APPENDIX E

Hydrology and Water Quality Technical Report

Hydrology and Water Quality Technical Report
for the
Recycled Water Tertiary Treatment Plant Project
Lake Forest, California

Prepared for:

El Toro Water District
24251 Los Alisos Boulevard
Lake Forest, California 92630

Prepared by:
DUDEK
605 Third Street
Encinitas, California 92024
Contact: Shawn Shamlou
760.479.4228

FEBRUARY 2012

Printed on 30% post-consumer recycled material.

TABLE OF CONTENTS

Section **Page No.**

1.0 INTRODUCTION....1
1.1 Project Description....1
2.0 METHODOLOGY....1
2.1 Literature Review....1
2.2 Limitations....2
3.0 EXISTING CONDITIONS....2
3.1 Climate....2
3.2 Site Topography....2
3.3 Site Soil Types....2
3.4 Surface Water....3
3.5 Groundwater....3
3.6 Floodplain....4
3.7 Water Quality Regulation....4
3.7.1 Federal Water Pollution Control Act (Clean Water Act)....4
3.7.2 California Water Code (CWC)....22
3.7.3 County of Orange's Drainage Area Management Plan (DAMP)....26
4.0 SIGNIFICANCE THRESHOLDS....26
5.0 PROJECT IMPACTS....27
5.1 Summary of Hydrologic Impacts....27
5.1.1 Surface Water....28
5.1.2 Groundwater....29
5.1.3 Flooding....29
5.2 Summary of Water Quality Impacts....29
5.3 Cumulative Impacts....32
6.0 MITIGATION MEASURES....33
6.1 Best Management Practices (BMPs)....33
6.1.1 Construction Considerations....33
6.1.2 Permanent Design Consideration....34
6.1.3 Maintenance Activities....35
6.2 Mitigation....35
6.2.1 Construction BMPs....35
6.2.2 Site Design BMPs....36
6.2.3 Source Control BMPs....37

TABLE OF CONTENTS (Continued)

Section **Page No.**

6.2.4 Treatment Control BMPs 42
6.2.5 Low Impact Development (LID) BMPs 43

7.0 SIGNIFICANCE OF IMPACT AFTER MITIGATION 45

8.0 ACKNOWLEDGEMENTS 45

9.0 REFERENCES 45

APPENDICES

A Storm Water Runoff Flow Calculation

FIGURES

1 Regional Map 5
2 Vicinity Map 7
3 Aerial Map 9
4 Hydrologic Divisions 11
5 Groundwater Basin Map 13
6 FEMA Floodzone Map 15
7 Site Drainage, Proposed Project and Basin Length 17

TABLES

1 El Toro Water Recycling Plant Hydrologic Setting 3
2 Clean Water Act 303(d) List of Water Quality Limited Segments 20
3 Beneficial Uses of Inland Surface Water 22
4 Beneficial Uses of Bays, Estuaries, and Tidal Prisms 23
5 Beneficial Uses of Groundwater 23
6 Conceptual Peak Flow Summary 28
7 Anticipated and Potential Pollutants Generated by Land Use Type 31
8 Volume of Runoff Generated from the 2 Year and 5 Year Storm 45

ABBREVIATIONS AND ACRONYMS

AFY	Acre-Feet Per Year
AGI	American Geological Institute
ACOE	Army Corps of Engineers
AMSL	Above Mean Sea Level
ASBS	Areas of Special Biological Significance
Basin Plan	Water Quality Control Plan for RWQCB
BMPs	Best Management Practices
CF	Cubic Feet
CFS	Cubic Feet Per Second
COC	Central Orange County
COD	Chemical Oxygen Demand
CRA	Colorado River Aqueduct
CWA	Clean Water Act
CWC	California Water Code
DWR	Department of Water Resources
DAMP	Drainage Area Management Plan
EPA	Environmental Protection Agency
ETWD	El Toro Water District
FT	Feet
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
HA	Hydrologic Area
HSA	Hydrologic Sub-Area
HU	Hydrologic Unit
LA	Load Allocations
LID	Low Impact Development
LUP	Linear Underground Project
MCL	Maximum Contaminant Level
MG/L	Milligrams per Liter
MS4	Municipal Separate Storm Sewer System
N	Nitrogen
NPDES	National Pollution Discharge Elimination System
RWQCB	Regional Water Quality Control Board
SWP	State Water Project
SRWCB	State Water Resources Control Board
SWPPP	Storm Water Pollution Prevention Plan
TDS	Total Dissolved Solids

TMDL	Total Maximum Daily Load
USGS	United States Geological Survey
WLA	Waste Load Allocation
WMA	Watershed Management Area
WQO	Water Quality Objectives
WQMP	Water Quality Management Plan
WRP	Water Recycling Plant

1.0 INTRODUCTION

1.1 Project Description

Dudek has prepared this Hydrology and Water Quality Technical Report per Orange County requirements, as they apply to this project's development plan approval process. The scope of this technical report is conceptual and should not be relied on solely for construction activities. This report evaluates the potential impacts to surface and ground water quality that could occur both during construction and over the long-term. Potential changes in drainage, erosion, and sedimentation will be characterized as well as the effects of this project on runoff volumes.

The proposed El Toro Water District (ETWD) Tertiary Treatment Plant project would convert the existing recycled water plant which provides secondary treatment into a full tertiary treatment facility. The project site consists of approximately 1.65 acres in South Orange County (see *Figure 1* and *Figure 2*). The project also includes a transmission pipeline that would extend 5,000 feet west, beneath Ridge Route Drive, from the existing ETWD Recycling Plant (WRP) (*Figure 3*). The WRP is situated within the Laguna Woods Golf Course which is bounded by residential development to the east, Ridge Route Drive to the north, El Toro Road to the south and Moulton Parkway to the west.

Surrounding land uses (as detailed in City of Laguna Woods Zoning Map, 2011 and City of Laguna Hills Zoning District Map, 2003) include mixed-use and open space to the north, residential community district and private community facilities to the east, community commercial district and urban activities center to the south, and open space and urban activities center to the west.

2.0 METHODOLOGY

Data regarding hydrology and water quality for the site were obtained through a review of pertinent literature, proposed site plans and Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM). Hydrologic data was evaluated to identify existing drainage basins and flow characteristics. The Orange County Hydrology Manual was used to determine peak flows on a conceptual level. The County of Orange's 2011 Model Water Quality Management Plan (WQMP) was utilized to comply with permanent and construction storm water quality requirements through Best Management Practices (BMPs).

2.1 Literature Review

Documents reviewed to obtain information regarding surface water and groundwater include the Water Quality Control Plan for the Santa Ana Basin, the Orange County Hydrology Manual (2003), Orange County Drainage Area Management Plan (2003), Department of Water

Resources (DWR) and additional sources noted in the references section at the end of this report. Water quality information for the site was obtained from the following sources: 2010 Integrated Report (Clean Water Act Section 303(d) List / 305(b) Report) (SWRCB, 2010) and Water Quality Control Plan Santa Ana River Basin (SARWQCB, 1995 with amendments).

2.2 Limitations

This report is based on review of pertinent literature as discussed above. Watershed and drainage characteristics, stream flow, and channel characteristics were defined by other professionals and their data was interpreted by Dudek. A detailed field study was beyond the scope of this report. Runoff peak flow rates were estimated based on available information using the rational method outlined in the Orange County Hydrology Manual.

3.0 EXISTING CONDITIONS

Land use on the site consists of the El Toro Water District WRP including a parking lot and disturbed land. The proposed transmission pipeline would be entirely within the existing paved right of way of Ridge Route Drive (*Figure 3*).

3.1 Climate

The climate of Orange County is characterized by warm, dry summers and mild, wet winters. The average rainfall is about 14 inches per year, most of which falls in several storm events between October and April. The average temperature for the project location in Orange County ranges from 55º F in the winter months to 73º F in the summer months (ETWD Urban Water Management Plan, 2010).

3.2 Site Topography

The elevation of the ETWD WRP project site ranges from approximately 296 to 299 feet above mean sea level (AMSL) based on review of site-specific topography contours (*Figure 7*). The WRP project area generally drains from southeast to northwest.

3.3 Site Soil Types

Three surficial soil types are identified at the ETWD WRP project site. They are classified as Balcom clay loam with 30 to 50 percent slopes, Cropley clay with 2 to 9 percent slopes, and Myford sandy loam with 9 to 30 percent slopes and eroded, as described by the U.S. Department of Agriculture in the Soil Survey of Orange County and Western part of Riverside County, California (USDA 1973). The surficial soil at the site is classified in groups B (Balcom clay loam) and D (Cropley clay and Myford sandy loam). Soils are classified by the Natural Resource

Conservation Service into four hydrologic soil groups based on the soil's runoff potential. The four hydrologic soils groups are A, B, C and D, and are described in the Orange County Hydrology Manual. Group A generally has the smallest runoff potential and high precipitation infiltration rate. Group D generally has the greatest runoff potential and small precipitation infiltration rate.

3.4 Surface Water

The project site is located in the Santa Ana River Hydrologic Unit (HU) (801.00), which is one of the three hydrologic units established within the Santa Ana Region as designated in the 1995 Santa Ana Regional Water Quality Control Board (RWQCB) Water Quality Control Plan for the Santa Ana River Basin (Basin Plan). The Santa Ana River HU is divided into seven Hydrologic Areas (HA); and the proposed project site is within the Lower Santa Ana River HA (801.10), which covers an area of approximately 436 square miles. The Lower Santa Ana River HA is divided into three Hydrologic Sub-areas (HSA). The proposed project site is located within the East Coastal Plain HSA which covers an area of approximately 302 square miles. Significant drainages within the East Coastal Plain HSA in the vicinity of the project site include Upper and Lower San Diego Creek, which drain to the Newport Bay frontal watersheds.

The project site lies within the Central Orange County (COC) Watershed Management Area (WMA), which encompasses approximately 154 square miles of land draining into Newport Bay. The primary watercourse of the COC WMA is the San Diego Creek, draining an area of approximately 122 square miles (OC Watersheds 2011). COC WMA, as described by OC Watersheds, is highly urbanized with approximately 705,000 residents and includes three Critical Coastal Areas (CCAs) and two Areas of Special Biological Significance (ASBS).

Table 1
El Toro Water Recycling Plant Hydrologic Setting

Name	Hydrologic Unit	Area (mi2)
Santa Ana River HU	801.00	1,906
Lower Santa Ana River HA	801.10	436
East Coastal Plain HSA	801.11	302

Source: Water Quality Control Plan for the Santa Ana River Basin, 1995 with amendments to date.

