As is demonstrated by the San Joaquin Marsh monitoring data discussed below in Chapter 3, IRWD effectively manages a complex system of constructed treatment wetlands, ponds, and streams; riparian mitigation areas; and natural riparian marshes in a manner that balances water quality objectives with natural resource and recreational open space management. The hydraulic pathways through the various components of the San Joaquin Marsh are shown in Figure 5.

The primary water supply to the San Joaquin Marsh is base flow diverted from San Diego Creek under Permit 20979. However, approximately 0.3 MGD enters Pond 5 through permitted discharge of groundwater dewatering operations at the MWRP. Additionally, there are six stormdrains that drain from the surrounding developments to the north and west into the Carlson Marsh, the North Michelson Pond, or the North Carlson Pond. At least one of the stormdrains provides a near constant flow (less than 10 gpm, estimated) to the North Carlson Pond of what appears to be dewatered groundwater from the surrounding developments.

There are two intake pumps from San Diego Creek capable of diverting 3,400 GPM (7.6 cfs) and 3,800 GPM (8.5 cfs) independently, or 6,000 GPM (13.3 cfs) if operated together. During normal operations, only one pump is operated at a time. The pumps normally operate between 10 PM and 8 AM, in order to capitalize on lower utility costs.

Water that is diverted from San Diego Creek flows through an engineered, eight pond, surface water treatment wetland. Pollutant removal/transformation is achieved via a number of physical (e.g., adsorption, sedimentation) and biogeochemical (e.g., nitrogen cycle, carbon cycle) processes. The wetland effluent is either pumped out to San Diego Creek, or is used to irrigate mitigation wetlands located north and west of the ponds. The wetland effluentpump generally operates during the same hours as the intake pump, except during large storm events, when the pump is used to remove stormdrain inputs. The amount of effluent that is recirculated into the mitigation area is adjustable, and varies seasonally. Return flow from the mitigation area normally flows back into Pond 5 through the Carlson Marsh, and into Pond 6 through the Linear Pond. The riparian mitigation areas are flooded annually for a two- to four-week period, one to two cycles per year, for ecosystem maintenance and to mimic natural wintertime, high-flow inundation. At the conclusion of the flooding period, water is released to UCNRS through a culvert that passes underneath Campus Drive.

Document Path: I:\jn2478\SanJoaquinMarch_Detail_arrows.mxd

STETSON ENGINEERS INC.

Background: NAIP 2014

SAN JOAQUIN MARSH

0 325 650 Feet

FIGURE 5

The amount of water lost to evaporation, evapotranspiration by the plants, and seepage to groundwater from the San Joaquin Marsh varies seasonally and by type of hydrologic year (wet, normal or dry). Generally, during wet or colder periods, less water is lost to evapotranspiration, and more water is gained through groundwater interactions, dewatering, and stormdrain inputs.

The Peters Canyon Channel Water Capture and Reuse Pipeline Project, Reduced Discharge Technical Study (ESA, 2015) cites that hydraulic retention time of the main ponds within the San Joaquin Marsh (Ponds 1-6) to be approximately 10 to 14 days in the summer and 17 to 21 days when water levels in the engineered treatment ponds were elevated. However, the study failed to account for the volume of the ponds, streams, dewatering channel and the water conveyances through the Carlson Marsh and riparian mitigation areas. Additionally, the treatment wetland pond volumes may have been underestimated by assuming two feet of depth, which is up to two feet less than their normal operating depth. Accounting for these additional volumes would increase the hydraulic retention time through the San Joaquin Marsh.

A more detailed description of how the various components of the San Joaquin Marsh are managed can be found in Appendix A.

1.6 Similar Projects with Water Rights Permits

Within the RWQCB Region 8, there are eight appropriative water rights listed in the SWRCB's electronic Water Rights Information Management System (eWRIMS) database with a use type of "Fish and Wildlife Preservation and Enhancement" (Table 4). Five of eight water rights are licensed and three are permitted. The five licensed rights are generally for small projects, and none of them have a treatment wetland component. In general, these projects are small storage ponds for recreational, fire protection, wildlife and/or irrigation uses.

IRWD's Permit 20979 is one of the three permitted rights. The other two permitted rights belong to Elsinore Valley Municipal Water District and Orange County Water District (OCWD). Each of these permits includes multiple use types in addition to wildlife enhancement. Elsinore Valley's permit is for storage in Lake Elsinore and does not have a wetland component. OCWD's permit is for multiple diversion points on the Santa Ana River and multiple use types, including wildlife enhancement at the Prado Wetland. Progress reports for the OCWD permit were reviewed for relevance to the San Joaquin Marsh. However, diversions for all use types

were reported as a combined set of numbers, and therefore, quantities of diversions to the Prado wetland were not available, nor were any water quality or performance data.

TABLE 4. PERMITTED OR LICENSED PROJECTS REVIEWED FOR SIMILARITY TO PERMIT 20979

App. Number	Permit ID	License ID	Status	Status Date	Primary Owner	Face Value (AFY)	County	Watershed
06108	003344	001649	License	10/31/1928	US San Bernardino Natl Forest	10.1	San Bernardino	Santa Ana
08552	004739	002382	License	02/10/1936	Crossline Community Church	108.5	Orange	Newport Bay
10899	006334	004167	License	10/09/1944	Crossline Community Church	111.5	Orange	Newport Bay
20966	014127	008726	License	10/03/1962	U S Cleveland Natl Forest	1.7	Orange	Santa Ana
28302	019624	012992	License	10/30/1984	Top Capital LLC	7.3	Riverside	Santa Ana
27570	18962	13663	License	11/02/1982	PG&E	72,550	Plumas	Feather
29408	20952	--	Permit	02/02/1989	City of Thousand Oaks	15,683	Ventura	Calleguas Creek
30618	020979	--	Permit	04/21/1997	Irvine Ranch Water District	3,600	Orange	Newport Bay
30502	021165	--	Permit	04/05/2004	Elsinore Valley Municipal Water District	11,200	Riverside	Santa Ana
31174A	021243	--	Permit	06/30/2009	Orange County Water District	362,000	Orange, Riverside	Santa Ana
26541B	20897	--	Permit	09/24/1980	So. Cal Edison	19,687	Mono	Lahontan

One wildlife enhancement project outside of Region 8 was also reviewed, Permit 20952, owned by City of Thousand Oaks. The right holder owns and operates Hill Canyon Waste Water Treatment Plant that discharges tertiary treated waste water to Conejo Creek. Permit 20952 authorizes the right holder to divert up to 21.7 cfs for a maximum of 15,683 AFY. The season of diversion is year-round, and the purposes of use are Irrigation within the Camrosa and Pleasant Valley Water Districts, and Fish and Wildlife Preservation and Enhancement within a

Confluence Wetland. The majority of the water is diverted to provide irrigation within the water districts, but 6 cfs are bypassed for the purpose of Fish and Wildlife Preservation to a 6.7-acre Confluence Wetland pond turtle mitigation wetland associated with the construction of the Hill Canyon Wastewater Treatment Plant. The permittee submits the results of the monitoring and reporting for the pond turtle mitigation program with their Progress Report by Permittee.

Two hydroelectric projects were considered as similar projects, because appropriations are diverted for the purpose of use, which in this case is Hydroelectric Power Generation, but the water is not consumed as part of the use. Rather, water is returned to the system after it serves its permitted purpose. We evaluated how these projects were reporting use in their diversion and use statements. The two projects considered were the Pacific Gas and Electric Company's Belden Dam (License 13663) and the Southern California Edison's Agnew Lake Dam (Permit 20897). The projects are similar to the San Joaquin Marsh in that diversion and use of water is restricted to point of diversion and the place of use stated in the permit. Devices are required to measure the quantity of water diverted, and annual reporting is required to document diversion and use. In both cases, the owners are reporting the amount used as equal to the amount diverted, regardless of the fact that the water was subsequently returned to the system at some point downstream from the point of diversion.

2.0 PERMIT 20979 PERFORMANCE AND USE

An annual summary of volume in and out of the San Joaquin Marsh for calendar years 1998 through 2015 was developed based on metered data received from IRWD (Table 5). The average annual volume pumped into the San Joaquin Marsh from San Diego Creek was 3,570 AFY, while the average volume discharged from the Marsh to San Diego Creek was 3,050 AFY. The volume of diversions exceeded the 3,600 AFY face value of Permit 20979 in eleven out of eighteen years in the table (bold entries in Table 5). See Appendix B for monthly inflow and outflow data, as well as additional operational quantities. Values in Table 5 are reported in both millions of gallons (MG) and in acre-feet (AF) to enable comparisons to the SWRCB progress reports, which use the former units, and the Permit 20979 terms, which use the latter.

TABLE 5. VOLUME IN AND OUT OF SAN JOAQUIN MARSH, ANNUAL SUMMARY, 1998-2015

	Marsh Flow (MG)		Marsh Flow (AF)	
Year	**Inflow**	**Outflow**	**Inflow**	**Outflow**
1998	492	433	1,510	1,329
1999	1,048	712	3,217	2,186
2000	656	434	2,014	1,332
2001	1,418	1,286	**4,351**	3,946
2002	1,290	1,009	**3,958**	3,097
2003	1,349	1,131	**4,141**	3,471
2004	890	796	2,730	2,444
2005	696	722	2,135	2,216
2006	1,281	1,182	**3,931**	3,627
2007	913	823	2,803	2,527
2008	1,390	1,197	**4,266**	3,672
2009	1,305	1,123	**4,005**	3,447
2010	1,304	1,265	**4,003**	3,882
2011	1,254	1,432	**3,848**	4,394
2012	1,450	1,210	**4,449**	3,713
2013	1,355	1,154	**4,158**	3,541
2014	1,206	809	**3,702**	2,484
2015	988	603	3,032	1,851
Average*:	1,164	993	3,573	3,049
Max*:	1,450	1,432	4,449	4,394
Min*:	656	434	2,014	1,332

*Statistics for 1999-2015 since 1998 does not have complete data for the year

2.1 Annual Reporting to the SWRCB

Reported diversions (from Table 3) and metered diversions (from Table 5) are compared in Table 6. This comparison shows some discrepancies in how diversions were reported, namely in 2012, in which 3,870 AF were reported as diverted, but 4,449 AF were metered as inflow to the San Joaquin Marsh.

Future progress reports will require IRWD to continue to provide estimates of diversions and use for Permit 20979. In some previous years, "use" was reported to be less than diversions, and appeared to be based on the volume of water consumed by the San Joaquin Marsh (i.e. not returned to the stream). However, for future progress reports, diversions and use should be reported as the same number, with both based upon the total volume diverted. Because Permit

20979 is for Wildlife Enhancement, all water diverted to the San Joaquin Marsh may be considered as put to beneficial use, as this water is necessary to support habitat and properly operate the San Joaquin Marsh.

IRWD reported diversions of 3,032 AF and use of 3,032 AF in 2015. This value matches the metered pump inflow to the San Joaquin Marsh and is the correct value to report, both for diversion and use. Future progress reports to the SWRCB should follow the methods used for the 2015 report.

TABLE 6. COMPARISON OF REPORTED AND METERED DIVERSIONS, ANNUAL SUMMARY, 1998-2015

Year	Amount Diverted	
	Reported Amount, from SWRCB Progress Reports (AF)	Metered Amount, from SJM Inlet Pumps (AF)
1998	n/a[1]	1,510
1999	n/a[1]	3,217
2000	*no progress reports appear to have been filed for 2000 through 2008*	2,014
2001		4,351
2002		3,958
2003		4,141
2004		2,730
2005		2,135
2006		3,931
2007		2,803
2008		4,266
2009	4,005	4,005
2010	4,004	4,003
2011	3,848	3,848
2012	3,870	4,449
2013	n/a [2]	4,158
2014	n/a [3]	3,702
2015	3,032	3,032

Notes:
1. The 1998 and 1999 progress report forms did not have a space to enter 'amount directly diverted'. The requested information was called 'amount of water used'.
2. On the 2013 progress report, IRWD reported a constant diversion rate of 3,200 gpm in each month, rather than total volume diverted per month. This amount was reported for both "amount directly diverted" and "amount used".
3. On the 2014 progress report, IRWD reported a constant diversion rate of 3,000 gpm in each month, rather than total volume diverted per month. This amount was reported for both "amount directly diverted" and "amount used".

2.2 Licensure

As described in Section 1.4, the SWRCB intends that a project proceed to licensure once construction is complete and water has been put to full beneficial use. Evaluation of diversions to the San Joaquin Marsh for 1999 to 2015 shows that diversions have exceeded 3,600 AFY in eleven out of eighteen years. This is sufficient demonstration of full beneficial use.

Prior to filing a notice of completion, IRWD should consider whether a change to the Permit terms is warranted. Specifically, the following Permit terms may be modified:

- Permit 20979 Term 4, Place of Use: the current place of use is 140 acres, but the total San Joaquin Marsh area is 500 acres. IRWD should consider including additional areas of the greater San Joaquin Marsh in the Permit's place of use if those additional areas consistently use water from San Diego Creek.
- Permit 20979 Term 5, Rate of diversion: Review of pump records shows that the permitted maximum diversion rate of 5 cfs is often exceeded, both on an instantaneous basis and when flow rates are averaged on a daily basis.
- Permit 20979 Term 9, Application to Authorized Use: The complete application of the water to the authorized use shall be made by December 31, 2007. Consideration of facilities or diversions performed under Permit 20979, after that date, may require a request for time extension.

