



CITY OF FOUNTAIN VALLEY GENERAL PLAN UPDATE

EXISTING CONDITIONS INFRASTRUCTURE
TECHNICAL REPORT FOR HYDROLOGY,
SEWER, WATER, & WATER QUALITY

City of Fountain Valley
Orange County, California

Prepared For

PLACEWORKS
3 MacArthur Place, Suite 1100
Santa Ana, CA 92707
714.966.9220

Prepared By

Fusco Engineering, Inc.
16795 Von Karman, Suite 100
Irvine, California 92606
949.474.1960

Project Manager:

Ian Adam

Principal / Stormwater Manager

Date Prepared: May 1, 2019

full circle thinking®

CITY OF FOUNTAIN VALLEY GENERAL PLAN UPDATE

EXISTING CONDITIONS INFRASTRUCTURE REPORT FOR HYDROLOGY, SEWER, WATER, AND WATER QUALITY

CITY OF FOUNTAIN VALLEY
ORANGE COUNTY, CALIFORNIA

PREPARED FOR:

PLACEWORKS
3 MacArthur Pl, Suite 1100
Santa Ana, CA 92707

PREPARED BY:

FUSCOE ENGINEERING, INC.
16795 Von Karman, Suite 100
Irvine, CA 92606
949.474.1960
www.fuscoe.com

DATE PREPARED: MAY 1, 2019

TABLE OF CONTENTS

1. OVERVIEW	3
1.1 Background	3
1.2 Summary of Infrastructure Findings.....	4
1.2.1 Hydrology.....	4
1.2.2 Sewer & Wastewater	5
1.2.3 Water Supply	5
1.2.4 Water Quality	5
2. ENVIRONMENTAL SETTING	7
2.1 Hydrology.....	7
2.1.1 Watershed Setting and Existing Drainage Facilities.....	7
2.1.2 Storm Drain Capacity	9
2.1.3 City and SOI Existing Floodplain Mapping.....	12
2.2 Sewer & Wastewater Infrastructure	14
2.2.1 Existing Sewer System and Facilities.....	14
2.2.2 Existing Sewer Flows	14
2.2.3 Existing Sewer Capacity Assessment	17
2.3 Water Distribution System.....	20
2.3.1 Existing Water System	20
2.3.2 Existing Water Demand.....	20
2.3.3 Existing Water Capacity Assessment and Water Planning.....	24
2.4 Water Quality	27
2.4.1 Existing Regulations	27
2.4.2 Existing Surface Water Conditions	30
2.4.3 Existing Groundwater Conditions	32
3. TECHNICAL APPENDICES	35

LIST OF FIGURES

Figure 1 Fountain Valley GPU Aerial Extent6
Figure 2 City of Fountain Valley Existing Storm Drain Facilities.....8
Figure 3 City and OCFCD Drainage Projects within Fountain Valley GPU Area..... 11
Figure 4 City of Fountain Valley Flood Zones..... 13
Figure 5 City of Fountain Valley Existing Sewer Facilities16
Figure 6 City of Fountain Valley Sewer Deficiency Areas..... 19
Figure 7 City of Fountain Valley Existing Water System Facilities.....23
Figure 8 City of Fountain Valley Water System Projects26
Figure 9 City of Fountain Valley Watersheds29

LIST OF TABLES

Table 1 Existing Land Uses3
Table 2 OCFCD Capital Improvement Projects within Fountain Valley GPU Area.....9
Table 3 Existing Sewer Generation 14
Table 4 Sewer System Condition Deficiency Criteria17
Table 5 Existing Water Demands20
Table 6 Water System Projects.....24
Table 7 List of 303(d) Impairments and TMDLs27
Table 8 List of Receiving Waters and Beneficial Uses31
Table 9 Beneficial Uses of the OC Basin32
Table 10 Numeric Water Quality Objectives.....32

APPENDICES

Appendix A Sewer Flow Calculations

Appendix B Water Demand Calculations

1. OVERVIEW

1.1 BACKGROUND

The City of Fountain Valley (“City”) is currently undergoing a General Plan Update (GPU) which is intended to shape development in the City and its sphere of influence (SOI) area over the next 30-plus years. A General Plan is the principal long-range policy and planning document for guiding the physical development, conservation, and enhancement of California cities and counties. As part of the GPU, infrastructure such as drainage, sewer, water systems, and water quality that support the existing and proposed land uses will be analyzed at a citywide level and in connection with the opportunity areas. This report will focus on the existing conditions of these infrastructure systems that serve the City and its SOI (collectively referred to the Fountain Valley GPU area).

The City is located in the south central part of Orange County and is bounded by the cities of Santa Ana, Garden Grove and Westminster to the north, the cities of Costa Mesa and Santa Ana to the east, the cities of Huntington Beach and Westminster to the west, and Huntington Beach to the south. The Santa Ana River is directly adjacent to the City’s eastern boundary. The City’s SOI, commonly referred to as North Island, includes approximately 20 acres including right-of-way (ROW) and 366 dwelling units and is located east of Harbor Blvd and south of W. Edinger Avenue, adjacent to the Santa Ana River.¹ See Figure 1 for an aerial extent of the Fountain Valley GPU area.

The entire City encompasses approximately 5,824 acres including the North Island SOI. Existing land uses include approximately 19,355 residential dwelling units (DUs) and 11.3 million square feet (sf) of non-residential sf. Individual land uses and footprints are provided in Table 1.