3.5 Groundwater

A groundwater basin is defined by the American Geological Institute (AGI) as a hydrogeologic unit containing one large aquifer as well as several connected and interrelated aquifers that has reasonably well defined boundaries and more or less definite areas of recharge and discharge (AGI 1977). The Santa Ana River HU, shown in *Figure 4*, encompasses the Lower Santa Ana

River groundwater management zone. The proposed project site lies along the edge of the defined groundwater basin and is not located in a defined groundwater basin as depicted in *Figure 5*.

Based on a hydro-punch sample collected by Dudek in April of 2010 at the North Line Sewer Pump Station, north of the project site, groundwater was encountered at approximately 15 feet below land surface (BLS).

3.6 Floodplain

FEMA FIRMs identify flood zones and areas that are susceptible to 100-year and 500-year floods. The proposed project site is not located within a FEMA 100-year or 500-year flood zone, as shown on the FEMA FIRM (FEMA, accessed December 9, 2011) and displayed in *Figure 6.*

3.7 Water Quality Regulation

The project site is located north of El Toro Road within the jurisdiction of the Santa Ana Regional Water Quality Control Board (RWQCB). Permanent and construction storm water quality requirements are discussed in the County of Orange's 2011 WQMP. According to guidelines set forth in the County of Orange's WQMP for North County Permit areas as well as the 2003 Drainage Area Management Plan (DAMP), the ETWD Recycled Water Tertiary Treatment Plant project qualifies as a priority development project. The project is a new development that creates 10,000 square feet or more of impervious surface (WQMP, Table 7.II-2) and it is a significant redevelopment project with the addition of 5,000 or more square feet of impervious surface on a developed site (DAMP, Table 7.I.1)). The proposed 5,000 foot transmission pipeline under Ridge Route Drive is classified as a Type 1 Linear Underground Project (LUP) (General Permit, Section 6.1.1) and does not qualify as a priority project. The following section provides background for the water quality regulations relevant to the site.

3.7.1 Federal Water Pollution Control Act (Clean Water Act)

Increasing public awareness and concern for controlling water pollution led to enactment of the Federal Water Pollution Control Act Amendments of 1972. As amended in 1977, this law became commonly known as the Clean Water Act (CWA). The Act established basic guidelines for regulating discharges of pollutants into the waters of the United States. The CWA requires that states adopt water quality standards to protect public health, enhance the quality of water resources, and ensure implementation of the CWA.

DUDEK

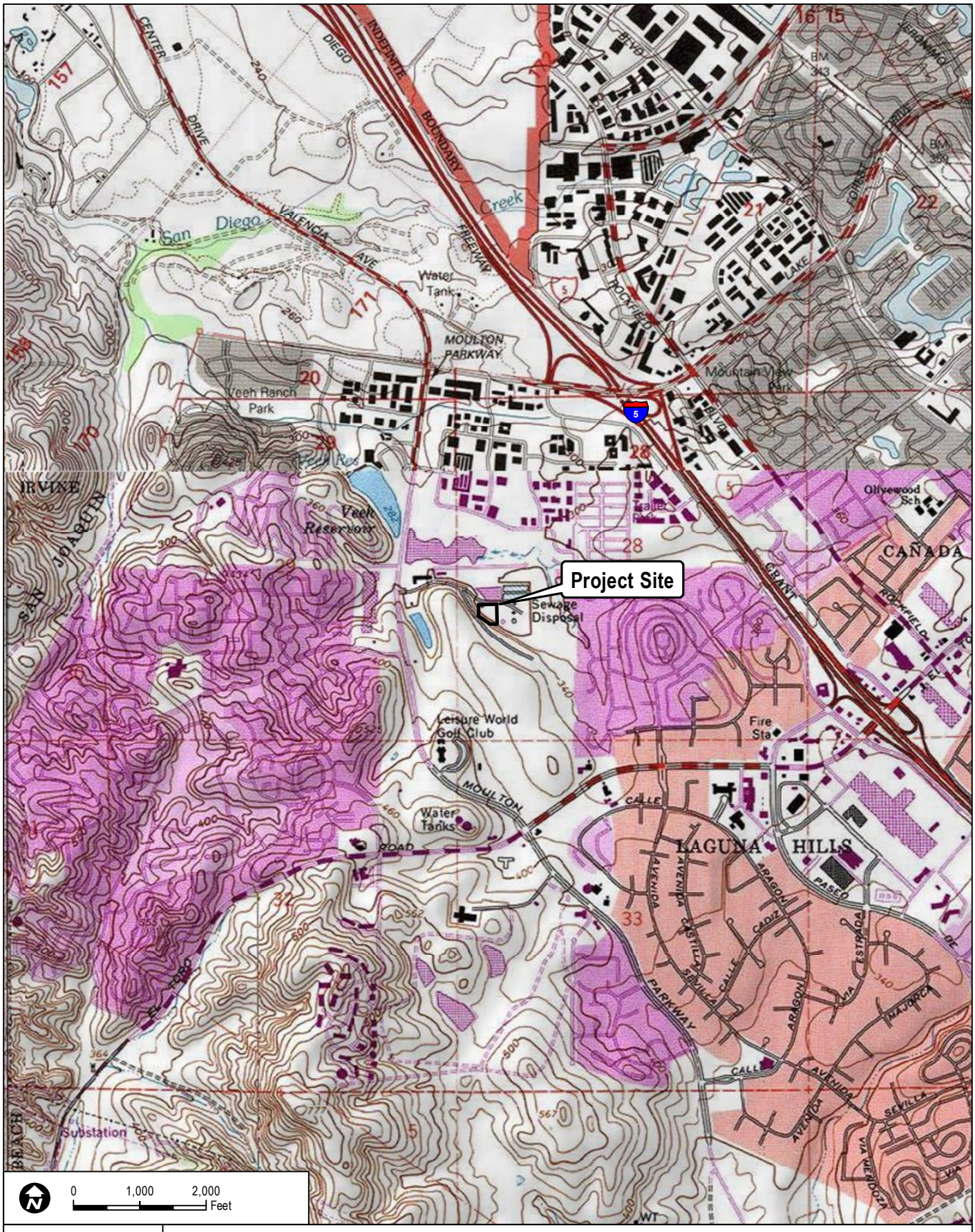
7199

FIGURE 1

Regional Map

RECYCLED WATER TERTIARY TREATMENT PLANT PROJECT

INTENTIONALLY LEFT BLANK



DUDEK

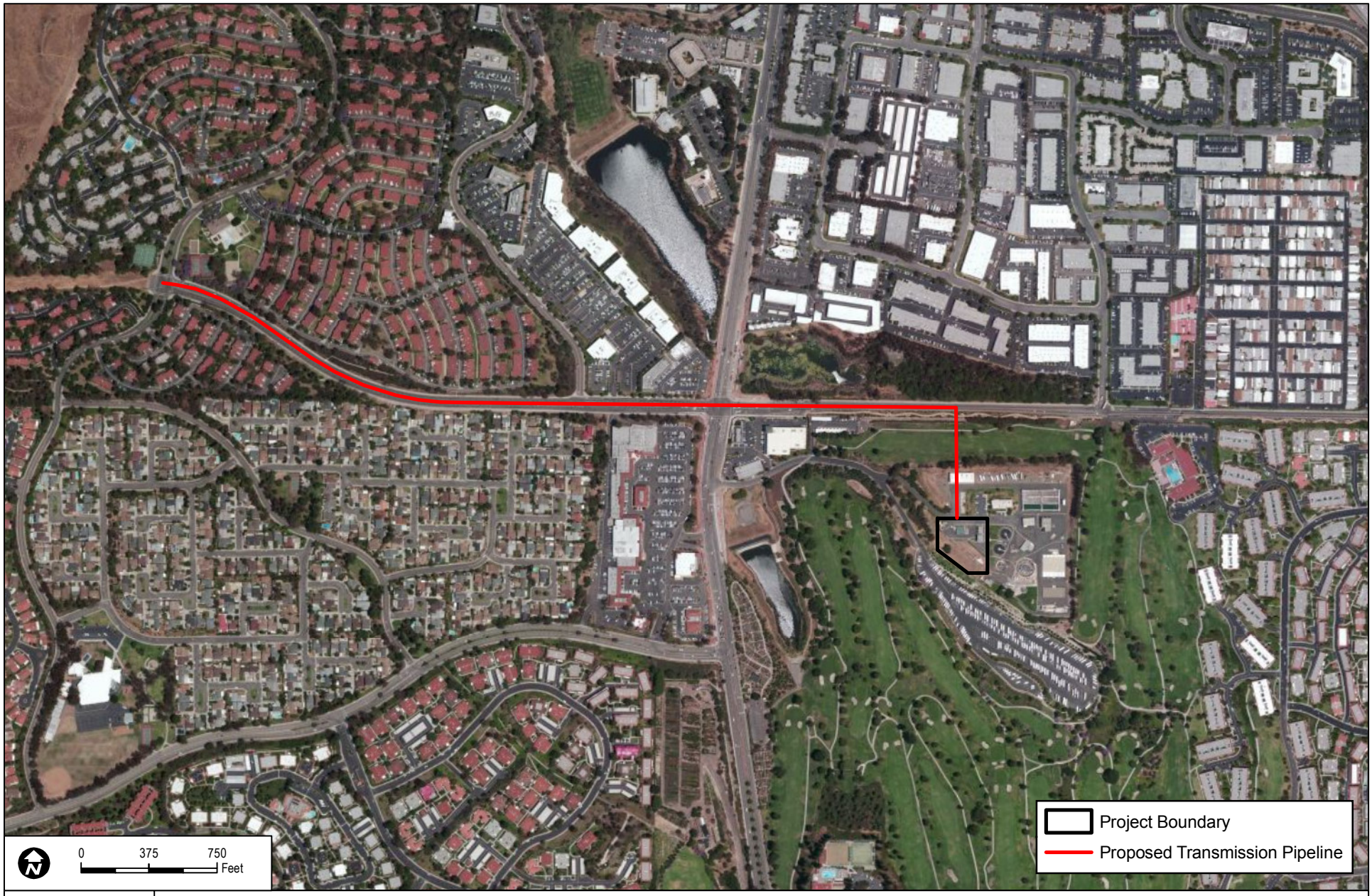
7199

SOURCE: USGS 7.5-Minute Series San Juan Capistrano Quadrangle.