In addition, if IRWD wishes to divert a larger volume than the face value of 3,600 AFY in future years, an application for a new permit to appropriate the additional water will be required.

3.0 MARSH PERFORMANCE - WATER SUPPLY AND WATER QUALITY

Future changes in hydrology and upstream conditions may affect water supply available at the San Joaquin Marsh. Changes in streamflow can then affect water quality performance of the San Joaquin Marsh. This portion of the memorandum assesses the San Joaquin Marsh performance under existing and future conditions.

3.1 Water Supply Availability

The constructed wetlands of the San Joaquin Marsh are supplied by water from San Diego Creek (Figure 5)[6]. For this technical memorandum, Stetson evaluated water availability on San Diego Creek only using data from the USGS, OCPW, IRWD, and a previous study by ESA (2015).

3.1.1 Hydrologic Conditions

Streamflow on San Diego Creek is gaged at Campus Drive, located just downstream of the San Joaquin Marsh outlet. This gage, in combination with inflow and outflow records for the San Joaquin Marsh, can be used to estimate volume of flow available for diversion to the San Joaquin Marsh. This method of analysis was utilized in ESA's study of a water capture and reuse project on Peters Canyon Wash (ESA, 2015). Peters Canyon Wash is a tributary to San Diego Creek and represents approximately 35% of the drainage area of the San Diego Creek at Campus Drive gage. The study examined how the San Joaquin Marsh would be impacted by increased diversions on Peters Canyon Wash.

Similar procedures as outlined in the 2015 study by ESA were utilized to estimate flows at the San Joaquin Marsh inlet (ESA, 2015; see page 23 and Figure 11). Flow at the San Joaquin Marsh inlet was calculated on a daily basis as flow measured at the Campus Drive gage, plus net water used by the San Joaquin Marsh (i.e. the difference between daily inflow and outflow at the San Joaquin Marsh pumps). An adjustment factor was used for the contribution from Sand Canyon, which enters San Diego Creek between the San Joaquin Marsh inlet and the Campus Drive gage. A factor of 7% was used, per the ESA study. Flows were estimated using these methods for water years 1999 through 2015.

Prior to implementation of the San Joaquin Marsh project, the USGS and OCPW measured flows at the Campus Drive gage location. The USGS measured flows during WYs 1978-89 and 1983-1985. OCPW began measurements at that location in 1989, with data recorded consistently starting in WY 1992. These pre-project flow measurements were used to estimate flow available at the San Joaquin Marsh inlet. Combined with the data from the Peters Canyon study, 29 years of flow data were available during the 38-year period from WY 1978

[6] Stormwater and discharge form MWRP groundwater dewatering may enter Ponds 5 and 6 of the constructed wetlands and be discharged to San Diego Creek from the wetland effluent pump.

through 2015 (no data for WY 1980-1982 and WY 1986-1991). The occurrence of annual streamflow at the San Joaquin Marsh inlet and precipitation at the Irvine weather station is shown in Figure 6. The graph shows 29 years of precipitation and streamflow, ranked and plotted in descending order. When compared to historical precipitation records, the 29-year period represents a hydrologic period with both wet and dry periods. It includes the two wettest years on record (WY 1978 and 1983) as well as the recent drought from WY 2011 to 2015.

An occurrence curve, such as the one shown in Figure 6, is often used to separate years into different hydrologic conditions. Three categories have been defined based on the total volume of annual streamflow: Wet years are those with more than 34,500 AFY; Normal years are those with less than 34,500 AFY but more than 17,000 AFY; and Dry years are those with less than or equal to 17,000 AFY. These break points correspond approximate to the 25th and 75th percentiles. Wet years are the upper quartile of years; Dry years are the lower quartile of years; and Normal years represent the two middle quartiles.

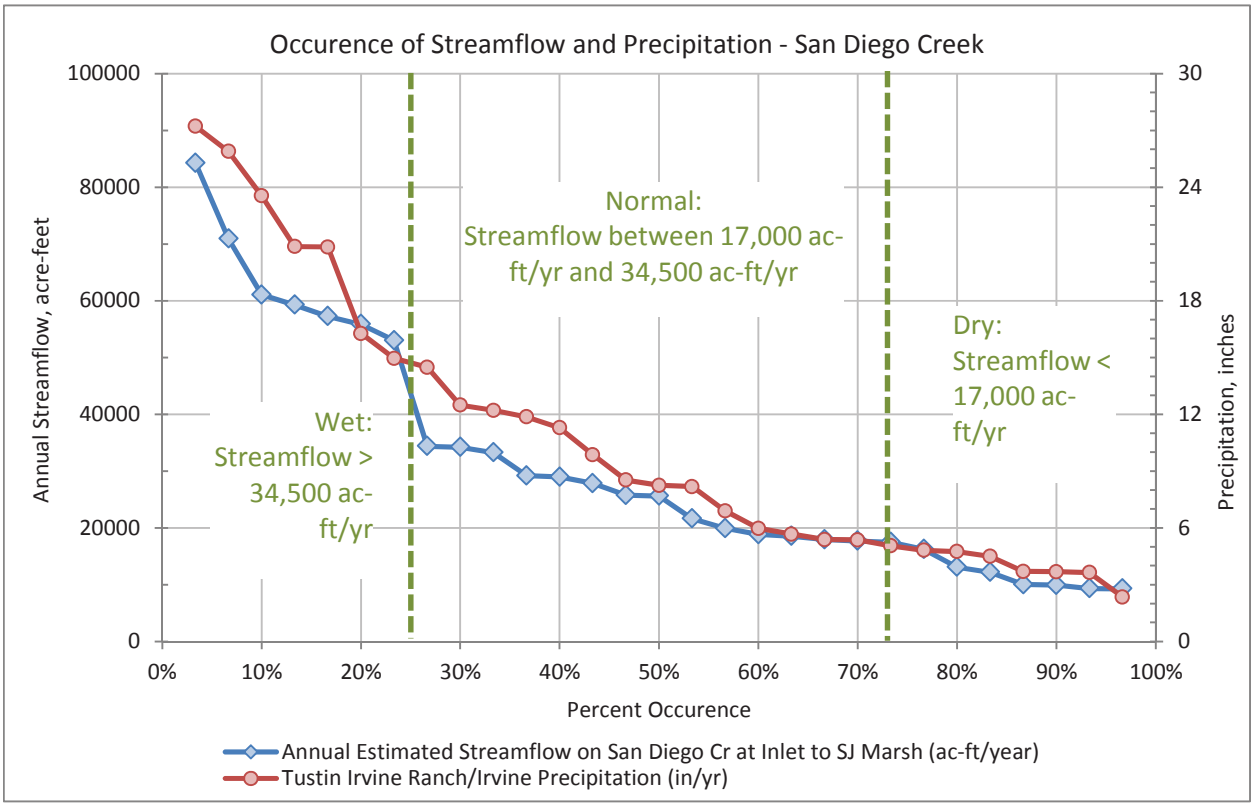


FIGURE 6. OCCURRENCE OF ANNUAL STREAMFLOW AND PRECIPITATION (WYS 1978-79; 1982-1983; 1992-2015)

3.1.2 Existing Diversions Under Varying Hydrologic Conditions

IRWD provided daily inflow and outflow records for San Joaquin Marsh for 1998 through 2015. A summary of that data was presented previously in Table 5. For 1999 through 2014[7], annual project diversions are compared to annual streamflow estimated at the San Joaquin Marsh inlet in Figure 7. The scatter plot shows no correlation between the amount of streamflow and the amount of water diverted. There are two likely causes for this: (1) practical operational considerations may have been the primary driver of diversion volumes (i.e. in 2005, diversion facilities were not operable for part of the year); and (2) the lack of correlation may be due to water being available in most years to satisfy the permitted amount of 3,600 AFY; that is, there is no correlation because water is available in most years. This concept is illustrated in Figure 8, which shows diversions compared to precipitation for 1999 – 2013. Note that during the recent dry period (WY 2009 – 2013), annual diversions exceeded 3,600 AFY in each year. Despite drying conditions, IRWD was able to divert water to satisfy or exceed the Permit terms in all of these years.

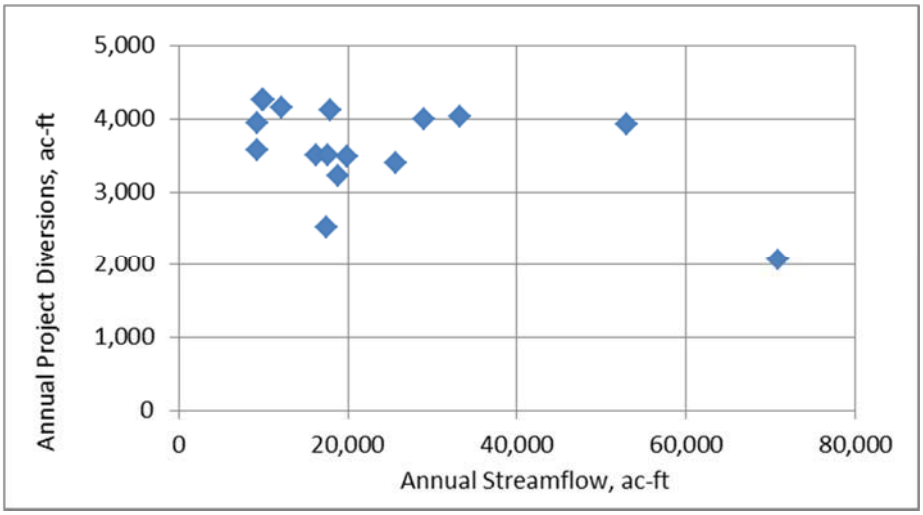


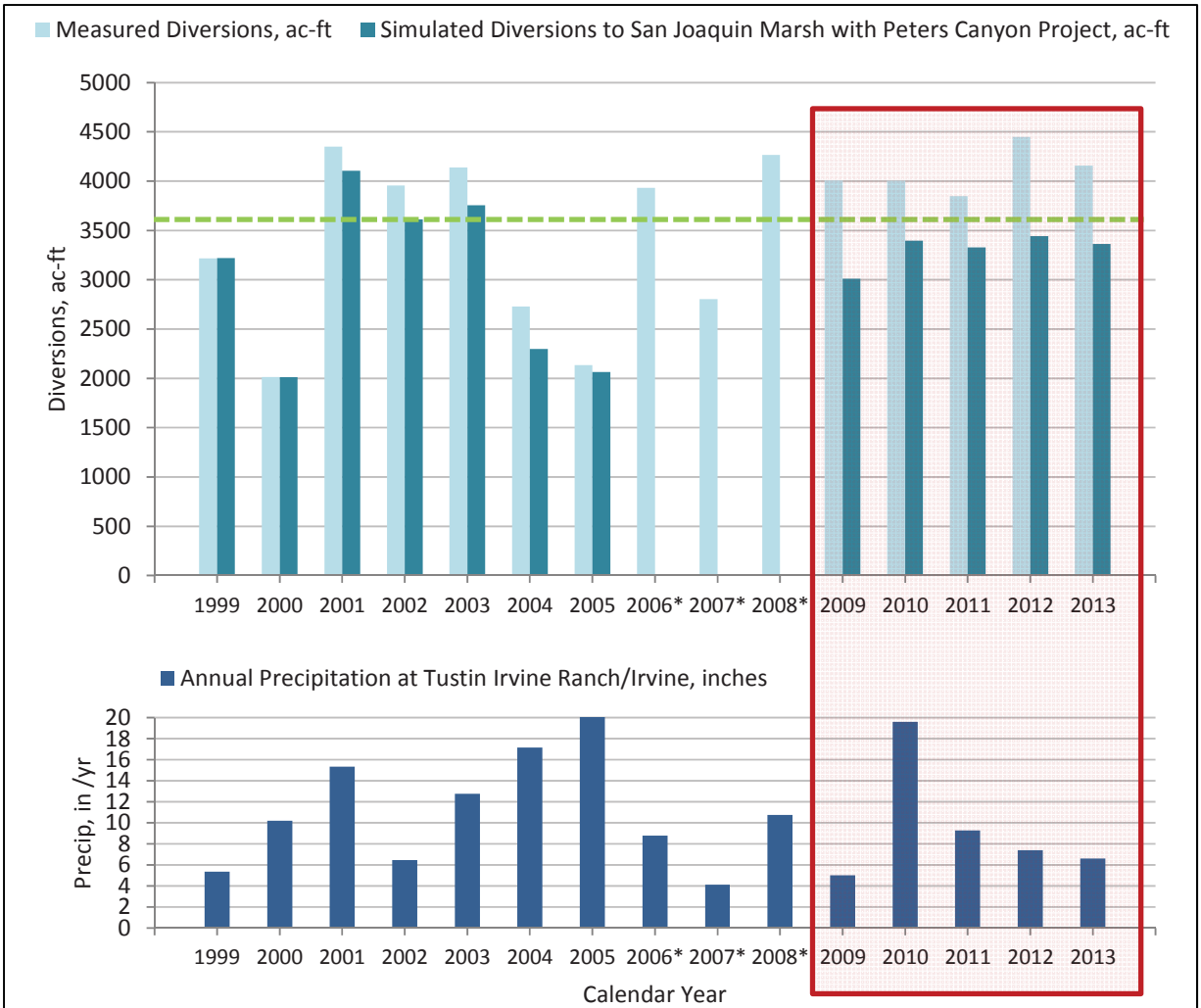
FIGURE 7. ANNUAL PROJECT DIVERSIONS COMPARED TO ANNUAL ESTIMATED STREAMFLOW AT THE MARSH INLET, 1999-2014

[7] WY 2015 was not included because flow at Campus Drive was only available through June 2015 (OCPW, 2016).