Table 1 Existing Land Uses

Existing Land Use Category	Total Acres ¹	Dwelling Units	Building Square Feet
Existing Land Uses within City Boundary			
Agriculture	55	--	722
Commercial and Services	418	--	5,004,091
Education	238	--	41,164
General Office	77	--	1,105,020
Industrial	231	--	4,154,448
Mixed Commercial and Industrial	9	--	66,264
Mobile Homes	40	329	--
Multi-Family Residential	149	3,741	--
Single Family Residential – Detached	2,123	12,811	--

¹ City of Fountain Valley North Island, LAFCO. Found here: <http://oclafco.org/images/stories/PDF/islands/NorthIslandProfile.pdf>

Existing Land Use Category	Total Acres ¹	Dwelling Units	Building Square Feet
Single Family Residential - Attached	181	2,108	--
Open Space and Recreation	698	--	2,359
Public Facilities	71	--	784,755
Religious Facilities	43	--	90,627
Existing Land Uses within North Island SOI Boundary			
Commercial and Services	1	--	2,784
Mobile Homes	4	62	--
Multi-Family Residential	11	280	--
Single Family-Residential - Attached	1	24	--
Total within City and SOI	4,350	19,355	11,252,234
Notes ¹ Total acreage of existing land use is 5,824 acres. This analysis does not include existing Utilities (131 acres), Vacant (17 acres), Water/Flood Control (104 acres), or ROW (1,213 acres) land uses as these land uses will not generate existing water demands or sewer flows in the existing condition.			

This report analyzes the existing infrastructure systems that serve the Fountain Valley GPU area and the existing land uses summarized in Table 1. The analysis includes a review and summary of the baseline conditions of the storm drainage system, water and wastewater systems, and existing water quality regulations currently in place. The analysis also includes the utilization of GIS tools and data and ongoing communication with City staff.

1.2 SUMMARY OF INFRASTRUCTURE FINDINGS

As discussed in the sections below, the City of Fountain Valley in conjunction with several other agencies operate and maintain utility systems within the Fountain Valley GPU area. All existing infrastructure in the City has a process in place for correcting deficiencies and addressing any potential capacity issues to ensure a robust infrastructure network. Summaries of each utility system are provided below and throughout this technical report.

1.2.1 Hydrology

Storm drainage throughout the City is conveyed via local catch basins and City storm drain facilities that ultimately connect into OCFCD drainage facilities. The City's storm drain infrastructure is generally in good condition as confirmed by the City's Public Works Department. The City constantly monitors and maintains stormwater pumping stations to ensure they are functioning efficiently to minimize the potential for flooding.

1.2.2 Sewer & Wastewater

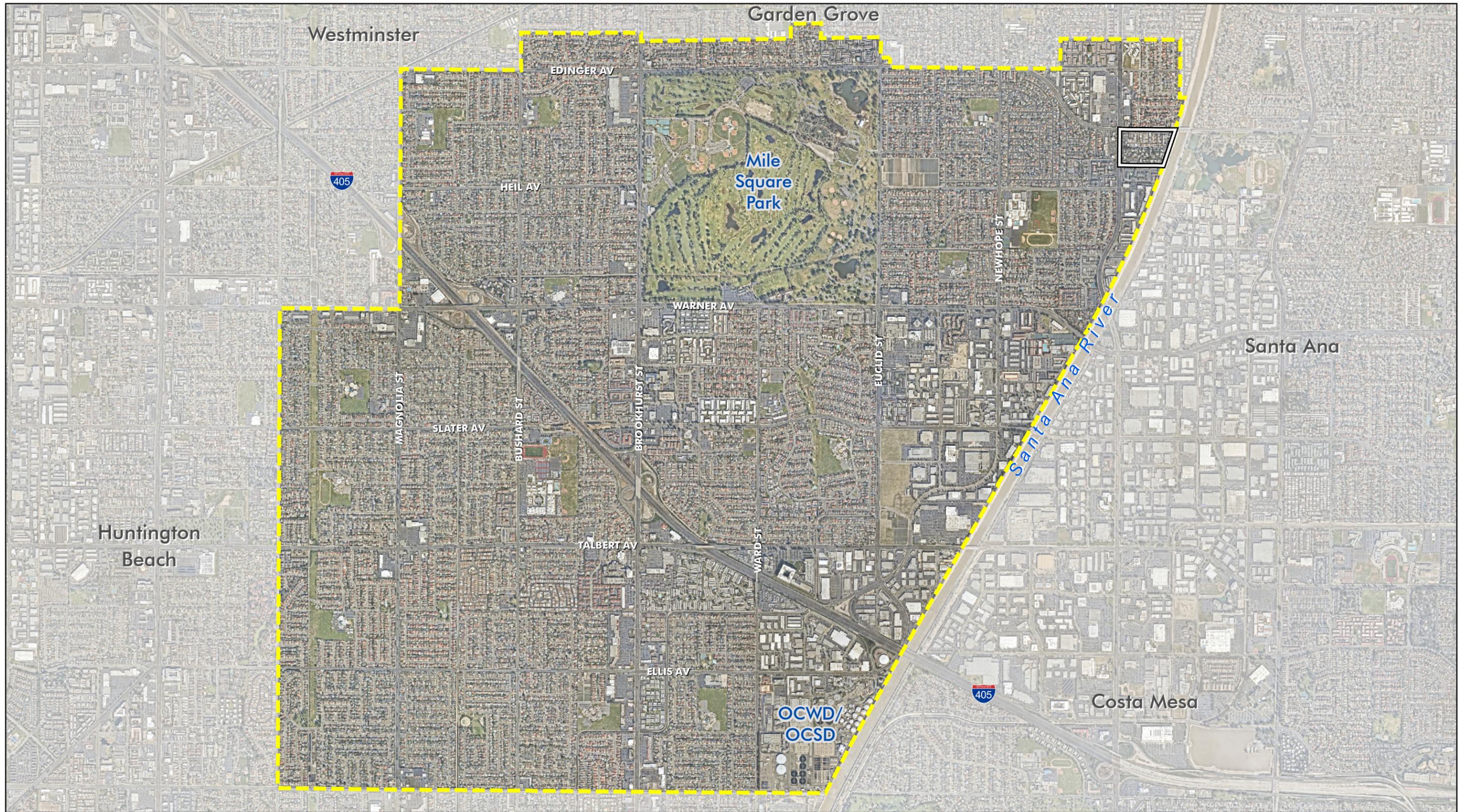
The City maintains responsibility for the local sewer facilities that ultimately tie into OCSD regional trunk sewer systems. Sewer flows within the City and SOI areas have been conservatively estimated to be approximately 5.1 million gallons per day (MGD). The existing sewer infrastructure system is functioning effectively to convey these existing flows. The City has programs in place via the Capital Improvement Plan to address deficiencies within the City's sewer system. These deficiencies were identified in the City's 2013 Sewer Master Plan and other subsequent sewer studies. In addition, the Engineering Department works closely with the Maintenance Division to ensure the sewer system is functioning effectively.