FIGURE 2
Vicinity Map

RECYCLED WATER TERTIARY TREATMENT PLANT PROJECT

INTENTIONALLY LEFT BLANK



DUDEK

7199

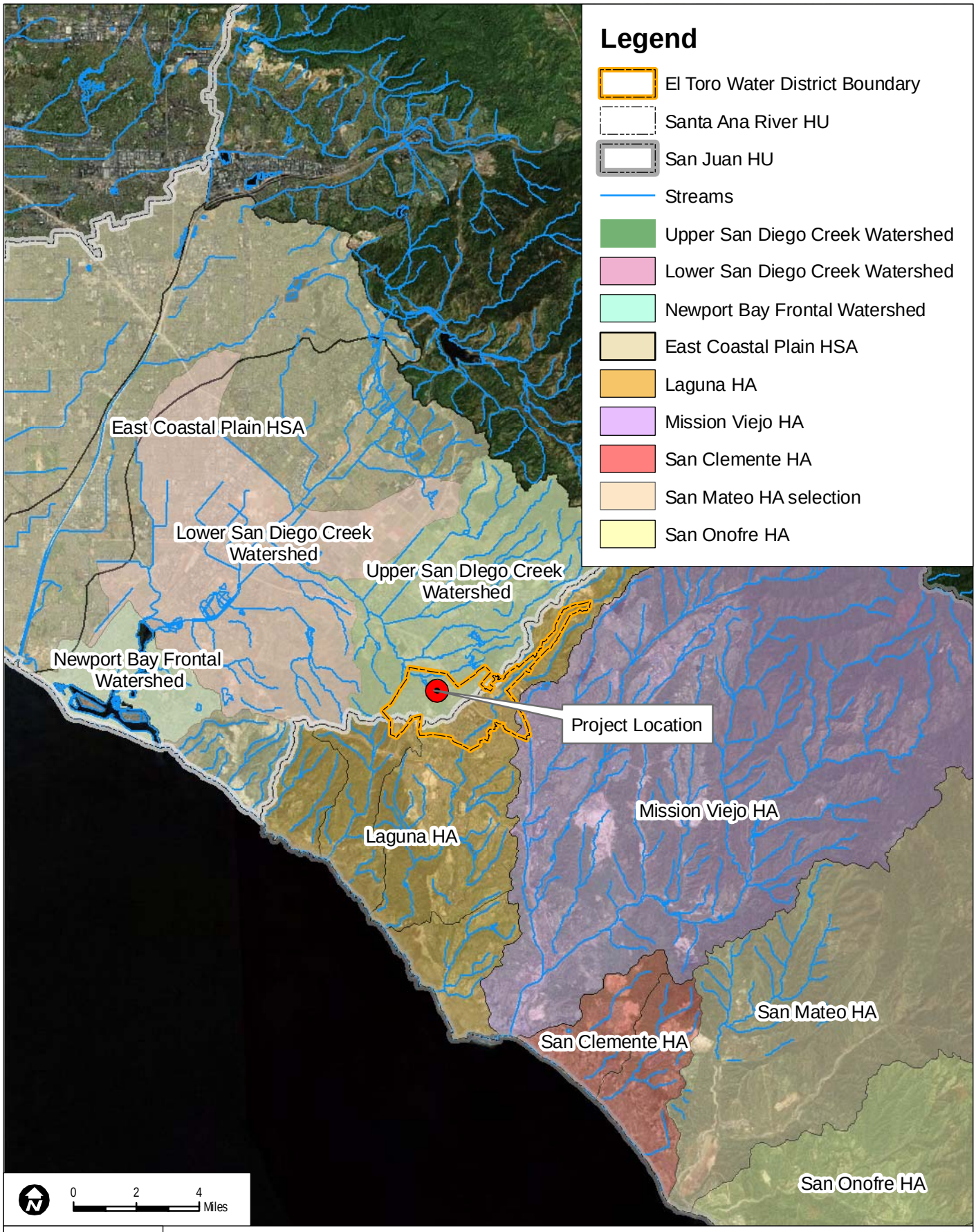
SOURCE: El Toro Water District, Bing Maps.