3.1.3 Future Diversions Under Varying Hydrologic Conditions

The 2015 ESA study of the Peters Canyon Channel Water Capture and Reuse Project estimated that flows to San Joaquin Marsh might be reduced by up to 19% due to the Peters Canyon Project. Increased diversions on Peters Canyon Wash were simulated, and reduced streamflow from that portion of the watershed was then simulated at the San Joaquin Marsh inlet. The impact of 19% was based on calculations for 2009 through 2013, a 5-year period that, on average, was drier than the 14-year period from 1999 through 2013.

In Figure 8, diversions under existing conditions are compared to diversions with the implementation of the Peters Canyon project. The top portion of the graph shows measured diversions for 1999 through 2013, as well as simulated diversions with the Peters Canyon project for the same period. This analysis relied on the simulated data at Peters Canyon for the 14-year period from 1999 through 2013 prepared in a previous study (ESA ,2015). No new simulation of flows at Peters Canyon was completed for this memorandum. The 19% impact can be seen in the years highlighted in the red box: diversions in each year are reduced from above 3,600 AFY to less than 3,600 AFY. This indicates that the implementation of the Peters Canyon project could impact the ability to maximize beneficial use under Permit 20979. The bottom portion of the graph shows precipitation. The 2009 to 2013 period was relatively dry, especially the latter three years. The impacts of the Peters Canyon project would be most pronounced in dry periods. In more normal or wet years (i.e. 2001 or 2005), reductions in diversions due to the Peters Canyon project would be minimal. In 2010, which was a wet year, the Peters Canyon project would impact diversions by reducing from over 3,600 AFY to less than 3,600 AFY.



Notes:
Green dotted line in top graph represents 3,600-AFY face value of Permit 20979.
Red box highlights 5-year dry period from 2009 to 2013. Impacts of Peters Canyon Project were assessed during this period (ESA, 2015).
Sources: Measured diversions from IRWD data at San Joaquin Marsh pump intake. Simulated diversions computed in previous study (ESA, 2015). Precipitation data from Tustin Irvine Ranch and Irvine Stations (WRCC/CIMIS; see Figure 6), but shown by calendar year.
*Gage on Peters Canyon Wash was out of service from October 2006 through September 2008 so simulated results not available for this time period; Simulated flows in 2006 are for partial year; no data for 2007 or 2008.

FIGURE 8. EXISTING DIVERSIONS COMPARED TO SIMULATED DIVERSIONS WITH IMPLEMENTATION OF PETERS CANYON CHANNEL WATER CAPTURE PROJECT

A preliminary assessment of future diversion scenarios, based on the 1999 through 2013 period for which data are available, was performed for the Peters Canyon Study. This preliminary analysis is intended to provide general estimates of diversions that might be available under future conditions.

Future water supply scenarios that may be investigated to determine available diversions are listed in Table 7. The first two scenarios were previously established in the 2015 study by ESA. Scenario 1 represents actual diversions that were measured in the San Joaquin Marsh since

1999. Scenario 2 is ESA's simulation of how diversions would be impacted by the Peters Canyon water capture project. Scenario 3 is a future simulation in which diversions are limited to 5 cfs per day per the limit of Permit 20979. Scenario 4 is the same as Scenario 3 but includes the Peters Canyon Project. Scenario 5 looks at the option of adding a new permit with an additional right to divert 5 cfs (for a total of 10 cfs per day[8]). Scenario 6 is the same as Scenario 5 but includes the Peters Canyon Project.

TABLE 7. SUMMARY OF WATER AVAILABILITY SCENARIOS AND ESTIMATED DIVERSIONS TO SAN JOAQUIN MARSH

Scenario / Assumptions	(1) Historical	(2) Historical + Peters Canyon Project	(3) Future, 5 cfs max per day	(4) Future, 5 cfs max per day, plus Peters Canyon Project	(5) Future, 10 cfs max per day	(6) Future, 10 cfs max per day, plus Peters Canyon Project
Diversion of baseflows only[1]	✓	✓	✓	✓	✓	✓
Historical diversions	✓	✓				
Future diversions - 5 cfs max per day			✓	✓	✓	✓
Peters Canyon Water Capture Project		✓		✓		✓
New permit - additional 5 cfs per day						✓
Diversions (AFY)[2]						
Normal Conditions	3,600	3,600	TBD[3]	TBD[3]	TBD[3]	TBD[3]
Dry Conditions	3,600	3,350	TBD[3]	TBD[3]	TBD[3]	TBD[3]

1. Storm flows not diverted; baseflows defined as less than 18.6 cfs per day, per Peters Canyon study (ESA, 2015).
2. Normal conditions are average diversions for 12-year period of 1999-2005 and 2009-2013; Dry conditions are average values for 2009 - 2013. Simulation period is based on availability of data for Peters Canyon study (ESA, 2015) which covered 1999 through 2013.
3. Quantities to be determined: these quantities rely upon decisions about future operations related to Permit 20979, including: (1) the maximum rate of diversion that will be utilized in the future, and (2) the additional diversion volume and flow rate that would be sought under a new permit. Quantities may be calculated once decisions on future Permit changes and operations are determined. See Conclusions and Recommendations in Section 5.

Water supply availability at San Joaquin Marsh will be less than 3,600 AFY during dry hydrologic conditions under historical operations when the Peters Canyon Project is fully operational. Diversion results may be determined for normal conditions and for dry conditions,

[8]A new permit with an additional right of 5 cfs was proposed based on reviewing existing diversions and operations: should the existing Permit be restricted to a daily maximum of 5 cfs under future conditions, an additional 5 cfs could be diverted on days when flows exceed 10 cfs or more at the Marsh inlet. The annual volume that this would yield has not yet been calculated.

for scenarios 3 through 6, based on recommended changes to Permit 20979, current operations, and future demand requirements. The hydrologic classifications identified in Section 3.1.1 were applied to the years used in this analysis[9]. Normal conditions represent the 12-year period from 1999-2005 and 2009-2013[10] and include five dry years, four normal, and three wet. The five-year dry period from 2009 to 2013 consists of three dry years, one normal and one wet.

3.1.4 Base Flow and Storm Flow Characteristics

Streamflow in San Diego Creek will be reduced year-round with the Peters Canyon project, with baseflows in the summer being more greatly impacted. Subsequently, diversions are reduced by the highest percentages in May through September. The analysis presented in the previous section, and shown in Figure 8, is based on using daily data to estimate reductions in diversions to the ponds.

Baseflows are generally defined as flows on the falling, or receding, limb of a storm hydrograph, which occur after storm flows have subsided. A qualitative analysis of baseflow was performed for flow in San Diego Creek, upstream of the San Joaquin Marsh, before diversions are taken from the Creek. The data show baseflows have decreased since the 1970s and 1980s from values that ranged between 10 cfs and 20 cfs to recent baseflows that show a minimum between 5 cfs and 6 cfs. While some of the change may be due to natural hydrologic variation, anthropogenic activities have likely impacted available streamflow.

For example, review of storm characteristics in two wet years, 1983 and 2005, shows that baseflows in 2005 were lower than in 1983. Figure 9 shows the comparison of daily streamflow on San Diego Creek upstream of San Joaquin Marsh for WY 1983 and WY 2005. Both years were hydrologically wet and had similar amounts of rainfall: about 26 inches of rainfall in WY 1983 compared to about 29 inches of rainfall in WY 2005[11]. In WY 1983, after arrival of a storm, base flows receded to values typically greater than 20 cfs. In WY 2005, baseflows receded

[9] The hydrologic categories were developed using existing streamflow data that covered a 29-year period. The categories were then applied to the study period of 1999-2013 so that a broader range of hydrologic conditions would be considered when categorizing the shorter study period. The study period was limited to 1999-2013 based on the available data in the Peters Canyon study (ESA, 2015).

[10] 2006 through 2008 are not included because data were not available for the Peters Canyon water capture project; rather, averages are presented only for years in which comparisons could be made for all scenarios.

[11] Rainfall totals from Tustin Irvine Ranch/Irvine data (WRCC 2016; CIMIS 2016).

to values typically around 10 cfs. Although based on limited streamflow data, this trend of reduced baseflows could continue in future years.

Over the last few decades, the drainage area of San Diego Creek has experienced an increase in urbanization. The population of the City of Irvine has increased from about 62,000 people in 1980 to over 250,000 people in 2016 (US Census Bureau, 2017). In general, urbanization of areas increases impervious area, which leads to higher storm peaks and less infiltration of rainfall into the ground. Changes in the shape of storm hydrographs were not assessed for this study. A rainfall-runoff model of the watershed, which incorporates changes in land use and water management practices, could be used to complete a longer-term record and assess differences between natural and anthropogenic changes. A rainfall-runoff model can simulate changes in impervious area to model changes in storm hydrographs.

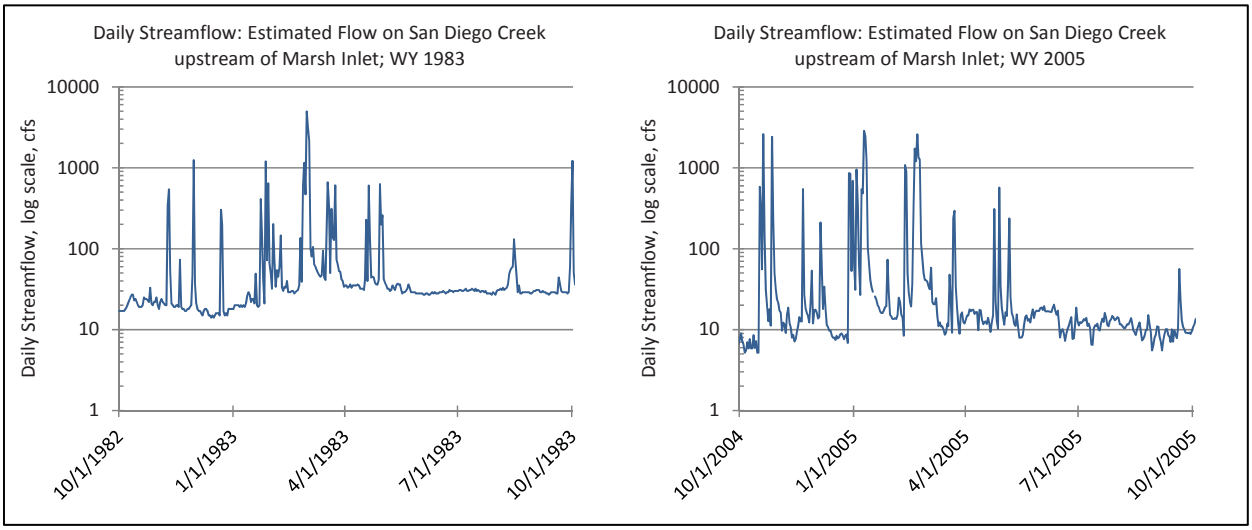


FIGURE 9. COMPARISON OF DAILY STREAMFLOW ON SAN DIEGO CREEK UPSTREAM OF SAN JOAQUIN MARSH IN WY 1983 AND WY 2005

3.2 Water Quality Performance

IRWD measures many water quality constituents within San Joaquin Marsh and at the inflow and outflow of the Marsh. Sampled constituents are given in Table 8. Sampling frequencies vary between annually and monthly. Nitrogen, ortho-phosphate, turbidity and chlorophyll are sampled most frequently, generally about once per month. For some constituents, sampling intervals have been reduced as consistent concentrations have been measured over time.

TABLE 8 SUMMARY OF CHEMICAL CONSTITUENTS MEASURED AT THE SAN JOAQUIN MARSH

Analyte	Analyte
Arsenic	Sediment
Cadmium	Selenate
Chlorophyll	Selenite
Chromium	Selenium
Copper	Total Coliform
E. coli	Total Hardness
Enterococcus	Total Nitrogen
Lead	Turbidity
Mercury	Zinc
ortho-Phosphate	Others (including various oil and grease, pesticide, and surfactant constituents)

Presently, nitrogen, ortho-phosphate, turbidity and chlorophyll are sampled most frequently, generally about once per month. For other constituents such as arsenic, cadmium, chromium, copper, lead, and mercury, current intervals between sampling events is approximately once to twice per year. Previously, sampling intervals during the late 1990s and early 2000s was daily for nutrients and monthly or semi-monthly for the metals.

Representative constituents have been selected and graphed to describe general water quality trends within San Joaquin Marsh. A full water quality analysis, including flow-weighted loading calculations, has not been conducted at this time. Stetson recommends that a full water quality analysis be conducted in the future to quantify loading and removal efficiencies using flow-weighted methods.