1.2.3 Water Supply

The City maintains the local water infrastructure throughout the GPU area which includes two storage reservoirs and booster pumping stations, six operating groundwater wells, one connection to Metropolitan Water District of Southern California conveyance line, two emergency inter-connections with other cities, and approximately 200 miles of distribution pipelines. OCWD also has existing recycled water infrastructure that serve portions of the City. Water demands within the City and SOI area have been conservatively estimated to be approximately 9.1 MGD. The existing water infrastructure system is functioning effectively to convey these existing demands. As shown in the City's 2013 Water Master Plan, the distribution system was found to be in good condition including the reservoir storage system. Due to the importance of groundwater supply, the City is constantly upgrading groundwater production wells within the City to ensure a consistent supply is provided.

1.2.4 Water Quality

The City resides within the Santa Ana River Watershed and the Anaheim Bay-Huntington Harbour Watershed and falls within the Santa Ana Regional Water Quality Control Board and its respective Basin Plan. The Fountain Valley GPU area discharges into several receiving water bodies which each have various Total Maximum Daily Load specifications and beneficial uses aimed at protecting water quality. The Fountain Valley GPU area also overlies the Orange County Groundwater Basin which also has prescribed beneficial uses and water quality objectives. Future projects that meet certain thresholds within the GPU area must follow development requirements of the North Orange County MS4 Storm Water Permit which include incorporating Low Impact Development Best Management Practices into individual projects to further help protect water quality in receiving waters.



Aerial Date: 02/25/2019

Fountain Valley GPU Aerial Extent

City of Fountain Valley General Plan Update

 City of Fountain Valley Boundary

 North Island SOI



Figure 1

4/1/2019



2. ENVIRONMENTAL SETTING

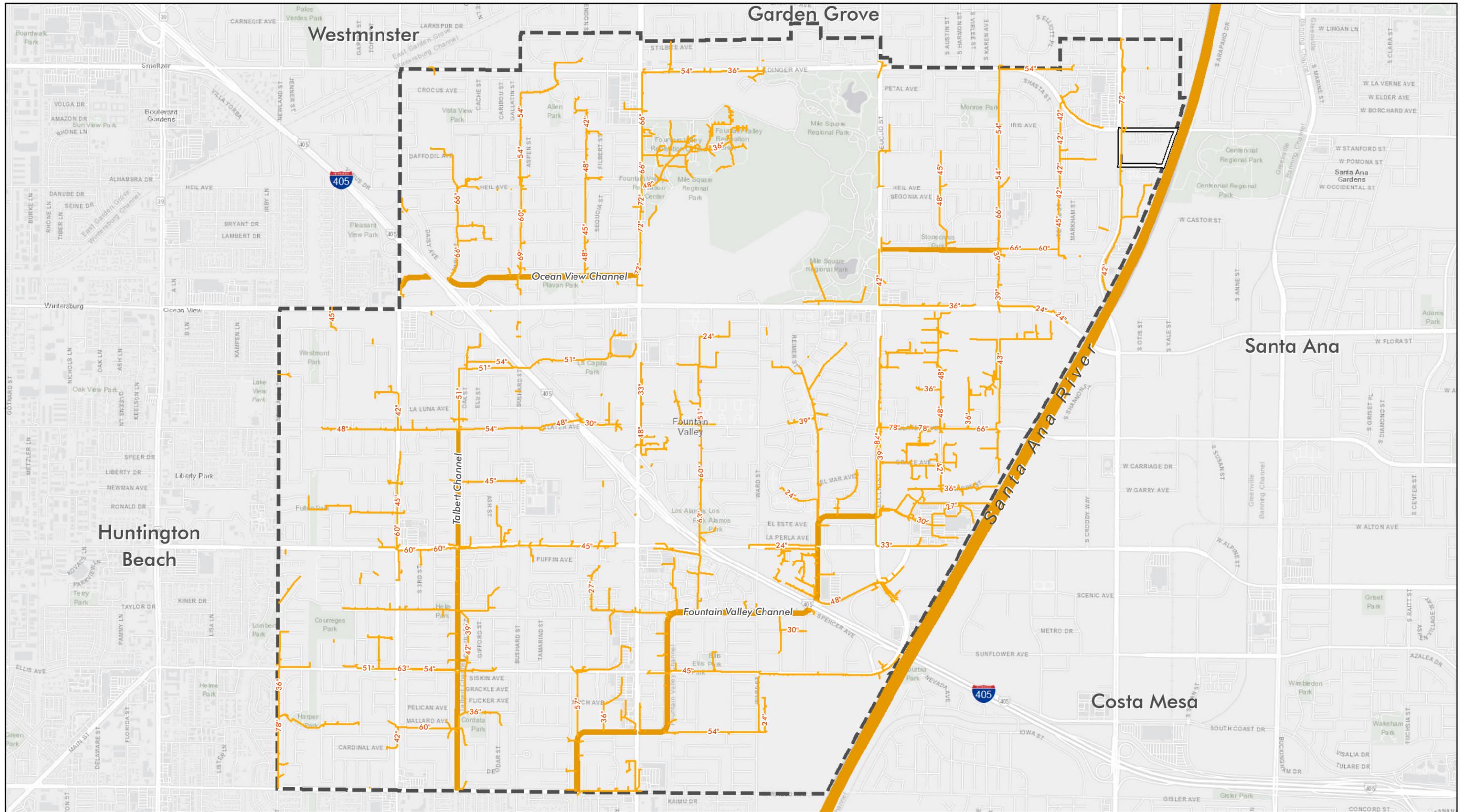
2.1 HYDROLOGY

2.1.1 Watershed Setting and Existing Drainage Facilities

The City resides within the Santa Ana River (SAR) Watershed and the Anaheim Bay-Huntington Harbour Watershed (ABHH Watershed). The SAR Watershed encompasses the eastern portion of the City and the ABHH Watershed encompasses the eastern portion of the City. Each watershed is comprised of a number of channels that ultimately deliver stormwater to the Pacific Ocean. The City drains to the following channels within the SAR and ABHH Watersheds:

- Talbert Channel
- Fountain Valley Channel
- East Garden Grove Wintersburg Channel
- Ocean View Channel

The channels mentioned above are all owned and maintained by the Orange County Flood Control District (OCFCD). The City has storm drain lines that convey stormwater to OCFCD regional conveyance facilities. The City maintains lines that range in diameter from 8"-78". The City has a detailed GIS based inventory of all drainage facilities including storm drain pipes, catch basins, BMPs/filters within catch basins, pump stations, settling basins and outfalls for both public and private properties. See Figure 2 below that shows the existing storm drain system throughout the City and the SOI area.