FIGURE 3

Aerial Photograph

RECYCLED WATER TERTIARY TREATMENT PLANT PROJECT

INTENTIONALLY LEFT BLANK



DUDEK

7199

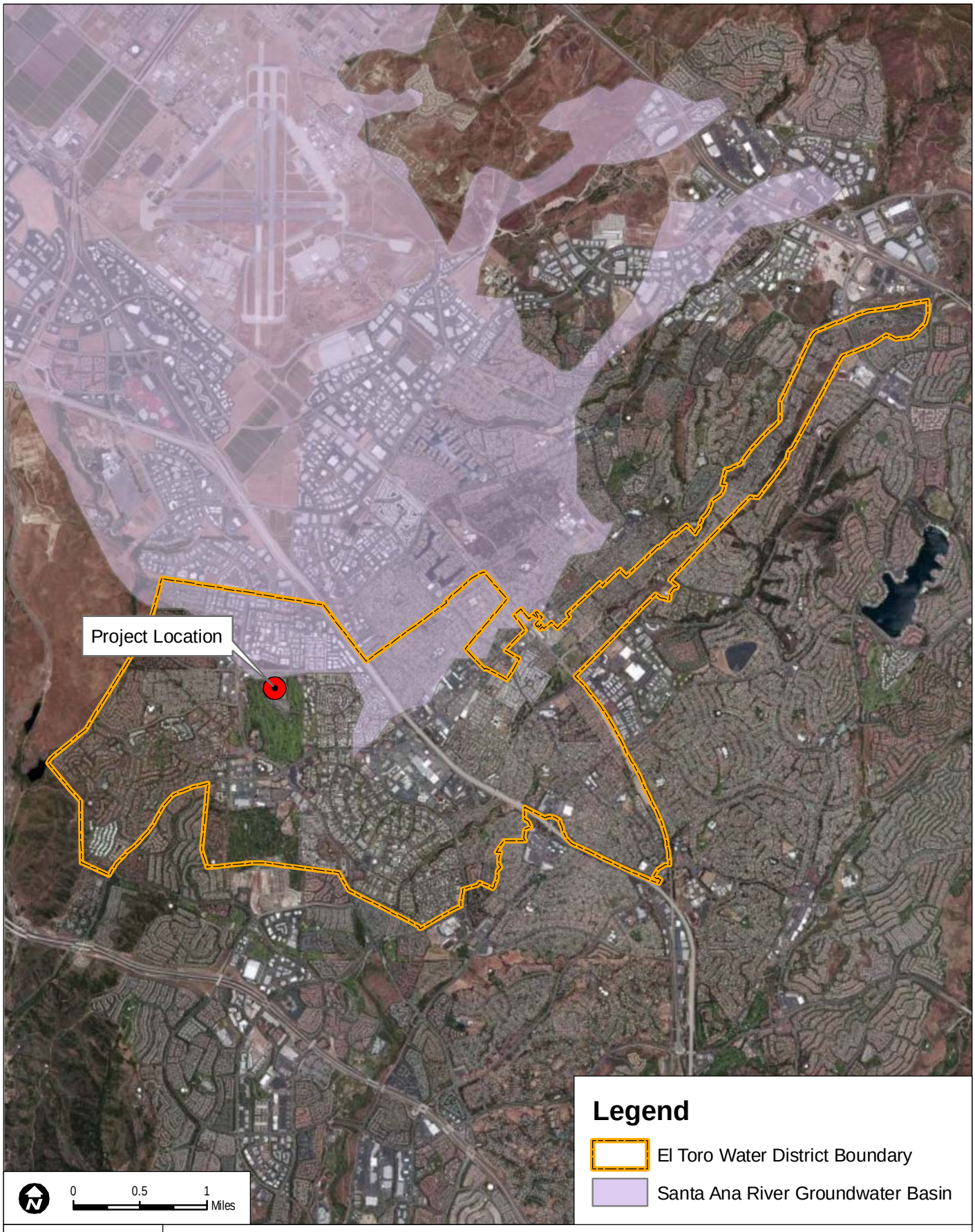
SOURCE: BING maps; SanGIS

FIGURE 4

Hydrologic Divisions

RECYCLED WATER TERTIARY TREATMENT PLANT PROJECT

INTENTIONALLY LEFT BLANK



DUDEK

7199

SOURCE: BING maps; SanGIS

FIGURE 5

Groundwater Basin Map

RECYCLED WATER TERTIARY TREATMENT PLANT PROJECT

INTENTIONALLY LEFT BLANK

DUDEK

7199

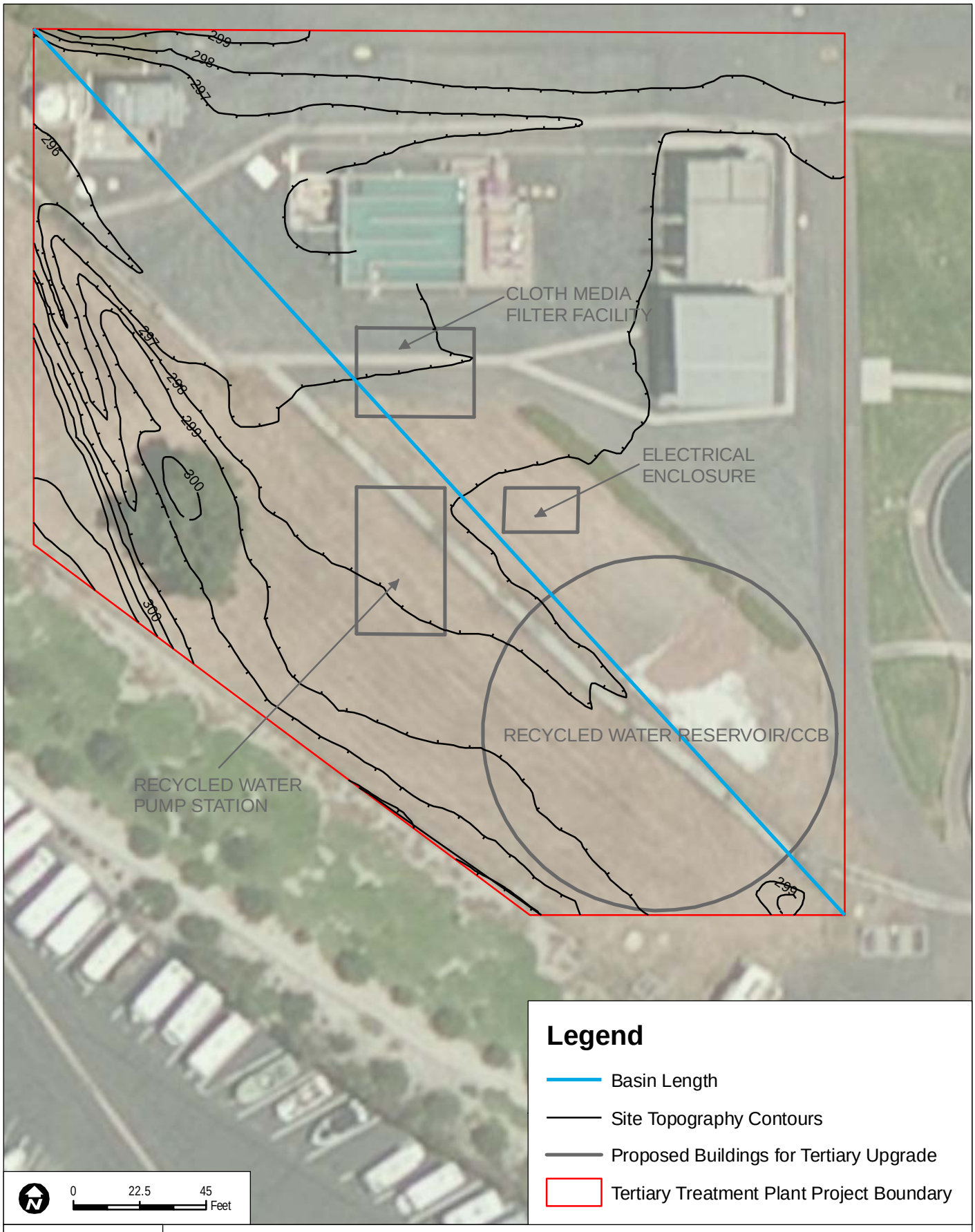
SOURCE: BING maps; FEMA

FIGURE 6

FEMA Floodzone Map

RECYCLED WATER TERTIARY TREATMENT PLANT PROJECT

INTENTIONALLY LEFT BLANK



DUDEK

7199

SOURCE: BING maps;Topo and Proposed Buildings from El Toro Water District CAD

FIGURE 7

Site Drainage, Proposed Project and Basin Length

RECYCLED WATER TERTIARY TREATMENT PLANT PROJECT

INTENTIONALLY LEFT BLANK

Section 401. Section 401 of the CWA requires an applicant for a federal permit, such as the construction or operation of a facility that may result in the discharge of a pollutant, to obtain certification from the state in which the discharge originates. This process is known as the Water Quality Certification for the project. For projects in Orange County, the Santa Ana RWQCB issues Section 401 permits.

- ***Section 402.*** Section 402 of the CWA established the National Pollution Discharge Elimination System (NPDES) to control water pollution by regulating point sources that discharge pollutants into waters of the United States. In the State of California, the United States Environmental Protection Agency (EPA) has authorized the State Water Resource Control Board (SWRCB) permitting authority to implement the NPDES program. In general, the State Water Resource Control Board issues two baseline general permits: one for industrial discharges and one for construction activities. The Phase II Rule that became final on December 8, 1999, expanded the existing NPDES program to address storm water discharges from construction sites that disturb land equal to or greater than one acre.
- ***Section 404.*** Section 404 of the CWA established a permitting program to regulate the discharge of dredged or filled material into waters of the United States. The definition of waters of the United States includes wetlands adjacent to national waters. This permitting program is administered by the Army Corp of Engineers (ACOE) and is enforced by the EPA.
- ***Section 303(d).*** Under Section 303(d) of the CWA, the SWRQB is required to develop a list of water quality limited segments for jurisdictional waters of the United States. The RWQCBs are responsible for establishing priority rankings and developing action plans, referred to as total maximum daily loads (TMDLs), to improve water quality of waterbodies included in the 303(d) list. The most recent 303(d) List of Water Quality Limited Segments approved by the EPA is from the 2010 integrated report. This document references the 2010 list. The list includes pollutants causing impairment to receiving waters or, in some cases, the condition leading to impairment. The TMDLs developed to date by the RWQCB for water bodies located downstream from the project site are discussed in Section 3.7.1.2.

3.7.1.1 303(d) List of Water Quality Limited Segments

The 2010 CWA 303(d) List of Water Quality Limited Segments classifies San Diego Creek Reach 2, San Diego Creek Reach 1, Newport Bay (Upper) and Newport Bay (Lower) as impaired water bodies. San Diego Creek Reach 2, San Diego Creek Reach 1, Newport Bay (Upper) and Newport Bay (Lower) are impaired waterbodies located downstream of the project site approximately 1.15, 4.07, 8.38, and 10.30 miles, respectively. The pollutant/stressor(s) and

potential source(s) for these impaired waterbodies are listed below in *Table 2, Clean Water Act 303(d) List of Water Quality Limited Segments.*

Table 2
Clean Water Act 303(d) List of Water Quality Limited Segments

Location	Pollutant/ Stressor	Potential Source	TMDL Requirement Status
San Diego Creek Reach 2	Indicator Bacteria	Source unknown	A (2021)
	Nutrients	Agriculture, groundwater loading, urban runoff/storm sewers	B
	Sedimentation/Siltation	Erosion/siltation, channel erosion, agriculture, construction/land development	B
	Unknown Toxicity	Unknown non-point source	B
San Diego Creek Reach 1	Fecal Coliform	Urban runoff	A (2019)
	Nutrients	Source unknown	B
	Pesticides	Unknown non-point source	B
	Sedimentation/Siltation	Source unknown	B
	Selenium	Source unknown	A (2007)
	Toxaphene	Source unknown	A (2019)
Newport Bay (Upper)	Chlordane	Source unknown	A (2019)
	Copper	Source unknown	A (2007)
	DDT	Source unknown	A (2019)
	Indicator Bacteria	Source unknown	B
	Metals	Urban runoff/storm sewers	A (2019)
	Nutrients	Source unknown	B
	PCBs	Source unknown	A (2019)
	Pesticides	Unknown non-point source, agriculture	B
	Sediment Toxicity	Source unknown	A (2019)
	Sedimentation/Siltation	Construction/land development, erosion/siltation, channel erosion, agriculture	B
Newport bay (Lower)	Chlordane	Source unknown	A (2019)
	Copper	Source unknown	A (2007)
	DDT	Source unknown	A (2019)
	Indicator Bacteria	Source unknown	B
	Nutrients	Source unknown	B

Table 2
Clean Water Act 303(d) List of Water Quality Limited Segments

Location	Pollutant/ Stressor	Potential Source	TMDL Requirement Status
	PCBs Pesticides	Source unknown Contaminated sediments, agriculture	A (2019) B
	Sediment Toxicity	Source unknown	A (2019)

1) These waterbodies are located downstream of the project site. Source: State Water Resources Control Board; EPA Approved October 11, 2011.
A = Listed on 303(d) list and requires development of TMDL. Anticipated date of TMDL development in parenthesis.
B = Listed on 303(d) list and is currently being addressed by an EPA approved TMDL.

3.7.1.2 Total Maximum Daily Loads (TMDLs)

The purpose of a TMDL is to meet water quality objectives (WQOs) and restore the beneficial uses for impaired waterbodies under Section 303(d) of the CWA. TMDLs represent a strategy for meeting WQOs by allocating quantitative limits for point and non-point pollution sources. A TMDL is defined as the sum of individual waste load allocations (WLAs) for point sources and load allocations (LAs) for non-point sources and natural background such that the capacity of the waterbody to assimilate pollutant loading (i.e., the loading capacity) is not exceeded. Therefore, the TMDL is the maximum amount of pollutant of concern that the waterbody can receive and still meet WQOs. Developed TMDLs for impairments are noted above in *Table 2*.

3.7.1.3 National Pollutant Discharge Elimination System (NPDES)

In 1990, EPA promulgated rules establishing Phase I of the NPDES storm water program for categories of storm water discharge including "medium" and "large" MS4s, which generally serve populations of 100,000 or greater. In 1999, EPA promulgated rules establishing Phase II of the NPDES storm water program for categories of storm water discharge not covered by Phase I including "small" MS4s, such as small communities.

The Regional Board issued the municipal storm water NPDES permit, Order No. 90-71 ("Municipal Permit") on July 13, 1990, for urban areas within Orange County. This municipal storm water permit was known as the first term permit. The permit was most recently renewed on January 29, 2010 (Order No. R8-2010-0062). The County of Orange's Model Water Quality Management Plan (WQMP) was developed and approved as of May 19, 2011. Projects receiving permits after plan approval by the RWQCB will be required to incorporate low impact development (LID) design concepts into the project design. Additionally, all priority projects will be required to have a final WQMP prepared.

3.7.2 California Water Code (CWC)

The California Water Code (CWC) is comprised of 31 divisions that contain statutory provisions that regulate water in the State of California.

3.7.2.1 Porter-Cologne Act

The Porter-Cologne Water Quality Control Act (Act) is Division 7 of the CWC and is directed primarily towards the control of water quality. The Act establishes the State Board and its nine regional boards as the principal state agencies responsible for control of water quality. As such, each regional board is required to formulate and adopt a Water Quality Control Plan (Basin Plan), which designates beneficial uses and establishes WQOs to protect these beneficial uses.

3.7.2.2 Santa Ana Regional Board's Basin Plan

Santa Ana Regional Board's Basin Plan was approved by the SWRCB in 1995 and includes updates adopted through June 2011 (including amendments in February 2008). The Regional Board designates beneficial uses in the Basin Plan under CWC Section 13241. Beneficial uses are defined as the uses of water necessary for the survival or well-being of man, plants, and wildlife. Designated beneficial uses in inland surface waters, coastal waters and groundwaters near the site are defined below according to the Basin Plan in *Tables 3* through *5*.

Table 3
Beneficial Uses of Inland Surface Water

Receiving Waters (Hydrologic Code)	Beneficial Uses																	
	MUN	*AGR*	*IND*	*PROC*	*GWR*	*NAV*	*POW*	*REC1*	*REC2*	*COMM*	*WARM*	*LWRM*	*COLD*	*BIOL*	*WILD*	*RARE*	*SPWN*	*EST*
San Diego Creek Reach 1 – Below Jeffrey Road (801.11)	+							X[2]	X		X				X			
San Diego Creek Reach 2 – Above Jeffrey Road to Headwaters (801.11)	+				I			I	I		I				I			

\+ Excepted from MUN (State Board Resolution No. 88-63, *Sou*rces of Drinking Water Policy).
X Potential or Existing Beneficial Use
I Intermittent Beneficial Use
[2] Access prohibited in all or part by Orange County Resources Development and Management Division (RDMD)

Table 4
Beneficial Uses of Bays, Estuaries, and Tidal Prisms

Receiving Waters (Hydrologic Code)	Beneficial Uses																		
	MUN	*AGR*	*IND*	*PROC*	*GWR*	*NAV*	*POW*	*REC1*	*REC2*	*COMM*	*WARM*	*LWRM*	*COLD*	*BIOL*	*WILD*	*RARE*	*SPWN*	*MAR*	*SHEL*	*EST*
Lower Newport Bay (801.11)	+					X		X	X	X					X	X	X	X	X	
Upper Newport Bay (801.11)	+							X	X	X				X	X	X	X	X	X	X

\+ Excepted from MUN (State Board Resolution No. 88-63, *Sou*rces of Drinking Water Policy).
X Potential or Existing Beneficial Use

Table 5
Beneficial Uses of Groundwater

Groundwater Management Zone (Hydrologic Code)	Beneficial Uses																	
	MUN	*AGR*	*IND*	*PROC*	*GWR*	*NAV*	*POW*	*REC1*	*REC2*	*COMM*	*WARM*	*LWRM*	*COLD*	*BIOL*	*WILD*	*RARE*	*SPWN*	*EST*
Lower Santa Ana River Basin																		
Irvine (801.11)	X	X	X	X														

X Potential or Existing Beneficial Use

MUN - Municipal and Domestic Supply:

Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.