Representative constituents of nitrogen, selenium, chlorophyll, ortho-phosphate, and turbidity are graphed in five panels in Figure 9. Panel A shows the chlorophyll concentration over time. Chlorophyll can be an indicator of the presence of algae. In general, concentration of chlorophyll are greater in the out flow than in the inflow. This may indicate that the San Joaquin Marsh adds biomass to San Diego Creek. The significance of this loading has not been assessed.

Panel B shows concentration of ortho-phosphate, which is an inorganic form of phosphate and component of total phosphorus concentration. Over time, concentration of ortho-phosphate in both the inflow and outflow of the San Joaquin Marsh has decreased. Concentration of ortho-phosphate in the effluent out of the San Joaquin Marsh is generally less than

concentrations into the marsh. For the past several years, concentration in both inflow and outflow has generally been less than 0.2 mg/L.

Panel C shows concentration of selenium. Selenium appears to have a seasonal pattern, with concentration peaking sometime in the winter or early spring, presumably due to storm runoff. Concentration in outflow is generally less than in inflow, indicating that San Joaquin Marsh is effective for selenium removal.

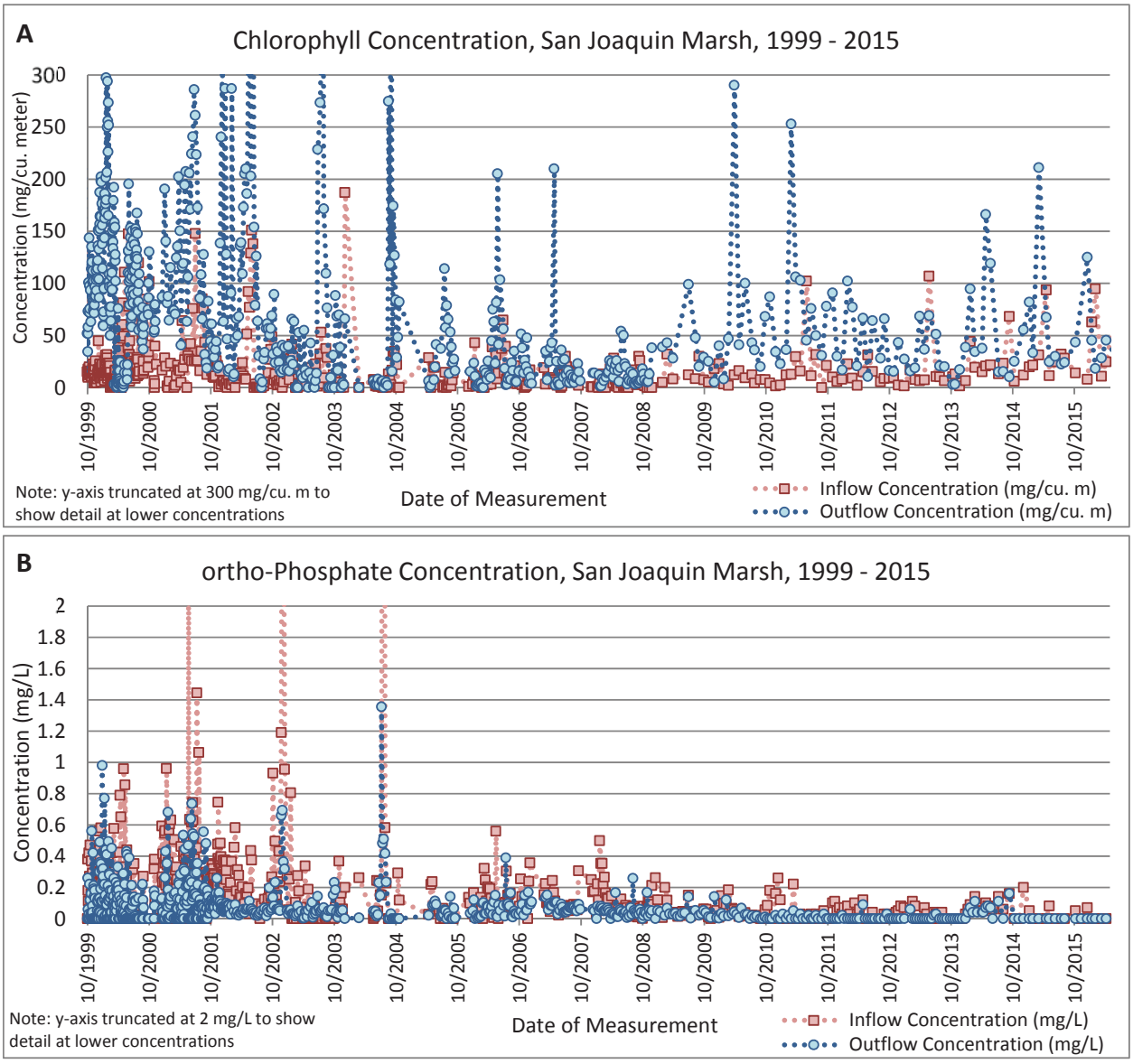
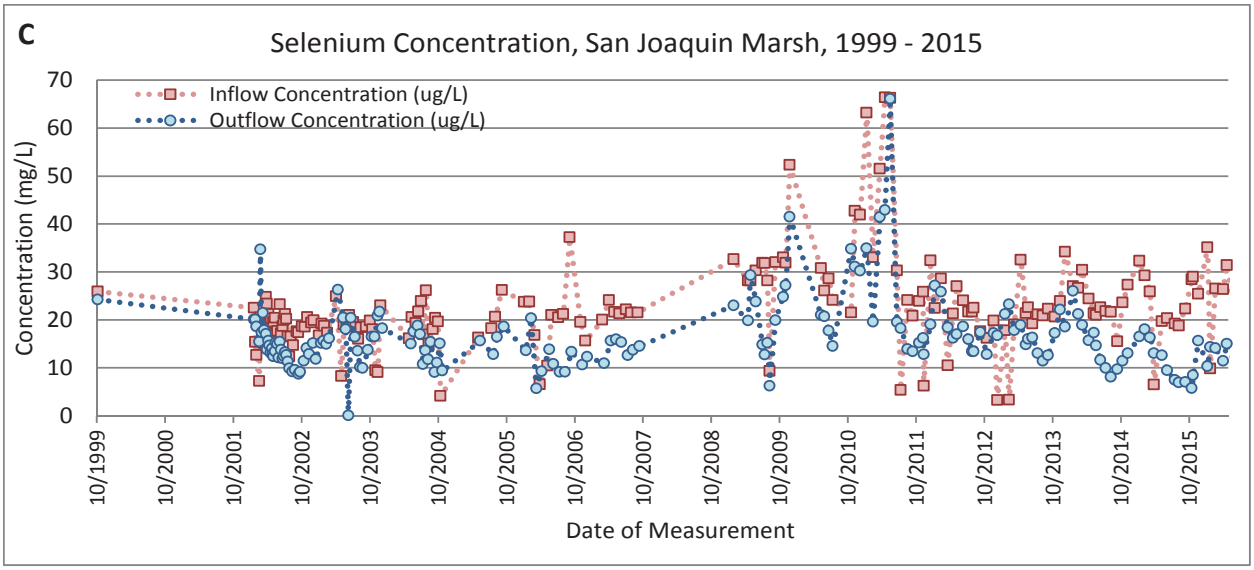
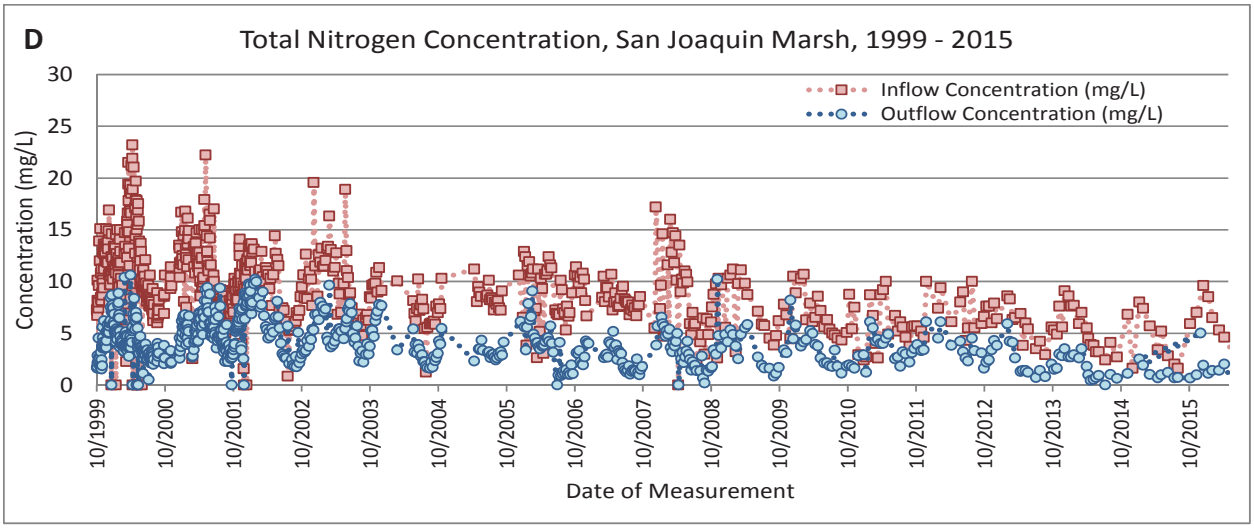


FIGURE 9. MEASURED WATER QUALITY CONSTITUENTS IN SAN JOAQUIN MARSH, 1999- 2015.





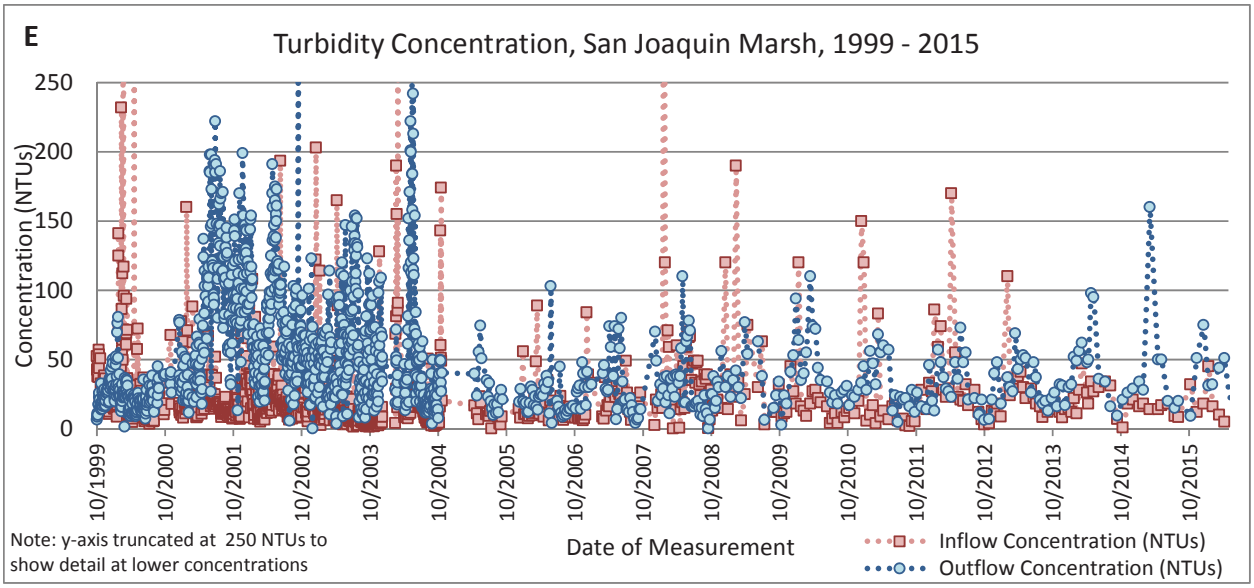


FIGURE 9. (CONTINUED) MEASURED WATER QUALITY CONSTITUENTS IN SAN JOAQUIN MARSH, 1999- 2015.

Panel D shows concentration of total nitrogen. Removal of nitrogen is one of the specific water quality goals of the treatment wetland. The graph shows that, in general, concentrations in San Joaquin Marsh outflow are less than those of inflow. The basin-wide water quality objective for nitrogen is 13 mg/L. The graph shows that nitrogen concentrations have been decreasing over time, and that since about 2008, concentrations in both inflow and outflow have been less than the objective of 13 mg/L. Nitrogen also exhibits a seasonal pattern, with peak concentrations in the winter and minimum concentrations in the summer.

Turbidity concentration over time is shown in Panel E. In general, concentration of flow out is greater than flow in. This indicates that the San Joaquin Marsh is usually adding particulates to San Diego Creek.

The graphs in Figure 9 provide evidence of changes in San Diego Creek nutrient water quality over time. The concentration of total nitrogen in the San Diego Creek inflow has decreased from over 15 mg/L in the early 2000s to value less than 10 mg/L over the past 5 years from 2012 to 2016. Similarly, ortho-phosphate has decreased from values commonly exceeding 0.4 mg/L in the early 2000s, to values less than 0.2 mg/L during the past 5 years. Reductions in nutrient loading in San Diego Creek is likely due to implementation of TMDL measures in the watershed. Reductions in chlorophyll concentrations in the San Joaquin Marsh effluent represent improved performance of the ponds due to operational changes.