City of Fountain Valley Existing Storm Drain Facilities

City of Fountain Valley General Plan Update



- City Boundary
- North Island SOI
- OCFCD Facilities
- City Storm Drain Facilities

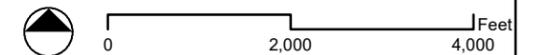


Figure 2

4/1/2019

2.1.2 Storm Drain Capacity

City of Fountain Valley Stormwater Management

The City is flat and largely built out with a storm drain system comprised of catch basins, storm drain lines and pump stations to convey stormwater runoff within the roadways and underground. The City has an ongoing monitoring and maintenance procedure to ensure the system is functioning effectively.

To prevent against significant flooding during storm events, the City monitors and maintains stormwater pumping stations to ensure they are functioning efficiently. As of 2017, the City recently improved the Sandalwood Pump Station which includes replacement of pumps with increase horsepower. Similar improvements are currently being made to the Walnut Pump station and are anticipated to be completed at the end of 2019.² See Figure 3 for locations of the pump station improvements.

In addition, the City currently requires individual drainage analyses to occur for redevelopments to ensure conformity with the entire Citywide drainage system.³ New developments and significant redevelopments must analyze the 10- and 25-year storm events of their project and determine if there are any impacts to the public storm drain system. The City uses a hybrid approach of ensuring storm drain capacity is maintained and promotes the use of existing features (i.e. parks) to serve as detention systems wherever needed and practical.

OCFCD Capital Improvement Plan Projects

OCFCD has a 7-Year CIP in place to plan for future drainage projects. There are several projects that impact drainage facilities within the Fountain Valley GPU area. These are summarized below.⁴

Table 2 OCFCD Capital Improvement Projects within Fountain Valley GPU Area

Project Name	Drainage Facility	CIP Year	Project Description
I-405 Widening Ocean View Channel (C06) Segment Improvements	Ocean View Channel	2018-19	Improve capacity by adding two elliptical pipes under Interstate 405 freeway (a cooperative project between OCTA and OCFCD)
Santa Ana River Channel (E01) Levee Repairs	Santa Ana River Channel	2018-19	Address deficiencies identified during levee inspection by the US Army Corps of Engineers

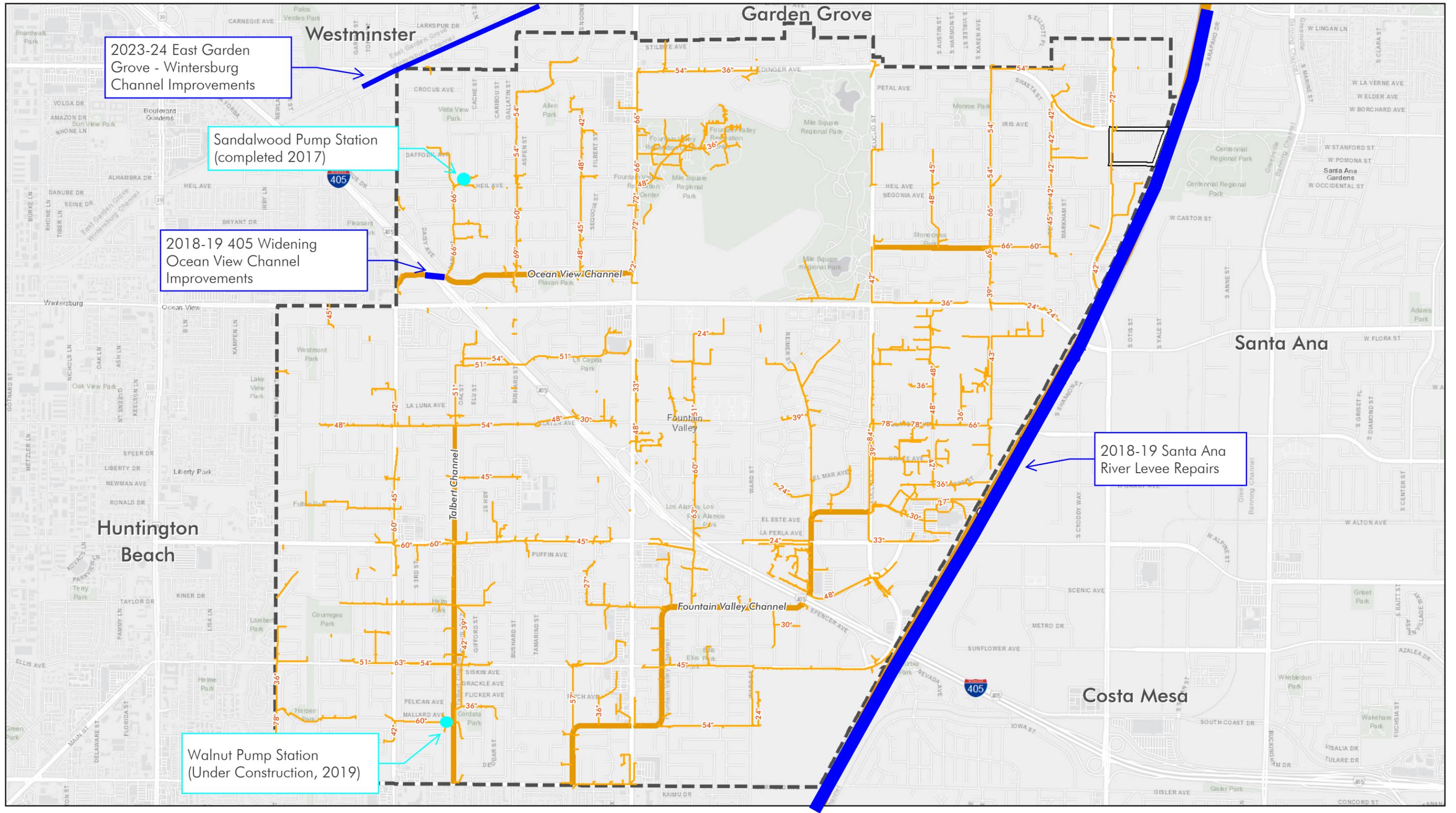
² Conference call with City staff on April 2, 2019.