AGR - Agricultural Supply:

Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

IND - Industrial Services Supply:

Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

PROC - Industrial Process Supply

Uses of water for industrial activities that depend primarily on water quality.

FRSH – Freshwater Replenishment

Uses of water for natural or artificial maintenance of surface water quantity or quality (e.g. salinity).

GWR – Groundwater Recharge

Uses of water for artificial recharge of groundwater for purpose of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.

REC 1 - Contact Water Recreation

Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water skiing, skin and scuba diving, surfing, whitewater activities, fishing, and use of natural hot springs.

REC 2 - Non-Contact Water Recreation

Uses of water for recreational activities involving proximity to water, but not normally involving contact with water where ingestion is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

WARM - Warm Freshwater Habitat

Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.

LWRM – Limited Warm Freshwater Habitat

Uses of water that support warmwater ecosystems which are severely limited in diversity and abundance as the result of concrete-lined watercourses and low, shallow dry weather flows which results in extreme temperature, pH, and/or dissolved oxygen conditions.

COLD - Cold Freshwater Habitat

Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

POW – Hydropower Generation

Waters are used for hydroelectric power generation.

WILD - Wildlife Habitat

Uses of water that support terrestrial ecosystems including, but not limited to, the preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

RARE - Threatened or Endangered Species

Uses if water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered.

NAV - Navigation

Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

COMM – Commercial and Sport Fishing

Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended to human consumption or bait process.

BIOL – Preservation of Biological Habitats of Special Significance

Uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection.

EST – Estuarine Habitat

Uses of water that support estuarine habitat ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).

MAR – Marine Habitat

Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates or wildlife water and food sources.

SPWN – Spawning, Reproduction, and/or Early Development

Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish. This use is applicable only for the protection of anadromous fish.

SHEL – Shellfish Harvesting

Uses of water that support habitats suitable for collection of filter-feeding shellfish (e.g., clams, oysters and mussels) for human consumption, commercial, or sport purposes.

3.7.3 County of Orange's Drainage Area Management Plan (DAMP)

Regulations set forth in the CWA require municipal NPDES permits to prohibit the discharge of non-storm water discharges to the storm water conveyance system, except as specified and measures shall be taken to the maximum extent practicable to reduce storm water pollutants. The County of Orange's Watershed Protection DAMP and WQMP provide guidelines to evaluate and address urban, as well as post-construction, stormwater runoff. The DAMP details the project review and permitting process, and identifies BMP selection procedures and implementation for new development and redevelopment projects. Included in the WQMP is the adoption of regional low impact development (LID). LID BMPs are provided in Section 6.2.5 and site design BMPs are provided in Section 6.2.2. When the municipal NPDES permit was reissued in 2009, additional storm water treatment requirements and standards were added. The DAMP is designed to assist in the development of a plan that adheres to the NPDES requirements and to evaluate the impact on receiving waters due to urban stormwater discharges.

4.0 SIGNIFICANCE THRESHOLDS

Section XII.A.3 of the Santa Ana Region Permit requires permittees to consider their CEQA preparation process which lists potential impacts related to urban runoff and stormwater pollution. These potential impact concerns are generally considered to be addressed in Appendix G of the CEQA guidelines, which provides that a proposed project may have a significant impact on hydrology and water quality if it results in any of the following conditions:

a) Violates any water quality standards or waste discharge requirements?

b) Substantially depletes the groundwater supplies or interferes 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 alters the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or situation on- or off- site?

d) Substantially alters the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate of amount of surface runoff in a manner which would result in flooding on- or off-site?

e) Creates or contributes runoff water which would exceed the capacity of existing or planned storm water drainage systems or provides substantial additional sources of polluted runoff?

f) Otherwise substantially degrades water quality?

g) Places 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) Places within a 100-year flood hazard area structures which would impede or redirect flood flows?

i) Exposes people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of a failure of a levee or a dam?

j) Inundation by seiche, tsunami, or mudflow?

As discussed in Section 3.7.3, the County of Orange developed its DAMP to comply with EPA NPDES requirements. Dudek assessed project impacts and mitigation measures according to the 2003 DAMP, which (in part) aims to effectively prohibit non-storm water discharges and reduce discharge of pollutants from storm water conveyance systems to the maximum extent practicable both during construction and through the use of the developed site. The DAMP is further discussed in context of project impacts and mitigation measures in Sections 5 and 6, respectively.

5.0 PROJECT IMPACTS

Impact discussions are included below, including impacts to groundwater, water quality, flooding and inundation.

5.1 Summary of Hydrologic Impacts

Potential impacts to the hydrologic regime have been identified and discussed in the sections below. A common impact to the hydrologic regime from development is the increase in impervious surfaces creating a decrease in travel time and an increase in runoff volumes. *Figure 7* depicts existing El Toro WRP existing drainage patterns and drainage features. *Table 6* below provides a summary of the calculated increase in storm water peak flow discharge as measured

in cubic feet per second (CFS). Peak flow rates were estimated using the rational method outlined in the Orange County Hydrology Manual.

Table 6
Conceptual Peak Flow Summary

STORM EVENT	EXISTING Q (cfs)1	PROPOSED Q (cfs)1	CHANGE in Q (cfs)
2-YEAR	1.6	2.3	0.7
10-YEAR	3.3	4.3	1.0
50-YEAR	4.6	5.8	1.2
100-YEAR	5.3	6.5	1.2

1. Refer to the Storm Water Runoff Flow Calculations in Appendix A for detailed calculations.

5.1.1 Surface Water

Impermeable surfaces will increase as a result of the El Toro WRP project. Therefore, the storm water runoff from the project site will increase as shown in *Table 6.*

The projected maximum increase in runoff of approximately 44 percent has the potential to impact downstream erosion and siltation. BMPs, as discussed in Section 6.2, are required to mitigate for these potential impacts.

LID BMPs necessitate that projects not increase stormwater runoff rates and duration as a result of development, mimicking pre-existing site hydrological conditions. Therefore, the projected 44 percent increase in runoff will require mitigation to achieve no net increase in flow quantities. Mitigation is provided in Section 6.2.

The 5,000 foot transmission pipeline is a Type 1 Linear Underground Project (as described in the General Permit, see Section 6.1.1) and is proposed to be placed under an existing paved right-of-way (Ridge Route Drive). No increase or decrease in impervious surface is proposed between pre-development and post-development conditions. The original grade and line of the paved right-of-way is proposed to be maintained. Therefore, storm water runoff is not anticipated to change as a result of the proposed development.

The General Permit (Order 2009-0009-DWQ as amended by 2010-0014-DWQ) states Type 1 LUPs do not have high potential to impact storm water quality. These projects are typically not developed during storm events, the construction period is typically short (a duration of weeks or months but less than a year), and disturbed soils from Type 1 LUP developments are typically required to be hauled off site, backfilled into a trench and/or covered at the end of the construction day.

5.1.2 Groundwater

Due to an increase of impermeable surfaces at the El Toro WRP site, infiltration to the groundwater basin will decrease; thus reducing the quantity of groundwater recharge. However, storm water runoff from the project site will recharge groundwater if an infiltration basin is selected as a treatment control for the project (See Section 6.2.4). Construction of the proposed transmission pipeline is not anticipated to impact groundwater.

If dewatering is required during construction, impacts to groundwater would be temporary and would not substantially deplete groundwater supplies.

5.1.3 Flooding

The proposed project site is not located within a FEMA 100-year or 500-year flood zone.

5.2 Summary of Water Quality Impacts

The proposed development will not generate significant amounts of non-visible pollutants. However, some pollutants are commonly found on similar developments and could affect water quality. The DAMP, Exhibit 7.II Model Water Quality Management Plan (WQMP), identifies the following categories of pollutants that are anticipated and/or could potentially be generated from the proposed project:

- Sediments - Sediments are soils or other surficial materials eroded and then transported or deposited by the action of wind, water, ice, or gravity. Sediments can increase turbidity, clog fish gills, reduce spawning habitat, lower young aquatic organisms survival rates, smother bottom dwelling organisms, and suppress aquatic vegetation growth.
- Nutrients - Nutrients are inorganic substances, such as nitrogen and phosphorus. They commonly exist in the form of mineral salts that are either dissolved or suspended in water. Primary sources of nutrients in urban runoff are fertilizers and eroded soils. Excessive discharge of nutrients to water bodies and streams can cause excessive aquatic algae and plant growth. Such excessive production, referred to as cultural eutrophication, may lead to excessive decay of organic matter in the water body, loss of oxygen in the water, release of toxins in sediment, and the eventual death of aquatic organisms.
- Metals - Metals are raw material components in non-metal products such as fuels, adhesives, paints, and other coatings. Primary source of metal pollution in storm water are typically commercially available metals and metal products. Metals of concern include cadmium, chromium, copper, lead, mercury, and zinc. Lead and chromium have been used as corrosion inhibitors in primer coatings and cooling tower systems. At low concentrations naturally occurring in soil, metals are not toxic. However, at higher

concentrations, certain metals can be toxic to aquatic life. Humans can be impacted from contaminated groundwater resources, and bioaccumulation of metals in fish and shellfish. Environmental concerns, regarding the potential for release of metals to the environment, have already led to restricted metal usage in certain applications.