The graphs in Figure 9 also depict the reduction in sampling intervals that IRWD has implemented over time. The sampling interval for chlorophyll and ortho-phosphate, which commonly occurred daily in 1998, now occurs monthly; while the sampling interval for selenium increased from weekly in 2002 to monthly in 2016. Other data provided by IRWD also indicate the constructed wetlands of the San Joaquin Marsh provide a general reduction in chromium, copper, and lead.

4.0 MICHELSON WATER RECYCLING PLANT CAPACITY

The Municipal Water District of Orange County (MWDOC) is a wholesale importer of water from the Metropolitan Water District of Southern California (MWD) that serves 28 retail water agencies. IRWD is the largest member agency of MWDOC in terms of service area and overall water use. Approximately 27 percent of IRWD's potable water needs are met by potable

water purchased and supplied by MWD through MWDOC. To offset the need for imported water for non-potable uses, IRWD has a robust recycled water program. Recycled water currently meets approximately 28 percent of IRWD's total water demand, and is used for landscape irrigation, agricultural irrigation, toilet flushing, cooling towers, industrial processes, composting, grading and compaction. Non –potable groundwater and untreated imported water is used to augment the recycled water system through the Irvine Lake Pipeline (ILP) during peak months.

The use of recycled water extends IRWD's drinking water supplies, reduces the need for additional potable water facilities, reduces the amount of treated wastewater discharged into the ocean, reduces reliance on costly imported water supplies, and increases water supply reliability. The use and expansion of recycled water will assist IRWD in providing water for future needs, while decreasing dependence on imported water. IRWD has an extensive dual distribution system, which delivers recycled water from its two recycling treatment plants, the MWRP and the Los Alisos Water Recycling Plant (LAWRP). Treated effluent from both plants meets the water quality standards set forth in the California Administrative Code (CAC), Title 22 for use as recycled water. The largest plant, the MWRP, has a permitted capacity of 28.0 million gallons per day (approximately 2,500 AFM) and uses both activated sludge and membrane bio-reactor technology to produce disinfected tertiary recycled water. Excess recycled water from MWRP may be sold to the OCWD Green Acres Project (GAP) from October through March. IRWD has the ability to bypass all or part of the sewage to Orange County Sanitation District (OCSD). During periods of low demand for recycled water, sewage effluent from the MWRP that is not needed for recycling is diverted to OCSD for treatment and disposal to the Pacific Ocean.

IRWD supplies recycled water to its customers through a recycled water distribution pipeline system of over 500 miles. To support the over 5,400 recycled water meters that currently use approximately 30,000 AF of recycled water annually, IRWD has incorporated 15 reservoirs (3 lakes and 12 tanks) with storage capacity of 4,536 AF (1.48 trillion gallons). Figure 10 shows recycled water demand from Fiscal Year (FY) 2002/2003 through FY 2015/2016. Each fiscal year in the following analysis runs from July of the previous year through June of the year depicted. For example, FY15/16 is labeled as 2016, and consists of data from July 2015 through June 2016. The last five years of recycled water demand were analyzed to assess the seasonal use and storage requirements of recycled water, in order to determine whether water

diverted to the San Joaquin Marsh could be used as a supplemental source to meet recycled water demand.

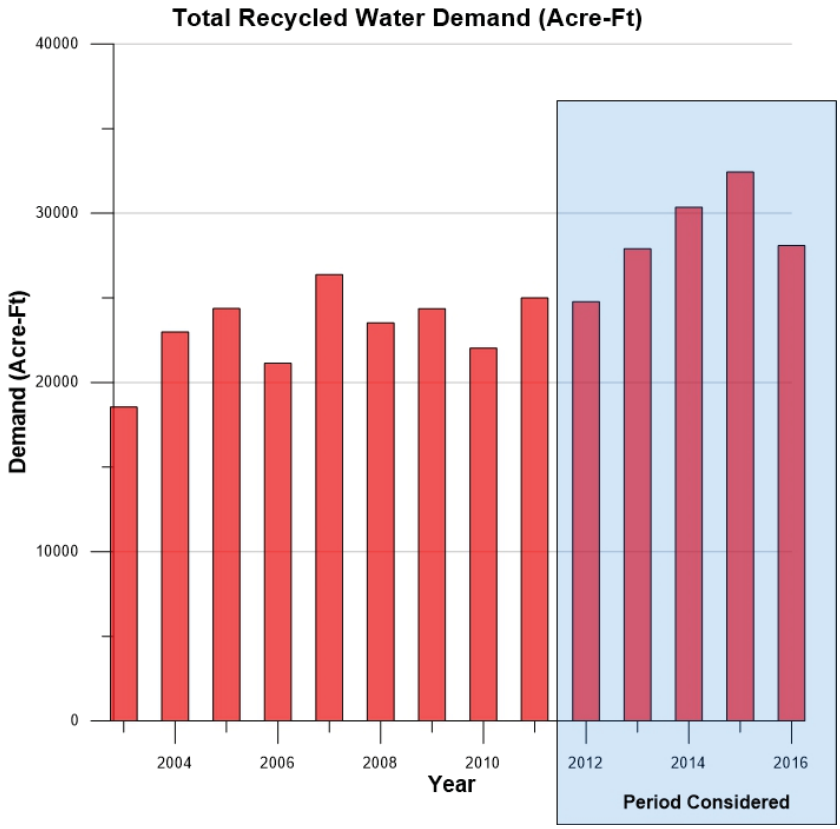


FIGURE 10. RECYCLED WATER DEMAND, 2003-2016

The MWRP and LAWRP together currently produce approximately 2,000 AFM (or 24,000 AFY) of recycled water. Production of recycled water is generally very consistent from month to month. However, recycled water demand varies seasonally, exceeding the production capacity from March to October, depending on the hydrologic conditions. During the winter months, recycled water production exceeds demand. IRWD stores excess recycled water produced during the winter in the aforementioned reservoirs, then uses that water to meet seasonal demand when it exceeds production capacity. Approximately 3,000 AFY of recycled water is directed to storage during the winter months, and total storage during the summer is generally maintained above a minimum of 1,400 AF. Recycled water demand that exceeds recycled water supply is met through augmentation by non-potable water produced by groundwater wells or delivered through the ILP from Irvine Lake (purchased). Figure 11 shows

the average monthly recycled water demand, along with the portion of the demand that is met by MWRP, LAWRP, and stored recycled water. The shaded area is demand that is met through augmentation by non-potable groundwater wells and the Irvine Lake Pipeline.

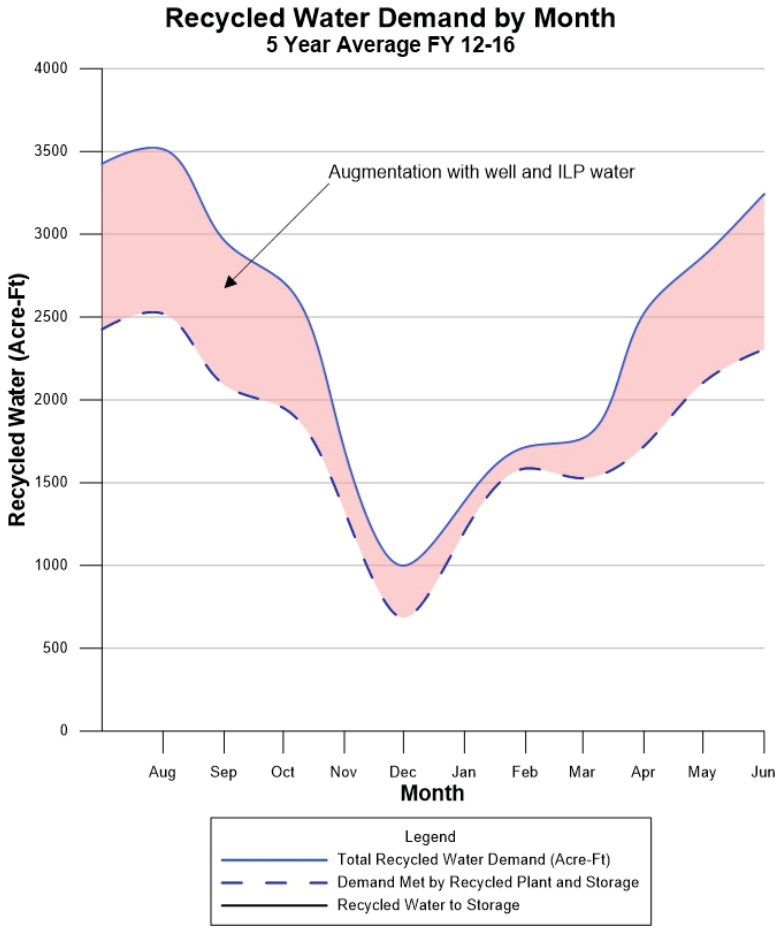


FIGURE 11. MONTHLY RECYCLED WATER DEMAND AND AUGMENTATION

Augmentation by non-potable groundwater wells averaged 3,780 AFY during the five years analyzed between FY 2012 and 2016. While recycled water plant and groundwater well production levels remain fairly consistent from month to month and year to year, the ILP is used to meet the demand not met by recycled water supply from storage. Figure 12 shows a FY 2012-2016 five-year average of the composition of the augmented water, and demonstrates that during the summer months 300-600 AFM of water is delivered through the ILP.

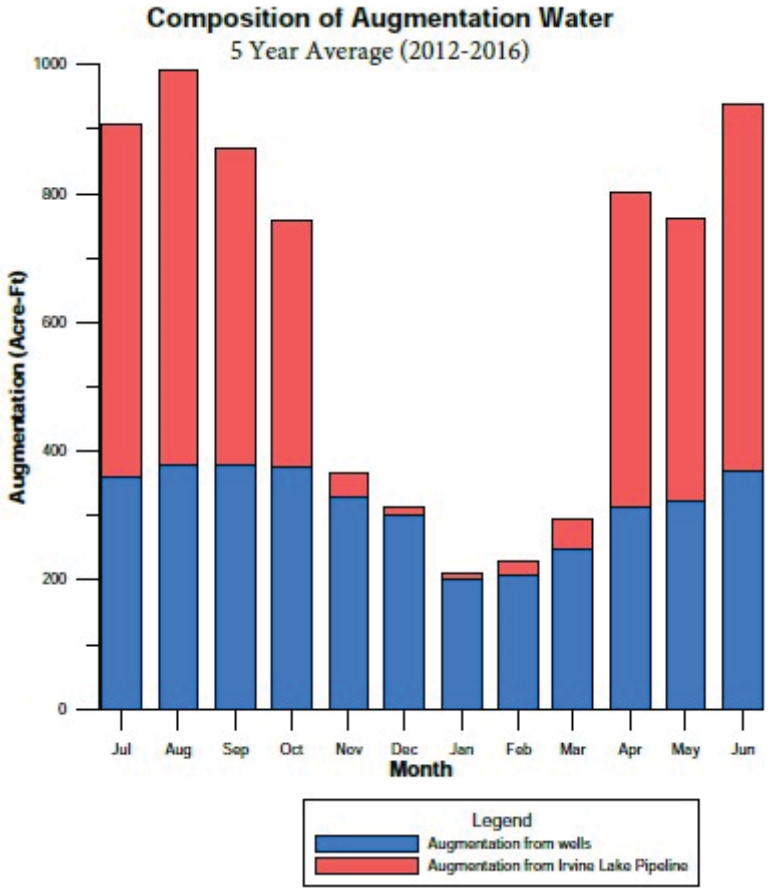
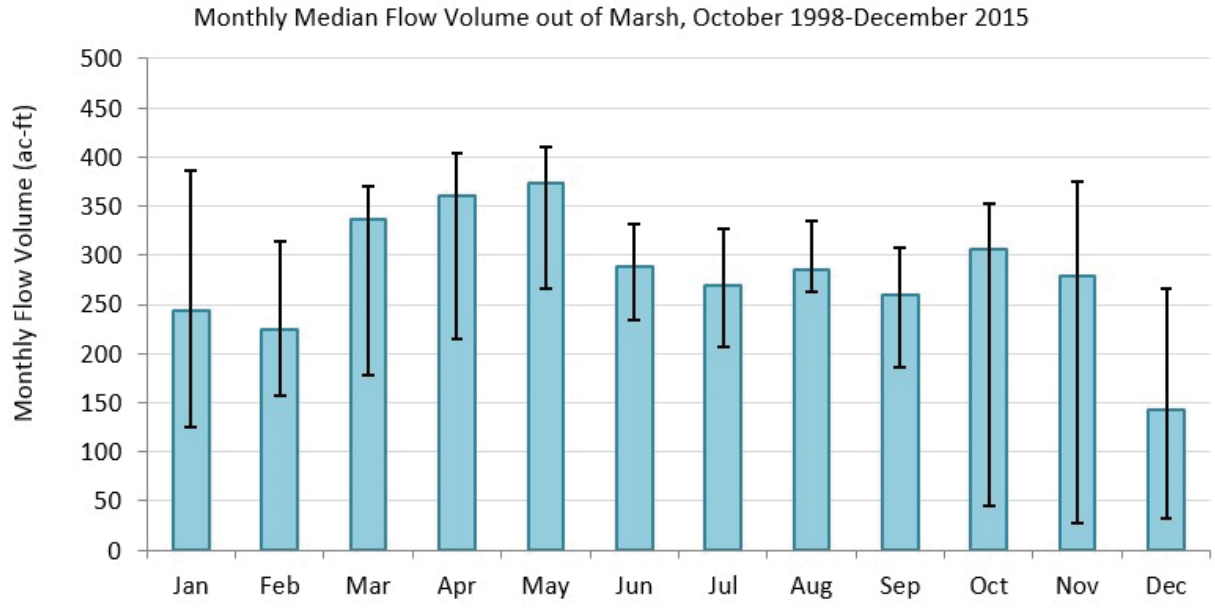


FIGURE 12. COMPOSITION OF AUGMENTATION WATER FY 2012-16

Use of the ILP water fluctuates significantly from year to year, depending on the hydrologic conditions and recycled water demand. In the five years considered, ILP deliveries varied from 1,500-7,000 AFY, with two consecutive months in 2015 that exceeded 1,400 AF. Figure 10 shows that recycled water use dropped by 4,000 acre feet in 2016, which is consistent with other districts in the Southern California area, and indicative of outdoor use conservation efforts resulting from drought awareness and regulatory actions. If the trend prior to 2016 is an indication of future demand, then increasing recycled water demand without further development of storage and recycled water production capacity will require increased amounts of ILP water for summertime augmentation. During the dry hydrologic conditions that occurred in 2015, when recycled water demand peaked, 7,000 AF of water was delivered through the ILP, as compared to 1,500 AF in 2012 (466% increase).