³ City of Fountain Valley Master Plan for Disposal of Storm Waters (September 1961).

⁴ OCFCD 7-year Capital Improvement Program 2018-19 to 2024-25. Projects found at the link below:
<https://ocpw.maps.arcgis.com/apps/MapJournal/index.html?appid=fd876c20d6534f1c90accda849effc7>

Project Name	Drainage Facility	CIP Year	Project Description
East Garden Grove - Wintersburg Channel multi-year improvements	East Garden Grove - Wintersburg Channel	2022-23 to 2024-25	Reconstruct existing trapezoidal earthen rip rap channel to a concrete rectangular channel, allowing the channel reach to convey a 100-year storm
County Maintenance Projects	All flood control channels	2018-19 to 2024-25	Maintain flood control channels by dredging basins, removing silt, and/or opening channel outlets

As shown above, there are four OCFCD CIP projects within the Fountain Valley GPU area over the next six years. These projects will improve the regional drainage infrastructure serving the GPU area. See Figure 3 for locations of the OCFCD improvements.



City and OCFCO Drainage Projects

City of Fountain Valley General Plan Update



- City Boundary
- OCFCO Facilities
- City Drainage Pump Station Improvements
- North Island SOI
- City Storm Drain Facilities
- OCFCO 7-year CIP Improvements

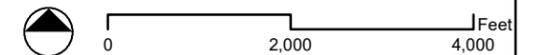


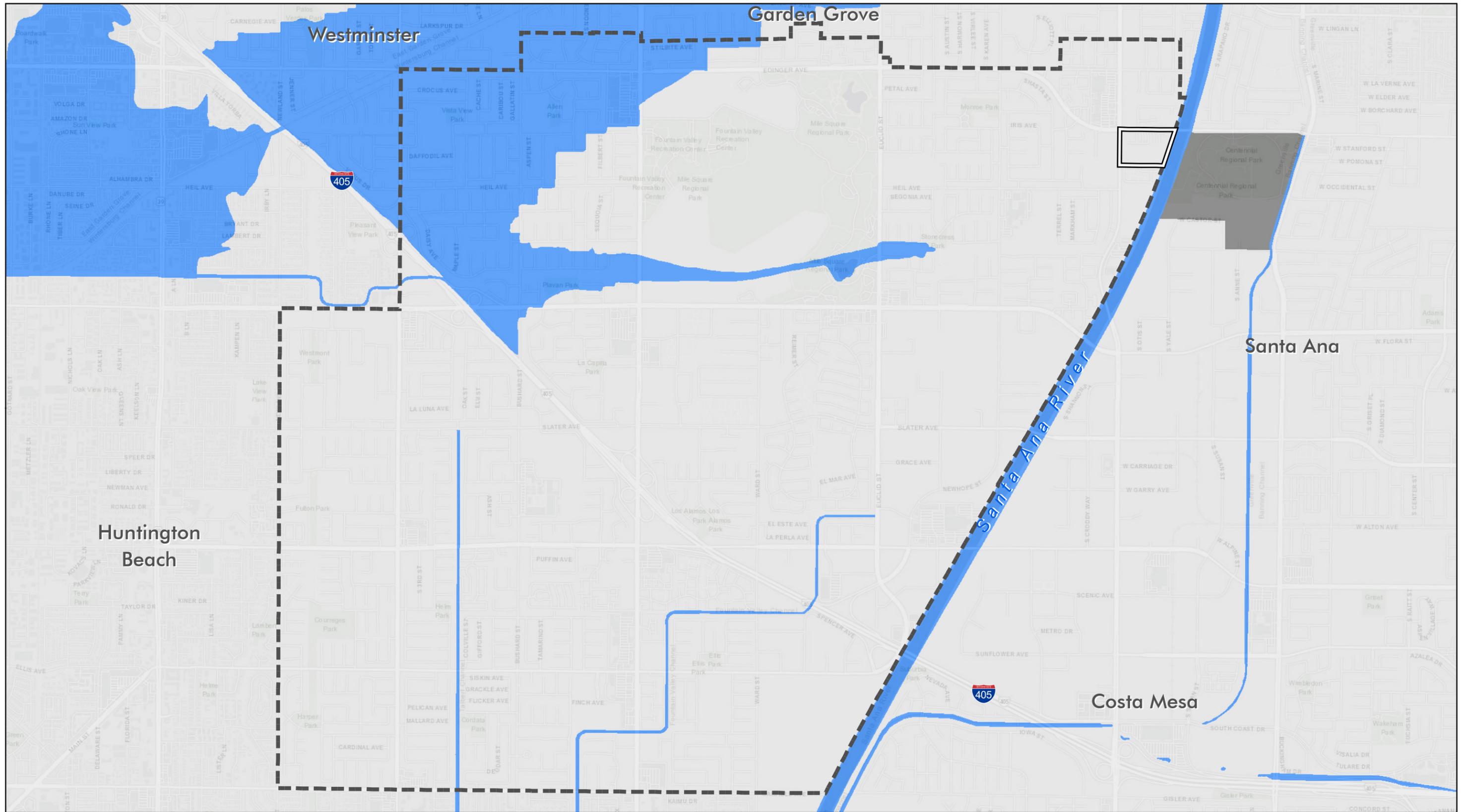
Figure 3

4/1/2019

2.1.3 City and SOI Existing Floodplain Mapping

The National Flood Insurance Act (1968) established the National Flood Insurance Program, which is based on the minimal requirements for flood plain management and is designed to minimize flood damage within Special Flood Hazard Areas. The Federal Emergency Management Agency (FEMA) is the agency that administrates the National Flood Insurance Program. Special Flood Hazard Areas (SFHA) are defined as areas that have a 1 percent chance of flooding within a given year, also referred to as the 100-year flood. Flood Insurance Rate Maps (FIRMs) were developed to identify areas of flood hazards within a community.