- Organic Compounds - Organic compounds are carbon-based. Commercially available or naturally occurring organic compounds are found in pesticides, solvents, and hydrocarbons. Organic compounds can, at certain concentrations, indirectly or directly constitute a hazard to life or health. When rinsing off objects, toxic levels of solvents and cleaning compounds can be discharged to storm drains. Dirt, grease, and grime retained in the cleaning fluid or rinse water may also adsorb levels of organic compounds that are harmful or hazardous to aquatic life.
- Trash & Debris - Trash (such as paper, plastic, polystyrene packing foam, and aluminum materials) and biodegradable organic matter (such as leaves, grass cuttings, and food waste) are general waste products on the landscape. The presence of trash & debris may have a significant impact on the recreational value of a water body and aquatic habitat. Excess organic matter can create a high biochemical oxygen demand in a stream and thereby lower its water quality. Also, in areas where stagnant water exists, the presence of excess organic matter can promote septic conditions resulting in the growth of undesirable organisms and the release of odorous and hazardous compounds such as hydrogen sulfide.
- Oxygen-Demanding Substances - This category includes biodegradable organic material as well as chemicals that react with dissolved oxygen in water to form other compounds. Proteins, carbohydrates, and fats are examples of biodegradable organic compounds. Compounds such as ammonia and hydrogen sulfide are examples of oxygen-demanding compounds. The oxygen demand of a substance can lead to depletion of dissolved oxygen in a water body and possibly the development of septic conditions.
- Oil and Grease - Oil and grease are characterized as high-molecular weight organic compounds. Primary sources of oil and grease are petroleum hydrocarbon products, motor products from leaking vehicles, esters, oils, fats, waxes, and high molecular-weight fatty acids. Introduction of these pollutants to the water bodies are very possible due to the wide uses and applications of some of these products in municipal, residential, commercial, industrial, and construction areas. Elevated oil and grease content can decrease the aesthetic value of the water body, as well as the water quality.
- Bacteria and Viruses - Bacteria and viruses are ubiquitous microorganisms that thrive under certain environmental conditions. Their proliferation is typically caused by the transport of animal or human fecal wastes from the watershed. Water, containing excessive bacteria and viruses can alter the aquatic habitat and create a harmful

environment for humans and aquatic life. Also, the decomposition of excess organic waste causes increased growth of undesirable organisms in the water.

- Pesticides - Pesticides (including herbicides) are chemical compounds commonly used to control nuisance growth or prevalence of organisms. Excessive application of a pesticide may result in runoff containing toxic levels of its active component.

Table 7 below presents anticipated and potential pollutants, as identified by the DAMP, for priority development projects. Anticipated and potential pollutant categories for the proposed development are indicated in the table below.

Table 7
Anticipated and Potential Pollutants Generated by Land Use Type

Project Categories	General Pollutant Categories								
	Sediments	*Nutrients*	*Heavy Metals*	*Organic Compounds*	*Trash & Debris*	*Oxygen Demanding Substances*	*Oil & Grease*	*Bacteria & Viruses*	*Pesticides*
Detached Residential	X	X			X	X	X	X	X
Attached Residential	X	X			X	P(1)	P(2)	P	X
Commercial Development (>100,000 SF)	P(1)	P(1)	P	P(5)	X	P(1)	X	P(3)	P(2)
Auto Repair Shops			P	X(4,5)	X		X		X
Restaurants					X	X	X	X	X
Hillside Development (>5,000 SF) in SDRWQCB	X	X			X	X	X	X	X
Hillside Development (>10,000 SF) in SARWQCB	X	X			X	X	X	X	X
Parking Lots	P(1)	P(1)	X	X(4)	X	P(1)	X	P(6)	X
Streets, Freeways, and Highways	X	P(1)	X	X(4)	X	P(1)	X	P(6)	X

X Anticipated
P Potential
(1) A potential pollutant if landscaping exists on-site
(2) A potential pollutant if the project includes uncovered parking areas.
(3) A potential pollutant if land use involves food or animal waste products.
(4) Including petroleum hydrocarbons
(5) Including solvents
(6) Analyses of pavement runoff routinely exhibit bacterial indicators

The development of the proposed tertiary treatment plant facilities will resemble the commercial development category listed in *Table 7*. The development of the proposed transmission pipeline will resemble the streets, freeways, and highways category. As the development of the proposed tertiary treatment plant facilities site proceeds there is a potential for the quantity of the identified, anticipated, and potential pollutants to increase. Construction of the proposed transmission pipeline is not anticipated to change surface, hydraulic, or drainage conditions and is not likely to be a factor when considering increase in pollutants due to change in land use. Therefore, in order to mitigate for water quality impacts that would occur from the project categories, mitigation measures are provided in Section 6.2.

5.3 Cumulative Impacts

Future and proposed construction projects close to the proposed project could result in cumulative impacts to hydrology and water quality. Increases in impervious surfaces associated with these projects would result in an increase in storm water runoff, decreased infiltration, and an increase in pollutant transport. Without effective control, these changes can adversely affect water quality and drainage.

Individual projects are required to address individually generated construction and post-construction runoff in order to comply with the federal CWA, the State's Porter-Cologne Water Quality Control Act, and the County's Watershed Protection, Storm Water Management, and Discharge Control Ordinance. Adherence to the regulations governed by jurisdictional agencies substantially reduces the cumulative impacts of multiple projects on water quality.

All cumulative projects will be required to prepare a SWPPP per NPDES under the CWA. As per the General Permit, the following are required as a part of the SWPPP: meet established minimum BMP requirements; follow project site soil monitoring and reporting; conduct effluent, and potentially receiving water, monitoring and reporting, if necessary; abide by post-construction storm water performance standards; develop and implement Rain Event Action Plans; and conduct annual reporting to certify that the project site is in compliance with the permit. These SWPPPs will ensure that adequate BMPs are used for each of the projects to minimize water quality impacts. Given current regulations, each project would be constructed and managed in accordance with regional requirements which typically require acquisition of discharge permits and the use of BMPs to limit erosion, control sedimentation, and reduce pollutants in runoff.

Similar to the effects increased runoff can have to water quality, hydrological changes such as increased runoff rates and volumes can overwhelm existing storm water conveyance systems with an increase in impervious surfaces. The proposed project would incrementally increase

flows to existing drainage facilities. Contribution to regional water quality degradation and increased runoff would be considered a significant indirect cumulative impact.

6.0 MITIGATION MEASURES

Dudek utilized the Model WQMP to guide the following discussion of mitigation measures. The Model WQMP directs project applicants to identify pollutants of concern from the project area and in receiving waters, and incorporate all applicable BMPs and LID strategies to mitigate project impacts.

6.1 Best Management Practices (BMPs)

Development projects are required to develop and implement storm water BMPs both during construction and in the project's permanent design to reduce pollutants discharged from the project site, to the maximum extent practicable. Post-construction pollution prevention will be accomplished through the implementation of long-term BMPs. In general, site design BMPs minimize the potential for degradation of water quality. Source control BMPs help prevent onsite contaminants from entering the drainage system and thereby creating a potential water quality issue. Treatment control BMPs help to reduce or eliminate contaminants from entering the drainage system before water leaves the site. All three types of permanent design BMPs are outlined for the project. BMPs are also necessary to address the increase in runoff from the site in order to prevent excess erosion, siltation, or flooding off site. In addition, BMPs during construction are also mandated and are discussed in the following section.

6.1.1 Construction Considerations

Dischargers whose projects disturb one or more acres of soil are required to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit, 2009-0009-DWQ as amended by 2010-0014-DWQ). Construction activity subject to this permit includes clearing, grading and disturbances to the ground such as stockpiling or excavation. The Construction General Permit requires the development and implementation of a SWPPP. The SWPPP should contain a site map(s) which shows the construction site perimeter, existing and proposed buildings, lots, roadways, storm water collection and discharge points, general topography both before and after construction, and drainage patterns across the project. The SWPPP must list BMPs the discharger will use to protect storm water runoff and the placement of those BMPs in accordance with Caltrans Storm Water Quality Handbooks. Additionally, the SWPPP must contain a visual monitoring programs and a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs. Specific construction BMPs are discussed in Section 6.2.1.

The 5,000 foot transmission pipeline is classified as a Type 1 LUP, per the General Permit. The General Permit identifies a construction project at a Type 1 LUP when one of the following two project conditions is met:

1. 70 percent or more of the construction activity occurs on a paved surface and areas disturbed during construction are returned to preconstruction conditions (or equivalent protection is established at the end of constructions activities for the day).
2. Greater than 30 percent of construction activities occur within the non-paved shoulders or land immediately adjacent to paved surfaces, or where construction occurs on unpaved improved roads (including shoulders or land immediately adjacent to them).

Since the original surface, grade, and line of the paved right of way (Ridge Route Drive) will not be altered due to the construction of the Type 1 LUP, site design, source control and treatment control BMPs are not discussed for the proposed transmission pipeline. Discussion of site design, source control, LID BMPs and treatment control BMPs in the sections below apply to the proposed development of the ETWD WRP site.

Should groundwater dewatering be necessary during construction, all dischargers are required to obtain a permit from the Santa Ana RWQCB. Order No. R8-2009-0003, General De Minimus Permit for Discharges to Surface Waters, requires all permittees to monitor all discharges which pose an insignificant threat to water quality.

6.1.2 Permanent Design Consideration

Table 3 lists the impaired waterbodies downstream of the project as defined in the 2010 CWA Section 303(d) List of Water Quality Limited Segments. The nearest impaired waterbody is San Diego Creek Reach 2, which is located approximately 1.2 miles downstream of the project site. Since San Diego Creek Reach 2 and the Upper and Lower Newport Bay are impaired by bacteria and because bacteria loads within urbanized area generally originate from urban runoff discharges from Municipal Separate Sewer Systems (MS4s), BMPs that minimize bacteria loading from the project site shall be implemented to the maximum extent practicable. San Diego Creek Reach 2 is also listed as impaired by nutrients, sedimentation/siltation and toxicity which shall also be minimized with appropriate BMPs. Additionally, the general pollutants for each project component listed in *Table 7* should also be considered when selecting appropriate BMPs.

Site design, source control, and treatment control BMPs can minimize pollutant loading from the site. These types of BMPs are discussed in Section 6.2.

6.1.3 Maintenance Activities

A maintenance plan assuring that all permanent BMPs will be maintained should be developed per the DAMP Section 7.6.6. Examples of maintenance include removal of accumulated sediment and trash, thinning of vegetative brush in biotreatment swales, and maintaining the appearance and general status of the vegetation.

The maintenance plan should include the following:

Operation & Maintenance (O&M) Plan:

The designated responsible party will manage the storm water BMPs, employee's training program and duties, operating schedule, maintenance frequency, routine service schedule, specific maintenance activities (including maintenance of storm water conveyance stamps), copies of resource agency permits, and other necessary activities. At a minimum, maintenance agreements should require the applicant to provide inspection and servicing of all permanent treatment BMPs on an annual basis. Depending on the specific treatment control, BMPs selected in the final design of the project, maintenance may be required on a more regular basis.

6.2 Mitigation

Applicable site design, source control and treatment control mitigation required to maintain pre-development rainfall runoff characteristics are presented for the project in the following sections. Additionally, mitigation for water quality has been included for the project, as appropriate.