Figure 13 shows the amount of water that is available from the San Joaquin Marsh (inclusive of MWRP dewatering) for input to the MWRP if effluent water from the Marsh was not released to San Diego Creek. The graph shows median flow volumes out of the San Joaquin Marsh from October 1998 through December 2015. The black whisker bars depict the 20th and 80th percentile values for the same period. Approximately 200 AFM (or 2,400 AFY) are consistently available, with periods exceeding 350 AFM. Diverting San Joaquin Marsh outflow water to the MWRP would be a new consumptive use of water under Permit 20979 and would require repermitting[12] with the SWRCB. If San Joaquin Marsh outflows were processed through the MWRP, the water could be used to augment summertime recycled water production and increase deliveries to additional developed storage. A detailed analysis of the water quality of the San Joaquin Marsh outflow and its effect on the existing treatment processes is required prior to considering acceptance into the MWRP. Pre-treatment to reduce Total Dissolved Solids (TDS) to an acceptable level will likely be required[13].



Notes: Blue columns represent median values during the period from October 1998 through December 2015. Error bars (black lines) represent the 20th and 80th percentile values for the same period.

FIGURE 13. MONTHLY MEDIAN SAN JOAQUIN MARSH OUTFLOW VOLUME

Another option to support recycled water demand is to utilize only the water from dewatering the MWRP as additional input to the plant instead of utilizing the General Discharge Permit

[12] Repermitting may include changes to Permit 20979 or application of a new permit to appropriate water from San Joaquin Marsh outflow.

[13] Based on personal communication with MWRP personnel.

described in Section 1.3.2. In this option, dewatering water would be conveyed to the MWRP instead of discharged into the San Joaquin Marsh through the dewatering channel. As depicted in Figure 14, this would provide an additional minimum of 4-10 AFM during dry years, and would require coordination with the RWQCB for possible modification to the MWRP NPDES Permit and the General Discharge Permit coverage. A detailed study considering the dewatering water quality effects on MWRP processes and effluent discharge limits would also be required, as dewatering water is high in TDS (1,500-2,000 mg/L) and Selenium (up to 7 µg/L).

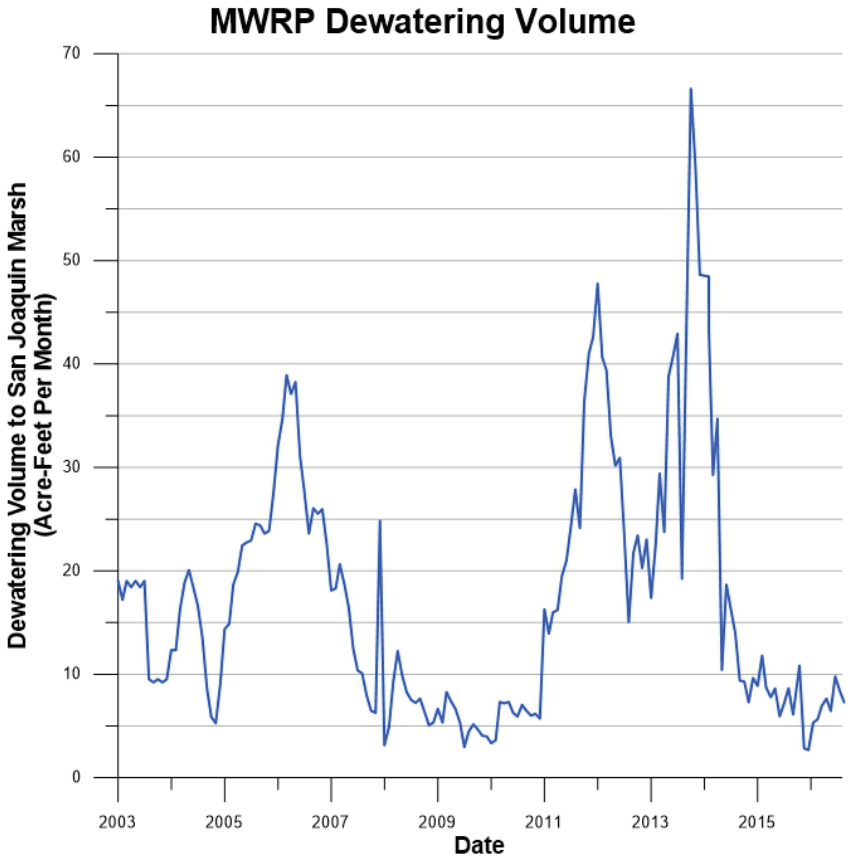


FIGURE 14. MONTHLY MWRP DEWATERING VOLUME 2003-2016

The recycled water production and demand data indicate that approximately 3,780 AFY of non-potable groundwater and between 1,500 AFY and 7,000 AFY of ILP water is required to compliment the water produced from the water recycling facilities. Previous hydrologic analysis suggests that water available from the Marsh effluent that presently discharge to San Diego Creek exceeds 200 AFM. While a new water right permit would be required to appropriate the effluent from the marsh for recycled water use, water quality considerations would also need to be addressed. Based on personal communication with IRWD personnel and the MWRP, TDS

concentration would need to be managed through treatment or blending in order to meet the discharge requirements of the recycled water use permit. RWQCB Order No. R8-2015-0024 limits TDS concentrations to a 12-month flow weighted average concentration of 720 mg/L at recycled water effluent discharge points. While no TDS concentration data for the San Joaquin Marsh were available for review, MWRP personnel indicated that effluent water from the San Joaquin Marsh would affect their ability to meet the discharge requirements under the recycled water discharge permit (R8-2015-0024).

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The purpose of Technical Memorandum 1.0 is to assess the historical use of Permit 20979 and to characterize the water supply and demand of the San Joaquin Marsh. The results of the investigation found that Permit 20979 has been fully exercised in a manner that meets the beneficial use of Wildlife Enhancement. Although Diversion and Use statements filed with the SWRCB have been inconsistent since 1998, the most recent diversion and use statement from 2015 accurately reflects the diversion and beneficial use of water. The water availability analysis indicates that while streamflow has been available from San Diego Creek to fully exercise Permit 20979, the Peters Canyon project will impact the ability to divert the face value volume of 3,600 AFY when total annual streamflow volume in San Diego Creek is less than 34,500 AFY, which occurs during normal and dry hydrologic conditions. Water quality data suggest that nutrient removal is achieved during all hydrologic conditions based on adaptively managing hydraulic residence time and operations of the ponds.

The review of Permit 20979 compliance, marsh operations, and other available data indicate the following key findings:

- Water diverted from San Diego Creek under Permit 20979 has been put to the beneficial use of Wildlife Enhancement.
- The permitted place of use for water under Permit 20979 is 140 acres; while the broader San Joaquin Marsh is approximately 500 acres, including the UCNRS and riparian mitigation areas.

- All water diverted from San Diego Creek, as measured by the inflow meter, should be identified as "water used" on the Diversion and Use Statement in a manner similar to the 2015 statement.
- Minimum summer-time baseflows have decreased from rates greater than 10 cfs in the 1970s and 1980s to values less than 10 cfs in the last 10 years.
- IRWD has diverted more than 3,600 AFY from San Diego Creek in eleven of ighteen years since 1998. There is no correlation between hydrologic conditions and diversions; which suggests, except for 2015, that water is available regardless of variations in streamflow.
- Implementation of the Peters Canyon Project will impact water available to the Ponds during Normal and Dry hydrologic conditions. While the annual impact to surface water availability may be up to 19%, impacts will be greatest to the summer baseflows and less in the winter wet season.
- The greatest impact of the Peters Canyon Project to diversions will be during below normal hydrologic years, resulting in available streamflow for diversion to be approximately 3,350 AFY under historical operations.
- Although diversions from San Diego Creek to the ponds commonly occur at a high rate between hours of 10 pm and 8 am, the average daily rate commonly exceeds instantaneous capacity of 5 cfs, which is in excess of the terms in Permit 20979.
- Return flow from the riparian mitigation area normally flows back into Pond 5 through the Carlson Marsh, and Pond 6 through the Linear Pond. However, the riparian mitigation areas and the Carlson Marsh are flooded annually for a two- to four-week period, one to two cycles per year, for ecosystem maintenance and to mimic natural wintertime, high-flow inundation. At the conclusion of the flooding period, water is released to UCNRS through a culvert that passes underneath Campus Drive.
- Not reporting of transfers to UCNRS is not an issue if it is stormwater, but may be an issue when IRWD uses diverted San Diego Creek water from Pond 6 to flood the riparian mitigation area, then drains the floodwater to UCNRS. This is outside the permitted place of use.
- Water quality data show that reductions in nutrients and metals occur through active management of hydraulic residence time during varying hydrologic

conditions. Future changes in water availability will require adjustments to hydraulic residence time in order to meet water quality objectives.

- Positive trends in TMDL implementation are leading to higher quality low flow water diverted from San Diego Creek. Improved performance of the wetlands has occurred since 2007 through implementation of the operations and maintenance manual which provides adaptive management of retention time and irrigation flow.
- Recycled water demand exceeds the supply from MWRP and LAWRP, requiring augmentation from non-potable groundwater wells and the ILP. During the dry hydrologic conditions of FY 2015, 7,000 AF of water was delivered through the ILP, as compared to 1,500 AF in 2012.
- Additional water supply may be available from the San Joaquin Marsh, San Diego Creek, or dewatering wells to supplement inflows at the MWRP without exceeding the plant's permitted capacity. In addition to constraints from the SWRCB and other regulatory agencies to the use of these waters, TDS water quality is a limiting factor.
- Additional water supply treated at the MWRP could be used to meet recycled water demand during the spring, summer and fall months. If additional storage reservoir capacity existed, it could also be used to meet wintertime storage objectives.
- In order to divert more than 3,600 AFY from San Diego Creek or appropriate effluent from the San Joaquin Marsh, an application for a new water right permit to appropriate the additional water is required.

5.2 Recommendations

Based on the data reviewed for this Memorandum, IRWD should consider requesting changes to Permit 20979 to conform with current operations. Changes that should be addressed include the Place of Use (Permit Term 4), rate of diversion (Permit Term 5), and time to complete application of water to beneficial use (Permit Term 9). Alternatively, IRWD may also consider changes to operations so they are consistent with the terms of the Permit. Changes to either a permitted or licensed water right may occur, but are subject to environmental and hydrologic review; some petitions require public notice that may result in comments.

In addition, the following analysis should be completed in order to assess the future operations of the San Joaquin Marsh.

1. Assess future water scenarios (Section 3.1.1., Table 7) to determine optimal diversion rate from San Diego Creek under future conditions to support an amendment to the instantaneous diversion rate.
2. Perform a full water quality analysis to quantify loading and removal efficiencies using flow-weighted methods, which have not been performed, but will provide an impact analysis for changes in flow rate and hydraulic residence times.
3. Analyze storm event procedures to determine if excess stormwater should flow to ponds 5 and 6, then pump out through the Wetland Pump; or whether it is preferable to divert stormwater through the Carlson Marsh and out through the UCNRS Culvert.
4. If a new water right is sought, assess water rights and operations used at other NTS sites to assess impact to future water availability at San Joaquin Marsh.

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Appendix A: Marsh Operations Description

The San Joaquin Marsh and Wildlife Sanctuary is comprised of five components: (1) an engineered, eight pond, surface water treatment wetland; (2) a nine-cell irrigated riparian mitigation area; (3) the Carlson Marsh, which is a more natural riparian wetland mitigation area north of the treatment wetlands; (4) a network of ponds and streams that move both Pond 6 effluent and stormwater along the cells and/or through the Carlson Marsh; and (5) a dewatering channel that carries dewatered groundwater from the MWRP to the treatment wetlands. Both the riparian and treatment wetlands provide habitats for a broad range of wildlife. Figure 5 in the main text shows the different components of the San Joaquin Marsh.