According to the Flood Zone determination, the majority of the City is designated as Zone X. Zone X is defined as the area determined to be outside the 500-year flood, protected by levee from 100-year flood, and with a minimal or 0.2% chance of flooding. The northwestern portion of the City is designated as Zone A, which represents areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. In addition, the Talbert Channel and the Fountain Valley Channel are also designated as Zone A. These channels are both located towards the central portion of the City and flows are routed south towards the Pacific Ocean. See Figure 4 below for a map of the FEMA flood zones within the Fountain Valley GPU.



City of Fountain Valley FEMA Flood Zones

City of Fountain Valley General Plan Update



City Boundary

North Island SOI

FEMA Flood Zones

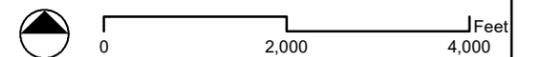
Zone A

Zone D

Zone X

Figure 4

4/1/2019



2.2 SEWER & WASTEWATER INFRASTRUCTURE

2.2.1 Existing Sewer System and Facilities

The City owns, operates, and maintains the majority of the sewer collection system within the City boundary. The North Island SOI has private sewer infrastructure that connects into City sewer lines within Edinger and Harbor Blvd. The majority of the sewer system serving the City was built in the 1960's and 1970's and is comprised of approximately 133-miles of vitrified clay pipe ranging from 6"-27" in diameter. The City's Engineering Department works closely with the Maintenance Division to ensure the sewer system is functioning effectively within the City boundary.

Sewer flows from the City ultimately connect into Orange County Sanitation District (OCSD) sewer trunk lines that convey wastewater to OCSD treatment plants. OCSD's Reclamation Plant No. 1 in Fountain Valley is the only current source of water for the Groundwater Replenishment System. Treated wastewater from the City and other cities within Orange County is conveyed to Plant No. 1 for treatment and is recharged into the groundwater basin for future water supply. The 24-hour facility is bordered by Ellis Avenue, the Santa Ana River, and the Orange County Water District. Figure 5 illustrates existing City and regional sewer infrastructure in the City and SOI.

2.2.2 Existing Sewer Flows

For existing land uses within the City and SOI area, sewer generation was estimated by employing sewer generation factors from the City's 2013 Sewer Master Plan (2013 SMP). Acreages of the existing non-residential development (i.e. commercial, industrial, etc.) and number of residential dwelling units were utilized along with their corresponding flow factors to develop existing condition flow rates.