6.2.1 Construction BMPs

The Orange County DAMP describes the standards for Construction Stormwater BMPs in section 8.4.4 Best Management Practices (BMPs) for Construction Projects, grouping them into 5 categories:

1. Erosion Control Practices – including physical stabilization BMPs (hydraulic mulch, soil binders, straw mulch, geotextiles, plastic covers, mats), vegetation stabilization BMPs (hydroseeding) and wind erosion control (application of water).
2. Sediment Control Practices – including perimeter protection (silt fence, fiber rolls, sand bag barrier, straw bale barrier), storm drain inlet protection, resource protection (gravel bag berm, silt fence, fiber rolls), sediment capture (sediment trap, desilting basin), velocity reduction (silt fence, check dam, velocity dissipation devices, sediment basin), and off-site sediment tracking (stabilized construction entrance/exit, construction road stabilization, entrance/outlet tire wash).

3. Waste Management & Materials Pollution Control Practices – including spill prevention and control, solid waste management, hazardous waste management, contaminated soil management, concrete waste management, sanitary/septic waste management, liquid waste management, vehicle and equipment cleaning, vehicle and equipment fueling, and vehicle and equipment maintenance.
4. Materials Management Practices – including material delivery and storage, material use and stockpile management
5. Non-Stormwater Management Practices – including water conservation, dewatering operations, paving and grinding operations, temporary stream crossing, clear water diversion, illicit connection reporting, potable water/irrigation, vehicle and equipment cleaning, vehicle and equipment fueling, vehicle and equipment maintenance, pile driving operations, concrete curing, concrete finishing, materials and equipment use over water, structure demolition, temporary batch plants and streambank stabilization.

6.2.2 Site Design BMPs

The following applicable site design BMPs are appropriate to maintain pre-development rainfall runoff characteristics to maintain or reduce pre-development downstream erosion, to limit siltation, and to protect stream habitat:

Maintain Pre-Development Rainfall Runoff Characteristics

- Minimize impervious footprint
- Conserve natural areas and provide buffer zones between natural water bodies and the project footprint
- Construct walkways, trails, overflow parking lots and alleys and other low traffic areas with permeable surfaces, such as pervious concrete, porous asphalt, pavers and granular materials
- Construct streets, sidewalks and parking lots to the minimum widths necessary, provided that safety and a walkable environment are not compromised
- Maintain and preserve natural drainage courses to mimic site's natural hydrologic regime
- Provide runoff storage measures dispersed uniformly throughout a site's landscape with a use of a variety of detention, retention and runoff practices
- Minimize directly connected impervious areas
- Drain rooftops and impervious sidewalks into adjacent landscaping prior to discharging to the storm drain
- Minimize soil compaction

- Maximize canopy interception and water conservation by preserving existing native trees and shrubs and planting additional native or drought tolerant trees and large shrubs

Protect Slopes and Channels

- Convey runoff safely from the tops of slopes
- Minimize disturbances to natural drainages
- Vegetate slopes with native or drought tolerant vegetation
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems
- Stabilize permanent channel crossings
- Install energy dissipaters such as riprap at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion

Project plans shall include storm water BMPs to decrease the potential for erosion of slopes and/or channels, consistent with local codes and ordinances and with the approval of jurisdictional agencies (US ACOE, RWQCB, and Department of Fish & Game).

In addition to the above-mentioned site design BMPs, site design BMPs such as vegetated swales should be considered in order to limit the discharge of additional storm water runoff.

6.2.3 Source Control BMPs

Source control BMPs includes water quality management practices that minimize the potential introduction of urban pollutants to runoff, limiting the water quality impacts to downstream watercourses. These management practices include both routine non-structural BMPs as well as routine structural BMPs (Model WQMP, 2011).

Structural Source Control BMPs

Provide Storm Drain System Stenciling and Signage

Signage should be highly visible and clear. The following are required to be included in the project design and plans:

- Provide labeling of all storm drain inlets
- Post signs which prohibit illegal dumping within project area
- Maintain legibility of stenciling and signage

Design Outdoor Hazardous Material Storage Areas to Reduce Pollutant Introduction

Where applicable, the following BMPs are required:

- Hazardous materials shall be placed in an enclosure or protected by secondary containment
- Storage area shall be paved and sufficiently impervious to spills/leaks
- Storage area shall have a roof or awning
- Stormwater retained within containment structure will not be discharged to MS4 system

Design Trash Enclosures to Reduce Pollutant Introduction

All trash containers are required to meet the following:

- Paved with an impervious surface
- Provide attached lids (roof or awning allowable) on all trash containers that exclude rain
- Connection of trash area drains to MS4 system is prohibited

Use Efficient Irrigation Systems and Landscape Design

Irrigation System and Landscape Design shall employ timing and application methods to minimize runoff into MS4 system. The following methods should be employed where applicable:

- Use of rain shutoff devices
- Design irrigation system to site specific water requirements
- Utilize flow reducers/shutoff valves triggered by pressure drop
- Plan must be consistent with County Water Conservation Resolution or city equivalent
- Timing and application methods shall be designed to minimize runoff into MS4 system

Protect Slopes and Channels

Development shall include the following BMPs to decrease the potential for erosion of slopes and/or channels:

- Convey runoff from tops of slopes
- Avoid disturbance of steep or unstable slopes
- Avoid disturbing natural channels
- Install permanent stabilization BMPs on disturbed slopes and in channels

- Populate slopes with drought tolerant vegetation
- Control and treat flow before it enters existing natural drainage
- Install energy dissipaters at outlets of culverts, storm drains, conduits or channels
- On-site conveyance channels should be lined to reduce erosion

Fueling Areas

Fueling areas shall be designed according to City and OC DAMP standards. Any fueling areas proposed for the development site shall implement the following measures as appropriate:

- Maintain clean fuel dispensing areas
- Design fueling areas to minimize exposure to storm water
- Minimize standing water
- Implement fueling safeguards
- Inspections of fueling equipment.
- Maintain spill-kit onsite
- Underground storage tanks shall be fit with spill containment and overflow prevention systems that meet regulations of Section 2635(b) of Title 23 of the Code of California Regulations
- Avoid direct precipitation by implementing roof or canopy
- Posted signage advising not to top off fuel tanks

Site Design and Landscape Planning

The owner shall be responsible for implementing and maintaining all vegetation established on manufactured or disturbed slopes.

Wash Water Controls for Food Preparation Areas

Facilities handling and dealing with food and food preparation must adhere to all health and safety standards. Wash water drainage to MS4 system is prohibited.

Community Car Wash Racks

Community car wash racks shall meet DAMP and City standards. Wash water drainage to MS4 system is prohibited.

Dock Areas

Loading/unloading dock areas shall include the following:

- Cover loading dock areas or design drainage to preclude urban run-on and runoff
- Direct connections to storm drains form depressed loading docks are prohibited

Maintenance Bays

Maintenance bays shall include the following:

- Repair/Maintenance bays shall be indoors or designed to preclude run-on and runoff.
- Design a repair/maintenance bay drainage system to capture all wash water, leaks and spills. Connect drains to a sump for collection and disposal.

Vehicle Wash Areas

Projects that include areas for washing/steam cleaning of vehicles shall use the following:

- Self-contained or covered with a roof or overhang.
- Equipped with clarifier or other pretreatment facility.
- Properly connected to sanitary sewer

Outdoor Processing Areas

Outdoor processing equipment operations shall adhere to the following requirements:

- Cover or enclose areas that would be the most significant source of pollutants or slope the area toward a dead-end sump; or, discharge to the sanitary sewer system following appropriate treatment.
- Grade or berm area to prevent run-on from surrounding areas.
- Installation of storm drains in areas of equipment repair is prohibited

Equipment Wash Areas

Outdoor equipment/accessory washing and steam cleaning activities shall use the following:

- Be self-contained or covered with a roof or overhang
- Be equipped with a clarifier, grease trap or other pretreatment facility

- Be properly connected to a sanitary sewer

Parking Areas

To minimize the off-site transport of pollutants from parking areas, the following design concepts shall be considered

- Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design
- Overflow parking may be constructed with permeable paving

Non-Structural Source Control BMPs

Activity Restrictions

This includes activity restrictions such as trash management, car wash restrictions, and fertilizer applications.

Common Area Landscape Management

On-going maintenance consistent with County Water Conservation Resolution or city equivalent, plus fertilizer and/or pesticide usage consistent with Management Guidelines for Use of Fertilizers (DAMP section 5.5).

BMP Maintenance

Identify responsibility for implementation of each non-structural BMP and scheduled cleaning and/or maintenance of all structural BMP facilities.

Title 22 CCR Compliance

Adherence to Title 22 (California Code of Regulations) and relevant California Health & Safety Code and shall be enforced by County Environmental Health on behalf of the State. The WQMP must describe how the development will comply.

Local Water Quality Permit Compliance

Under the Water Quality Ordinance the permittees may issue permits to ensure clean stormwater discharge from fuel dispensing areas and other areas of concern to public properties.

Underground Storage Tank (UST) Compliance

Compliance with State UST regulations, to be enforced by County Environmental Health Department.

Hazardous Materials Disclosure Compliance

Applicable to developments that store of use hazardous wastes. Shall comply with Orange County and other appropriate agency regulations.

Uniform Fire Code Implementation
Compliance with Article 80 of the Uniform Fire Code enforced by fire protection agency.

Common Area Litter Control
Includes litter control for the development (including trash pick-up and sweeping of common areas).

Employee Training
Employee or other responsible party training program, including development of manuals and programs intended to ensure awareness of activities that may result in pollutants entering the MS4 system.

Housekeeping of Loading Docks
To ensure clean and orderly condition of loading dock, specified housekeeping measures (including regular sweeping, litter control, cleanup of spills and broken containers) will be implemented where applicable.

Common Area Catch Basin Inspection
Includes routine inspection, cleaning and maintenance of all drainage facilities on an annual basis.

Street Sweeping Private Streets and Parking Lots
Streets and parking lots are required to be swept prior to the storm season.

6.2.4 Treatment Control BMPs

The following treatment control BMPs are available to remove the project's most significant pollutants of concern to high or medium removal efficiency.

Biofilters

- Grass swales
- Grass strips
- Wetland vegetation swales
- Bioretention

Detention Basins

- Extended/dry detention basins with grass lining
- Extended/dry detention basins with impervious lining

Infiltration Basins

- Infiltration basins
- Infiltration trenches

Wet Ponds and Wetlands

- Wet ponds
- Constructed wetlands

Filtration Systems

- Media filtration
- Sand filtration

Hydrodynamic Separation Systems

- Swirl concentrators
- Cyclone separators

A single or combination of treatment control BMPs as listed above shall be selected to infiltrate, filter, and/or treat runoff from the project footprint to the numeric sizing treatment standards outlined in Section 7, Exhibit 7.II, Attachment A of the DAMP. Alternate treatment control BMPs that treat the project's most significant pollutants of concern to high removal efficiency should evaluated during the final design of the project.