The primary water supply to the San Joaquin Marsh is base flow diverted from San Diego Creek under Permit 20979. However, approximately 0.3 MGD is supplied through permitted discharge of groundwater dewatering operations at the MWRP. Additionally, there are six stormdrains that drain from the surrounding developments to the north and west into the Carlson Marsh, the North Michelson Pond or the North Carlson Pond. At least one of the stormdrains provides a near constant flow (less than 10 gpm, estimated) of what appears to be dewatered groundwater to the North Michelson Pond.

There are in-channel sedimentation basins located along San Diego Creek adjacent to the San Joaquin Marsh that have been constructed as separate BMPs to reduce the sediment load to Newport Bay and are dredged periodically. Sediment Basin 3 is created by a weir structure that impounds surface flow to allow sedimentation. The San Diego Creek Pump (SDC Pump) intake is located adjacent to the weir. During low flow periods, it pumps all of the water temporarily impounded by the weir to the San Joaquin Marsh in order to maximize nutrient removal from water that enters Newport Bay. There are two intake pumps capable of 3,400 GPM (7.6 cfs) and 3,800 GPM (8.5 cfs) independently, or 6,000 GPM (13.3 cfs) if operated together. During normal operations, only one pump is operated at a time. The pumps normally operate between 10 PM and 8 AM, in order to capitalize on lower utility costs. One pump is capable of diverting all of the low-flow surface water temporarily impounded at the weir during its overnight operating period. In the near future, IRWD is replacing the pumps with two 2,400 GPM (5.3 cfs) Variable Frequency Drive (VFD) pumps that improve the ability to maintain the water level at the weir, allow diversion at a more constant rate, and reduces pulse flow to the ponds.

The hydraulic pathway through the San Joaquin Marsh is depicted in Figure 5 of the main text. Water that is diverted from San Diego Creek by the intake pump flows into Pond A and subsequently through Pond B to the numbered ponds. Ponds A and B act primarily as clarifiers prior to entering the engineered treatment wetlands (Ponds 1-6). Ponds 1-6 are designed to help meet water quality objectives and reduce eutrophication in Newport Bay by removing pollutants – especially nitrogen – from San Diego Creek. Pollutant removal/transformation is achieved via a number of physical (e.g., adsorption, sedimentation) and biogeochemical (e.g., nitrogen cycle, carbon cycle) processes. The ponds are at progressively lower water surface elevations, so water moves through the ponds over a series of adjustable weirs that are seasonally altered to either increase hydraulic retention time in the winter, or to modulate water elevations for habitat improvement and ecosystem maintenance.

Effluent from the engineered wetland system is pumped from Pond 6 by the Wetland Pump, and is either discharged back in Sediment Basin 2 of San Diego Creek, approximately 630 feet downstream from the intake weir, or pumped to the nine-cell riparian mitigation area. Outflow water quality samples are taken from the Wetland Pump wet well. The Wetland Pump generally operates during the same hours as the intake pump, except during large storm events. The amount of water that is diverted to the mitigation area is adjustable. When operating, the Wetland Pump maintains a constant level in the wet well, and consequently Pond 6. A review of the Wetland Pump output and the outlet meter to San Diego Creek indicates that the percentage of Pond 6 effluent being diverted to the riparian mitigation area varies both seasonally and from year to year, depending on environmental conditions. Generally, between 30-50% of Pond 6 effluent is pumped to the riparian mitigation area, where it either flows into the North Michelson, the Middle Stream or the North Carlson Pond. Additionally, a 2-inch PVC irrigation system, with ¾-inch emitters also draws water for the nine cell riparian mitigation area. Two of the nine cells are irrigated monthly by emitters when the Wetland Pump is running. The two cells that are being irrigated are rotated weekly, or as determined by the IRWD natural resources staff. Irrigation returns flow into either the Middle, East or West Streams. During normal operations, approximately 1 MGD is required to irrigate the riparian areas.

Water that is pumped into the North Michelson Pond, the Middle Stream or the North Carlson Pond flows across a series of weirs along the East and West Streams, passing through either the South Michelson or South Carlson Ponds before flowing to the Linear Pond, and back

into Pond 6. Weir levels are adjustable, and allow the San Joaquin Marsh operations staff to seasonally flood the nine cell riparian mitigation area.

During normal operations, the Carlson Marsh is supplied with water from a gate valve in the South Carlson Pond. As the water moves through the Carlson Marshes, it flows through a series of irrigation channels into marsh zones, where water levels are controlled by weirs at the Upper, Middle, Upper Lower, Middle Lower and Lower Lower Carlson Marsh. The weir levels are adjustable, and allow the San Joaquin Marsh operations staff to seasonally flood the Carlson Marsh. Water that flows through the Carlson Marsh joins with MWRP dewatering water and either flows back into Pond 5 over an adjustable weir, or flows over an adjustable weir and into a culvert under Campus Drive to the UCNRS.

MWRP dewatering groundwater is pumped from the plant into the dewatering channel, where it flows along the perimeter of the engineered wetland until it joins with the Carlson Marsh flow at the Lower Carlson Marsh. During normal operations, the weir to the UCNRS Culvert is higher than the Pond 5 weir, so any excess flow from the Carlson Marshes and the dewatering channel returns to the engineered wetland system at Pond 5.

The amount of water that is used or lost from the system varies seasonally and by type of hydrologic year (wet, normal or dry). Generally, during wet or colder periods, less water is lost to evapotranspiration, and more water is gained through groundwater interactions, dewatering, and stormdrain inputs.

Previous studies have estimated that hydraulic retention time of the San Joaquin Marsh is approximately 10 to 14 days in the summer and 17 to 21 days when water levels in the engineered treatment ponds were elevated. However, they failed to account for the volume of the ponds, streams, dewatering channel and the water conveyances through the Carlson Marsh and riparian mitigation areas. Additionally, the pond volumes were underestimated by assuming two feet of depth. Staff gaging records provided by marsh operations staff demonstrate that the maximum and normal levels (in feet) for the Ponds are approximately: Pond A (4.0, 3.4), Pond B (4.0, 3.4), Pond 1 (5.2, 3.3), Pond 2 (5.0, 3.2), Pond 3 (5.4, 2.6), Pond 4 (5.0, 4.0), Pond 5 (8.1, 5.2), and Pond 6 (9.7, 6.5). Additional study is required to more accurately calculate the hydraulic retention time of the entire system.

Seasonal Variations and Flow to UCNRS

The San Joaquin Marsh is flooded annually for a two- to four-week period, one to two cycles per year to simulate more natural hydrologic phenomena (e.g. winter flooding). This also improves habitat conditions for native plants and wildlife in riparian habitat areas. This is done by either taking advantage of stormflows, or if stormflows are insufficient, by adjusting the amount of Pond 6 effluent that is being directed towards the riparian areas. Monitoring data indicate that in dry years, up to100% of the Wetland Pump discharge is directed to the riparian area mitigation cells and the Carlson Marsh for a period of time, where it is retained for two to three weeks. At the conclusion of the flood period, the water is released and allowed to flow to UCNRS, who uses the water for the same purpose in their wetland systems. Additionally, the water levels in the engineered treatment wetlands may be raised slightly and a larger percentage of water can be diverted to the riparian mitigation areas during the winter to increase retention time and maximize nutrient removal during periods of colder temperature and slower plant/algal growth.

Vegetation harvesting occurs annually, such that the bulrush in each pond are partially removed once every three years. This maintains the free surface required for the wetlands to operate as designed and stimulates nutrient uptake from emerging new growth.

Operations During Storm Events

Storm flows in San Diego Creek are not used for diversion into the engineered treatment wetlands due to high sediment loading. However, as stated earlier, there are five storm drains that drain into either the North Michelson/Carlson Ponds, or into the Carlson Marsh. For small storm events, the North Michelson/Carlson Ponds act as sedimentation basins, which require dredging and sediment removal at some interval. Storm inputs flow down the East and West Streams, into the Carlson Marsh and Linear Pond, and enter the engineered treatment system at Ponds 5 and 6. Larger storm events require that the Wetland Pump be used to direct the storm flows out back into San Diego Creek. The percentage of water that is returned to the riparian mitigation area can be adjusted to maximize the removal of stormwater, as necessary. During large storm events, the amount of Pond 6 effluent being recirculated is reduced. In some cases, 100% of the Wetland Pump discharge is directed to the outflow.

If the Wetland Pump were to experience a mechanical failure, or if a storm event were to exceed the capacity of the Wetland Pump, the water level in the Lower Lower Carlson Marsh would rise above the UCNRS weir, and stormwater would flow through the UCNRS Culvert to the UCNRS marshes. If stormwater quality or sediment loading were to be of greater concern, the weirs in the system can be adjusted so that stormwater does not enter the engineered ponds, but instead flows through the UCNRS Culvert. This can be done by lowering the weir boards at the UCNRS Culvert below the Pond 5 weir, and directing the Middle and East Stream stormflows through the secondary flow path.

Appendix B: Marsh Flows and Operations Data

TABLE B-1. MARSH FLOW AND OPERATIONS DATA. ALL VALUES IN MILLIONS OF GALLONS (MG). SEE NOTES FOR EACH COLUMN AT END OF TABLE.

	Inflows			Outflows			Internal Conveyance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Month-Year	Inflow from SDC	Storm Drains and Direct Precipitation	Dewatering Flows from MWRP	Outflow to SDC	Transfers to UCI Marsh	ET	Conveyance to Riparian Areas
Jan-1998	---	---	---	---	---	---	---
Feb-1998	---	---	---	---	---	---	---
Mar-1998	---	---	---	---	---	---	---
Apr-1998	---	---	---	---	---	---	---
May-1998	---	---	---	---	---	---	---
Jun-1998	---	---	---	---	---	---	---
Jul-1998	---	---	---	---	---	---	---
Aug-1998	45	tbd	9.3	32	0	tbd	no data
Sep-1998	111	tbd	9.0	81	0	tbd	no data
Oct-1998	116	tbd	9.3	104	0	tbd	no data
Nov-1998	110	tbd	9.0	100	0	tbd	no data
Dec-1998	110	tbd	9.3	116	> 0	tbd	no data
Jan-1999	94	tbd	9.3	92	> 0	tbd	no data
Feb-1999	82	tbd	8.4	73	0	tbd	no data
Mar-1999	91	tbd	9.3	15	0	tbd	no data
Apr-1999	84	tbd	9.0	70	0	tbd	no data
May-1999	90	tbd	9.3	81	0	tbd	no data
Jun-1999	79	tbd	9.0	66	0	tbd	no data
Jul-1999	85	tbd	9.3	36	0	tbd	no data
Aug-1999	101	tbd	9.3	88	0	tbd	no data
Sep-1999	98	tbd	9.0	61	0	tbd	no data
Oct-1999	92	tbd	9.3	82	0	tbd	no data
Nov-1999	68	tbd	9.0	45	0	tbd	no data
Dec-1999	84	tbd	9.3	5	> 0	tbd	no data
Jan-2000	69	tbd	9.3	13	> 0	tbd	no data
Feb-2000	69	tbd	8.7	42	0	tbd	no data
Mar-2000	48	tbd	9.3	58	0	tbd	no data
Apr-2000	70	tbd	9.0	63	0	tbd	no data
May-2000	70	tbd	9.3	44	0	tbd	no data
Jun-2000	95	tbd	9.0	95	0	tbd	no data
Jul-2000	96	tbd	9.3	86	0	tbd	no data
Aug-2000	39	tbd	9.3	12	0	tbd	no data

	Inflows			Outflows			Internal Conveyance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Month-Year	Inflow from SDC	Storm Drains and Direct Precipitation	Dewatering Flows from MWRP	Outflow to SDC	Transfers to UCI Marsh	ET	Conveyance to Riparian Areas
Sep-2000	19	tbd	9.0	5	0	tbd	no data
Oct-2000	7	tbd	9.3	1	0	tbd	no data
Nov-2000	15	tbd	9.0	0	0	tbd	no data
Dec-2000	59	tbd	9.3	16	> 0	tbd	no data
Jan-2001	74	tbd	9.3	56	> 0	tbd	no data
Feb-2001	50	tbd	8.4	51	0	tbd	no data
Mar-2001	104	tbd	9.3	86	0	tbd	no data
Apr-2001	132	tbd	9.0	153	0	tbd	no data
May-2001	126	tbd	9.3	126	0	tbd	no data
Jun-2001	118	tbd	9.0	112	0	tbd	no data
Jul-2001	136	tbd	9.3	131	0	tbd	no data
Aug-2001	143	tbd	9.3	136	0	tbd	no data
Sep-2001	141	tbd	9.0	118	0	tbd	no data
Oct-2001	150	tbd	9.3	140	0	tbd	no data
Nov-2001	120	tbd	9.0	91	0	tbd	no data
Dec-2001	124	tbd	9.3	86	> 0	tbd	no data
Jan-2002	131	tbd	9.3	84	> 0	tbd	no data
Feb-2002	125	tbd	8.4	97	0	tbd	no data
Mar-2002	128	tbd	9.3	96	0	tbd	no data
Apr-2002	112	tbd	9.0	128	0	tbd	no data
May-2002	126	tbd	9.3	122	0	tbd	no data
Jun-2002	92	tbd	9.0	84	0	tbd	no data
Jul-2002	91	tbd	9.3	67	0	tbd	no data
Aug-2002	89	tbd	9.3	68	0	tbd	no data
Sep-2002	102	tbd	9.0	78	0	tbd	no data
Oct-2002	102	tbd	9.3	100	0	tbd	no data
Nov-2002	79	tbd	9.0	48	0	tbd	no data
Dec-2002	112	tbd	9.3	38	> 0	tbd	no data
Jan-2003	128	tbd	9.3	81	> 0	tbd	no data
Feb-2003	80	tbd	8.4	66	0	tbd	no data
Mar-2003	114	tbd	9.3	90	0	tbd	no data
Apr-2003	147	tbd	9.0	130	0	tbd	no data
May-2003	123	tbd	9.3	121	0	tbd	no data
Jun-2003	104	tbd	9.0	76	0	tbd	no data
Jul-2003	106	tbd	9.3	89	0	tbd	no data
Aug-2003	106	tbd	9.3	86	0	tbd	no data