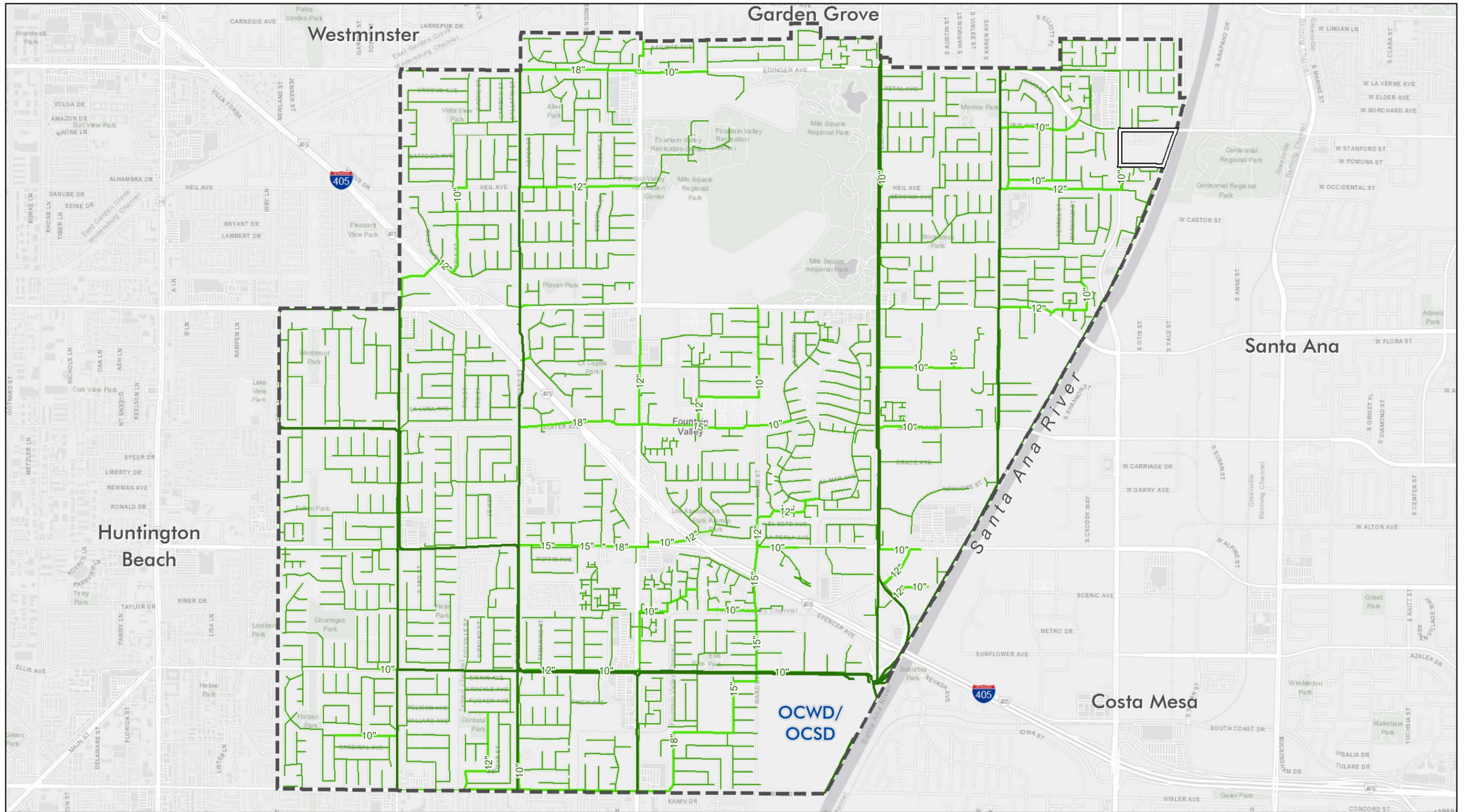
Table 3 Existing Sewer Generation

Existing Land Use Category	Total Acres	Housing Units	Building Acreage	Unit Flow Factor (gpd/unit) ¹	Sewage Generation (gpd)
Existing Land Uses within City Boundary					
Agriculture	55	--	0 ²	200	0
Commercial and Services	418	--	114.9	1,600	183,840
Education	238	--	0.9	1,600	1,440
General Office	77	--	25.4	1,600	40,640
Industrial	231	--	95.4	1,300	124,020
Mixed Commercial and Industrial	9	--	1.5	1,600	2,400
Mobile Homes	40	329	--	245	80,605
Multi-Family Residential	149	3,741	--	245	916,545

Existing Land Use Category	Total Acres	Housing Units	Building Acreage	Unit Flow Factor (gpd/unit) ¹	Sewage Generation (gpd)
Single Family Residential – Detached	2,123	12,811	--	245	3,138,695
Single Family Residential - Attached	181	2,108	--	245	516,460
Open Space and Recreation	698	--	0.1	200	20
Public Facilities	71	--	18	1,600	28,800
Religious Facilities	43	--	2.1	1,600	3,360
Total City Sewer Generation					5,036,825
Existing Land Uses within North Island SOI Boundary					
Commercial and Services	1	--	0.1	1,600	160
Mobile Homes	4	62	--	245	15,190
Multi-Family Residential	11	280	--	245	68,600
Single Family-Residential - Attached	1	24	--	245	5,880
Total North Island SOI Sewer Generation					89,830
Total within City and SOI	4,350	19,355	258		5,126,655
Notes					
¹ Unit flow factors are from the 2013 SMP.					
² Sewer flows were calculated for the existing Agricultural building acreage of 722 sf (0.01 acres) which results in a negligible sewer flow for this land use.					

As shown above, approximately 5.1 million gallons per day (MGD) is generated within the City and SOI. As described in the section below, the existing sewer infrastructure system is functioning effectively to convey these existing flows and the City has policies in place to address structural and hydraulic deficiencies as they arise.

Approximately 98% of the sewer generation is from within the City boundary and 2% of sewer generation originates from the North Island SOI area. As there are only eight (8) land use categories and associated unit flow factors within the 2013 SMP, it is anticipated that the existing sewer flow estimates are conservative. For example, a “commercial/business” unit sewer flow factor of 1,600 gpd was applied to General Office and Religious Facilities land uses which likely have a lesser sewer flows than a typical commercial or business land use.



Aerial Date: 02/25/2019

City of Fountain Valley Existing Sewer Facilities

City of Fountain Valley General Plan Update



- City Boundary
- North Island SOI

- City Sewer Facilities**
- 8" and Below in Diameter
- 9" - 24" in Diameter

- OCSD Sewer Facilities**
- OCSD Sewer Lines

Figure 5

4/1/2019



2.2.3 Existing Sewer Capacity Assessment

2013 Fountain Valley Sewer Master Plan

The 2013 Sewer Master Plan (2013 SMP) Supplement was developed by AndersonPenna Partners, Inc. (“APP Consultants”) and provides an update to the 2007 Sewer Master Plan (2007 SMP), the 2011 Sewer System Management Plan, and the 2010 Evaluation of Year Two Sewer Capital Improvements Program. The 2007 SMP included a sewer capacity analysis, a financial study, closed circuit television (CCT) inspection, a condition assessment, and a 15-year capital improvement plan. In 2009, the City adopted a new capital funding program which resulted in the start of repairing and replacing the most deficient sewer segments identified in the 2007 SMP. In 2010, the City began construction of the first year improvements and decided a more in-depth analysis of the prioritization of sewer projects was warranted. Therefore, the 2013 SMP updated the City’s GIS sewer system data and performed a detailed review of the sewer system to develop a new rehabilitation and replacement program that prioritized structurally defective and operationally deficient sewer over a 15-year planning horizon.

The 2012 CCTV inspection highlighted 83.5 miles of highest risk sewer segments to be analyzed by City staff and prioritized for upgrades. Sewer projects were developed based on deficient segments within the same vicinity and likeliness the sewers would share the same type of rehabilitation design and construction costs.

Table 4 Sewer System Condition Deficiency Criteria

Condition Grading	Condition	Grading Definition
Grade 1	Excellent	No observed defects
Grade 2	Good	Defects that have not begun to deteriorate
Grade 3	Fair	Moderate defects that will continue to deteriorate
Grade 4	Poor	Severe defects that will become Grade 5 defects within the foreseeable future
Grade 5	Very Poor	Defects requiring immediate attention

In addition to the condition assessment, hydraulic analyses of the existing gravity sewer system were conducted and based upon the calculated peak dry weather flows. Existing condition and ultimately condition sewer flow factors were included in the analysis that was based on the existing sewer system and the current land use zoning (no vacancies). Any segment of sewer pipe with a depth to diameter ratio (d/D) of 0.64 or more was considered to be hydraulically deficient.

The condition assessment identified that approximately 52% (355,850 ft) of the sewer system was in good condition, 36% (249,912 ft) was in fair condition, 10% (66,310 ft) was in poor condition and 2% (13,891 ft) was in very poor condition. The hydraulic analysis identified that approximately 2,879 ft and 5,923 ft of sewer lines were identified to be deficient using existing and ultimate flow factors, respectively. Structural Grade 5 deficient areas are illustrated on Figure 6.