6.2.5 Low Impact Development (LID) BMPs

The implementation of LID BMPs is stressed in order to minimize stormwater runoff rates and duration as a result of development. Section 5.1 indicates that an approximately 44 percent increase in runoff rate was calculated from the proposed project due to an increase in impermeable surfaces. In addition to the site design BMPs and treatment control BMPs, the following LID BMPs are listed by the 2011 Model WQMP as available for inclusion in the projects final design:

Infiltration

- Infiltration trenches
- Infiltration basins
- Bioretention without underdrains
- Drywells
- Permeable pavement
- Proprietary infiltration

Evapotranspiration and Evaporation

- Green roofs
- Brown roofs
- Blue roofs

Harvest and Use

- Cisterns
- Underground detention
- Irrigation use
- Domestic use

Biotreatment

- Bioretention with underdrains
- Stormwater planter boxes with underdrains
- Constructed wetlands
- Vegetated Swales
- Vegetated filter strips
- Dry extended detention basins
- Wet extended detention basins
- Proprietary detention

In order to mitigate the 44 percent increase in runoff from the proposed project, LID BMPs should to be incorporated. This will be accomplished by strategic placement of LID BMPs uniformly throughout the project to mimic the natural flow regime. Recommended LID BMPs to include in the upgrade of the El Toro Water Recycling Plant are listed as follows:

- Vegetated swales
- Vegetated filter strips
- Harvest and Treat at Plant

The Orange County Hydrology Manual Synthetic Unit Hydrograph method was used to estimate the volume of runoff generated from the proposed project for the 2 year and 5 year, 3 hour duration storms.

Table 8
Volume of Runoff Generated from the 2 Year and 5 Year Storm

Storm Event	Volume Runoff (Cubic Feet)
2 year, 3 hour duration	5,781
5 year, 3 hour duration	7,674

Method: Orange County Hydrology Manual Workbook Problem No. 12: Synthetic Unit Hydrograph.

7.0 SIGNIFICANCE OF IMPACT AFTER MITIGATION

After instituting the proposed mitigation measures, impacts from runoff for this project component would be at a level below significance.

8.0 ACKNOWLEDGEMENTS

This report was prepared by Dudek hydrogeologist Patrick Rentz under the supervision of Trey Driscoll, P.G., CHG and Derek Reed, P.E., Senior Engineer.

9.0 REFERENCES

American Geological Institute (AGI). Glossary of Geology. 1977.

California Stormwater Quality Association, Stormwater Best Management Practice Handbook, New Development and Redevelopment, January 2003.

City of Laguna Hills Zoning District Map. Prepared for the City of Laguna Hills. Costa Mesa, California: The Planning Center, April 2003.

City of Laguna Woods Zoning Map. Prepared for the City of Laguna Woods. Planning in Motion Hogle-Ireland, Inc., January 2011.

2010 Urban Water Management Plan. Prepared for El Toro Water District by Malcom Pirnie.

Federal Emergency Management Agency (FEMA). Flood Insurance Rate Map, Orange County, California and incorporated area.

Porter-Cologne Water Quality Control Act with Additions and Amendments Effective January 1, 2005, SWRCB, 2005. http://www.swrcb.ca.gov/water_laws/docs/portercologne.pdf

Orange County Drainage Area Management Plan (DAMP), July 2003

Orange County Model Water Quality Management Plan (WQMP), May 2011.

Orange County Hydrology Manual, October 1986.

Orange County Watersheds http://www.ocwatersheds.com

Santa Ana Regional Water Quality Control Board's (SARWQCB) General De Minimus Permit (Order No. R8-2009-0003) NPDES NO. CAG998001, *General Waste Discharge Requirements for Discharges that Pose an Insignificant (De Minimus) Threat to Water Quality.*

SARWQCB. Water Quality Control Plan for the Santa Ana River Basin – Region 8, Includes Amendments Adopted by the Regional Board through 2011.

SWRCB, 2010 List of Impaired Water bodies [303(d) List]. http://www.swrcb.ca.gov/water_issues/programs/tmdl/integrated2010.shtml

USDA. Soil Conservation Service and Forest Service. Soil Survey of Orange County and Western Part of Riverside County, September 1978.

APPENDIX A

Storm Water Runoff Flow Calculation

El Toro Tertiary Treatment Plant Hydrology Study

NOTES:
1. The hydrology analysis is based on Orange County Hydrology Manual per scope.

EQUATIONS:
1. $Tc = K [(Length^3)/(Elevation\ Change)]^{0.2}$ as shown in Orange County Hydrology Example Workbook. Based on Kirpitch formula.
2. K value was solved for using the Tc equation above. Tc was determined using the Time of Concentration nomograph (fig. D-1) in the Orange County Hydrology Manual

Assumptions:

EXISTING:
1. Assumes the frequency of a storm runoff is the same frequency of the rainfall producing this runoff
2. Assumes that the peak runoff occurs when all parts of the drainage area are contributing to the runoff
3. Assumes the rainfall intensity is uniformly distributed over the drainage area throughout the duration of the storm
4. Assumes basins do not change between existing and proposed conditions
5. Assumes existing and proposed flow paths are the same, and no water is diverted to storm drains.

PROPOSED:
1. Upgrade of WRP will include paving between proposed facilities (similar to existing facility).

EXISTING:

Basin	Area	Area	Max Elev	WS Length	End Elev	Slope 1	Elev Change	Soil Grp	K	Tc	NOTES
	ft^2	AC	ft	ft	ft	ft/ft	ft			min	
1	71,874	1.65	299.00	407.00	296.00	0.01	3.00	B & D	0.39	11.52	K=commercial(paved), 50% impervious

PROPOSED:

Basin	Area	Area	Max Elev	WS Length	End Elev	Slope 1	Elev Change	Soil Grp	K	Tc*	NOTES
	ft^2	AC	ft	ft	ft	ft/ft	ft/ft			min	
1	71,874	1.65	299.00	407.00	296.00	0.01	3.00	B & D	0.30	8.86	K=commercial(paved), 90% impervious

Runoff calculations - 2-yr Storm

NOTES:

1) $I=at^b$ $F_m=a_pF_p$ $Q=0.9(I-F_m)A$

2) For F_m calculations, a_p was obtained from GIS area calculation and F_p was obtained from soil-specific data published in USDA Soils Survey of Orange and Riverside Counties which is more representative than the average value given by the Hydrology Manual

NOTE:Values were taken from the county hydrology manual

N-Year Event		a	b
2		5.70	-0.574
10		10.21	-0.573
50		13.521	-0.566
100		15.56	-0.573
	EXISTING	PROPOSED	
a_p =	0.5	0.10	(% pervious surface)
F_p =	0.6	0.60	(in/hr)
F_m =	0.3	0.06	

Flow rate is based on **$Q=0.9(I-F_m)A$**

Drainage	Area	F_m	Tc	Intensity	Q
					EXIST
BASIN	ACRE		MIN	IN/HR	CFS
1	1.65	0.300	11.52	1.40	1.6

Basin	Area	F_m	Tc	Intensity	Q
					PROP
BASIN	ACRE		MIN	IN/HR	CFS
1	1.65	0.06	8.86	1.63	2.3

Runoff calculations - 10-yr Storm

NOTES:

1) $I=at^b$ $F_m=a_pF_p$ $Q=0.9(I-F_m)A$

2) For F_m calculations, a_p was obtained from GIS area calculation and F_p was obtained from soil-specific data published in USDA Soils Survey of Orange and Riverside Counties which is more representative than the average value given by the Hydrology Manual

NOTE:Values were taken from the county hydrology manual

N-Year Event		a	b
2		5.70	-0.574
10		10.21	-0.573
50		13.521	-0.566
100		15.56	-0.573
	EXISTING	PROPOSED	
a_p =	0.5	0.10	(% pervious surface)
F_p =	0.6	0.60	(in/hr)
F_m =	0.3	0.06	

Flow rate is based on **$Q=0.9(I-F_m)A$**

Drainage	Area	F_m	Tc	Intensity	Q
					EXIST
BASIN	ACRE		MIN	IN/HR	CFS
1	1.65	0.300	11.52	2.52	3.3

Basin	Area	F_m	Tc	Intensity	Q
					PROP
BASIN	ACRE		MIN	IN/HR	CFS
1	1.65	0.06	8.86	2.92	4.3

Runoff calculations - 50-yr Storm

NOTES:

1) $I=at^b$ $F_m=a_pF_p$ $Q=0.9(I-F_m)A$

2) For F_m calculations, a_p was obtained from GIS area calculation and F_p was obtained from soil-specific data published in USDA Soils Survey of Orange and Riverside Counties which is more representative than the average value given by the Hydrology Manual

NOTE:Values were taken from the county hydrology manual

N-Year Event		a	b
2		5.70	-0.574
10		10.21	-0.573
50		13.521	-0.566
100		15.56	-0.573
	EXISTING	PROPOSED	
a_p =	0.5	0.10	(% pervious surface)
F_p =	0.6	0.60	(in/hr)
F_m =	0.3	0.06	

Flow rate is based on **$Q=0.9(I-F_m)A$**

Drainage	Area	F_m	Tc	Intensity	Q
					EXIST
BASIN	ACRE		MIN	IN/HR	CFS
1	1.65	0.300	11.52	3.39	4.6

Basin	Area	F_m	Tc	Intensity	Q
					PROP
BASIN	ACRE		MIN	IN/HR	CFS
1	1.65	0.06	8.86	3.93	5.8

Runoff calculations - 100-yr Storm

NOTES:

1) $I=at^b$ $F_m=a_pF_p$ $Q=0.9(I-F_m)A$

2) For F_m calculations, a_p was obtained from GIS area calculation and F_p was obtained from soil-specific data published in USDA Soils Survey of Orange and Riverside Counties which is more representative than the average value given by the Hydrology Manual

NOTE:Values were taken from the county hydrology manual

N-Year Event		a	b
2		5.70	-0.574
10		10.21	-0.573
50		13.521	-0.566
100		15.56	-0.573
	EXISTING	PROPOSED	
a_p =	0.5	0.10	(% pervious surface)
F_p =	0.6	0.60	(in/hr)
F_m =	0.3	0.06	

Flow rate is based on **$Q=0.9(I-F_m)A$**

Drainage	Area	F_m	Tc	Intensity	Q
					EXIST
BASIN	ACRE		MIN	IN/HR	CFS
1	1.65	0.300	11.52	3.84	5.3

Basin	Area	F_m	Tc	Intensity	Q
					PROP
BASIN	ACRE		MIN	IN/HR	CFS
1	1.65	0.06	8.86	4.46	6.5