	Inflows			Outflows			Internal Conveyance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Month-Year	Inflow from SDC	Storm Drains and Direct Precipitation	Dewatering Flows from MWRP	Outflow to SDC	Transfers to UCI Marsh	ET	Conveyance to Riparian Areas
Sep-2003	99	tbd	9.0	79	0	tbd	no data
Oct-2003	157	tbd	9.3	142	0	tbd	no data
Nov-2003	137	tbd	9.0	132	0	tbd	no data
Dec-2003	48	tbd	9.3	40	> 0	tbd	no data
Jan-2004	0	tbd	9.3	0	> 0	tbd	no data
Feb-2004	61	tbd	8.7	65	0	tbd	no data
Mar-2004	16	tbd	9.3	2	0	tbd	no data
Apr-2004	116	tbd	9.0	68	0	tbd	no data
May-2004	140	tbd	9.3	126	0	tbd	no data
Jun-2004	131	tbd	9.0	118	0	tbd	no data
Jul-2004	108	tbd	9.3	91	0	tbd	no data
Aug-2004	127	tbd	9.3	114	0	tbd	no data
Sep-2004	100	tbd	9.0	100	0	tbd	no data
Oct-2004	90	tbd	9.3	112	0	tbd	no data
Nov-2004	0	tbd	9.0	0	0	tbd	no data
Dec-2004	0	tbd	9.3	0	> 0	tbd	no data
Jan-2005	0	tbd	9.3	127	> 0	tbd	no data
Feb-2005	0	tbd	8.4	39	0	tbd	no data
Mar-2005	0	tbd	9.3	0	0	tbd	no data
Apr-2005	91	tbd	9.0	70	0	tbd	no data
May-2005	121	tbd	9.3	145	0	tbd	no data
Jun-2005	72	tbd	9.0	52	0	tbd	no data
Jul-2005	125	tbd	9.3	119	0	tbd	no data
Aug-2005	109	tbd	9.3	109	0	tbd	no data
Sep-2005	67	tbd	9.0	36	0	tbd	no data
Oct-2005	0	tbd	9.3	0	0	tbd	no data
Nov-2005	0	tbd	9.0	0	0	tbd	no data
Dec-2005	111	tbd	9.3	26	> 0	tbd	no data
Jan-2006	127	tbd	9.3	41	> 0	tbd	no data
Feb-2006	118	tbd	8.4	152	0	tbd	no data
Mar-2006	130	tbd	9.3	154	0	tbd	no data
Apr-2006	126	tbd	9.0	162	0	tbd	no data
May-2006	124	tbd	9.3	141	0	tbd	no data
Jun-2006	64	tbd	9.0	55	0	tbd	no data
Jul-2006	85	tbd	9.3	73	0	tbd	no data
Aug-2006	112	tbd	9.3	89	0	tbd	no data

	Inflows			Outflows			Internal Conveyance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Month-Year	Inflow from SDC	Storm Drains and Direct Precipitation	Dewatering Flows from MWRP	Outflow to SDC	Transfers to UCI Marsh	ET	Conveyance to Riparian Areas
Sep-2006	53	tbd	9.0	88	0	tbd	no data
Oct-2006	122	tbd	9.3	53	0	tbd	no data
Nov-2006	95	tbd	9.0	65	0	tbd	no data
Dec-2006	126	tbd	9.3	109	> 0	tbd	no data
Jan-2007	12	tbd	9.3	0	> 0	tbd	no data
Feb-2007	14	tbd	8.4	8	0	tbd	no data
Mar-2007	129	tbd	9.3	121	0	tbd	no data
Apr-2007	121	tbd	9.0	127	0	tbd	no data
May-2007	131	tbd	9.3	134	0	tbd	no data
Jun-2007	104	tbd	9.0	108	0	tbd	no data
Jul-2007	109	tbd	9.3	103	0	tbd	no data
Aug-2007	107	tbd	9.3	106	0	tbd	no data
Sep-2007	92	tbd	9.0	69	0	tbd	no data
Oct-2007	0	tbd	9.3	0	0	tbd	no data
Nov-2007	0	tbd	9.0	0	0	tbd	no data
Dec-2007	94	tbd	9.3	47	> 0	tbd	no data
Jan-2008	119	tbd	9.3	78	> 0	tbd	no data
Feb-2008	118	tbd	8.7	91	0	tbd	no data
Mar-2008	123	tbd	9.3	111	0	tbd	no data
Apr-2008	126	tbd	9.0	119	0	tbd	no data
May-2008	130	tbd	9.3	126	0	tbd	no data
Jun-2008	109	tbd	9.0	108	0	tbd	no data
Jul-2008	100	tbd	9.3	77	0	tbd	no data
Aug-2008	110	tbd	9.3	96	0	tbd	no data
Sep-2008	108	tbd	9.0	90	0	tbd	no data
Oct-2008	122	tbd	9.3	111	0	tbd	no data
Nov-2008	111	tbd	9.0	122	0	tbd	no data
Dec-2008	115	tbd	9.3	68	> 0	tbd	no data
Jan-2009	131	tbd	9.3	88	> 0	tbd	no data
Feb-2009	103	tbd	8.4	73	0	tbd	no data
Mar-2009	129	tbd	9.3	120	0	tbd	no data
Apr-2009	119	tbd	9.0	116	0	tbd	no data
May-2009	102	tbd	9.3	87	0	tbd	no data
Jun-2009	106	tbd	9.0	92	0	tbd	no data
Jul-2009	104	tbd	9.3	93	0	tbd	no data
Aug-2009	102	tbd	9.3	90	0	tbd	no data

	Inflows			Outflows			Internal Conveyance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Month-Year	Inflow from SDC	Storm Drains and Direct Precipitation	Dewatering Flows from MWRP	Outflow to SDC	Transfers to UCI Marsh	ET	Conveyance to Riparian Areas
Sep-2009	98	tbd	9.0	84	0	tbd	no data
Oct-2009	108	tbd	9.3	98	0	tbd	no data
Nov-2009	95	tbd	9.0	95	0	tbd	no data
Dec-2009	109	tbd	9.3	87	> 0	tbd	no data
Jan-2010	98	tbd	9.3	126	> 0	tbd	179
Feb-2010	110	tbd	8.4	123	0	tbd	183
Mar-2010	144	tbd	9.3	138	0	tbd	193
Apr-2010	131	tbd	9.0	93	0	tbd	140
May-2010	112	tbd	9.3	96	0	tbd	154
Jun-2010	102	tbd	9.0	87	0	tbd	136
Jul-2010	104	tbd	9.3	87	0	tbd	135
Aug-2010	102	tbd	9.3	90	0	tbd	138
Sep-2010	98	tbd	9.0	84	0	tbd	130
Oct-2010	100	tbd	9.3	109	0	tbd	158
Nov-2010	112	tbd	9.0	126	0	tbd	177
Dec-2010	92	tbd	9.3	106	> 0	tbd	152
Jan-2011	128	tbd	9.3	144	> 0	tbd	187
Feb-2011	109	tbd	8.4	126	0	tbd	168
Mar-2011	116	tbd	9.3	144	0	tbd	189
Apr-2011	123	tbd	9.0	131	0	tbd	175
May-2011	113	tbd	9.3	116	0	tbd	167
Jun-2011	105	tbd	9.0	108	0	tbd	153
Jul-2011	98	tbd	9.3	106	0	tbd	151
Aug-2011	93	tbd	9.3	109	0	tbd	147
Sep-2011	87	tbd	9.0	110	0	tbd	145
Oct-2011	100	tbd	9.3	121	0	tbd	169
Nov-2011	90	tbd	9.0	134	0	tbd	176
Dec-2011	92	tbd	9.3	81	> 0	tbd	156
Jan-2012	90	tbd	9.3	72	> 0	tbd	163
Feb-2012	89	tbd	8.7	102	0	tbd	159
Mar-2012	108	tbd	9.3	116	0	tbd	167
Apr-2012	140	tbd	9.0	146	0	tbd	196
May-2012	140	tbd	9.3	139	0	tbd	186
Jun-2012	119	tbd	9.0	108	0	tbd	152
Jul-2012	128	tbd	9.3	116	0	tbd	154
Aug-2012	128	tbd	9.3	109	0	tbd	146

	Inflows			Outflows			Internal Conveyance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Month-Year	Inflow from SDC	Storm Drains and Direct Precipitation	Dewatering Flows from MWRP	Outflow to SDC	Transfers to UCI Marsh	ET	Conveyance to Riparian Areas
Sep-2012	128	tbd	9.0	106	0	tbd	148
Oct-2012	115	tbd	9.3	10	0	tbd	140
Nov-2012	135	tbd	9.0	122	0	tbd	171
Dec-2012	130	tbd	9.3	63	> 0	tbd	120
Jan-2013	138	tbd	9.3	126	> 0	tbd	181
Feb-2013	132	tbd	8.4	102	0	tbd	144
Mar-2013	136	tbd	9.3	120	0	tbd	179
Apr-2013	120	tbd	9.0	110	0	tbd	159
May-2013	117	tbd	9.3	114	0	tbd	168
Jun-2013	91	tbd	9.0	95	0	tbd	138
Jul-2013	69	tbd	9.3	61	0	tbd	127
Aug-2013	102	tbd	9.3	100	0	tbd	144
Sep-2013	103	tbd	9.0	87	0	tbd	125
Oct-2013	113	tbd	9.3	115	0	tbd	152
Nov-2013	123	tbd	9.0	115	0	tbd	154
Dec-2013	111	tbd	9.3	9	> 0	tbd	167
Jan-2014	103	tbd	9.3	77	> 0	tbd	141
Feb-2014	91	tbd	8.4	55	0	tbd	138
Mar-2014	115	tbd	9.3	108	0	tbd	151
Apr-2014	109	tbd	9.0	99	0	tbd	142
May-2014	106	tbd	9.3	86	0	tbd	133
Jun-2014	105	tbd	9.0	84	0	tbd	123
Jul-2014	107	tbd	9.3	60	0	tbd	87
Aug-2014	100	tbd	9.3	75	0	tbd	126
Sep-2014	100	tbd	9.0	60	0	tbd	104
Oct-2014	85	tbd	9.3	31	0	tbd	88
Nov-2014	81	tbd	9.0	65	0	tbd	119
Dec-2014	103	tbd	9.3	8	> 0	tbd	115
Jan-2015	98	tbd	9.3	100	> 0	tbd	155
Feb-2015	82	tbd	8.4	78	0	tbd	124
Mar-2015	85	tbd	9.3	76	0	tbd	122
Apr-2015	83	tbd	9.0	60	0	tbd	98
May-2015	103	tbd	9.3	86	0	tbd	129
Jun-2015	78	tbd	9.0	56	0	tbd	84
Jul-2015	90	tbd	9.3	28	0	tbd	82
Aug-2015	74	tbd	9.3	29	0	tbd	73

	Inflows			Outflows			Internal Conveyance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Month-Year	Inflow from SDC	Storm Drains and Direct Precipitation	Dewatering Flows from MWRP	Outflow to SDC	Transfers to UCI Marsh	ET	Conveyance to Riparian Areas
Sep-2015	77	tbd	9.0	26	0	tbd	66
Oct-2015	72	tbd	9.3	31	0	tbd	81
Nov-2015	62	tbd	9.0	29	0	tbd	68
Dec-2015	85	tbd	9.3	5	> 0	tbd	80

Notes:

1. Inflow from San Diego Creek inlet pumps, from IRWD records.
2. Storm drains and direct precipitation: not estimated at this time.
3. Dewatering flow from MWRP: estimated as the maximum allowable flow of 0.3 MGD for each day. Actual dewatering flows may have been less.
4. Outflow to San Diego Creek, from IRWD records.
5. Transfer to UCI Marsh: usually occurs in December and January but is not metered.
6. Evapotranspiration: losses to evaporation and transpiration in wetland areas not estimated at this time.
7. Conveyance to riparian areas: water that is pumped from the treatment wetland up to riparian wetlands. Records available for 2010 to 2015 only.