The City has programs in place via the CIP to address deficiencies within the City’s sewer system. As noted above, the Engineering Department works closely with the Maintenance Division to

ensure the sewer system is functioning effectively. It is anticipated that all structural defects noted in the SMPs will be addressed within 10 years.⁵ There are currently several sewer structural improvements in various areas City within the CIP as shown on Figure 6. Some of these improvement projects align with the Grade 5 deficiencies whereas others have been identified by the Maintenance Division as needing upgrades. Construction for these improvements is to start in early 2019 and end in late 2019.

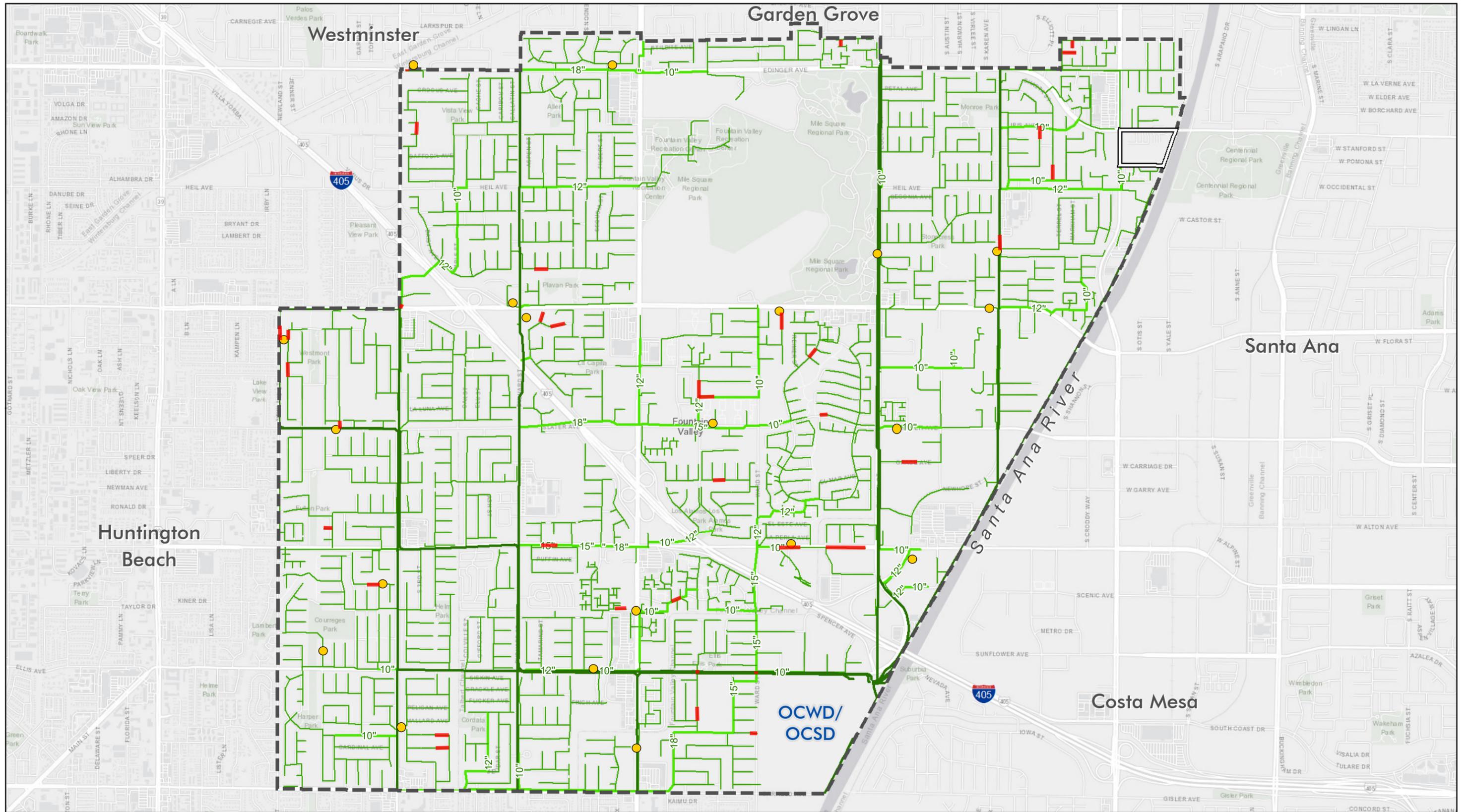
OCSD Capital Improvement Program

The OCSD Capital Improvement Program (CIP) highlights OCSD's continuous effort to keep its facilities operating at optimal levels. The 2017-18 CIP lists several projects within their regional sewer conveyance system. There are currently no distribution system projects within the Fountain Valley GPU area. Reclamation Plant No. 1 is undergoing several new projects, as listed below:

- Sludge Dewatering and Odor Control
- Digester Rehabilitation
- Headworks Rehabilitation and Expansion
- Headquarters Complex and Site Security

OCSD has a 10-Year Net CIP outlay which allocates the available budget to various projects throughout its service area. The majority of the budget (58%) is allocated to the reclamation plants. Approximately 23% is allocated to the existing collections/distribution system.

⁵ Conference call with City staff on April 2, 2019.



Aerial Date: 02/25/2019

City of Fountain Valley Sewer Deficiency Areas

City of Fountain Valley General Plan Update



City Boundary

North Island SOI

City Sewer Facilities

8" and Below in Diameter

9" - 24" in Diameter

OCSD Sewer Facilities

OCSD Sewer Lines

Category 5 Structural Deficiency Per 2012 CCTV Analysis

Proposed Sewer Replacement Project Per 2018/19 City CIP

Figure 6

4/1/2019



2.3 WATER DISTRIBUTION SYSTEM

2.3.1 Existing Water System

The City’s existing potable water system consists of two storage reservoirs and booster pumping stations, six operating groundwater wells, one connection to Metropolitan Water District of Southern California (Metropolitan), two emergency inter-connections with other cities, approximately 200 miles of distribution pipelines, 6,000 valves and over 2,000 fire hydrants. Water supplies are from local groundwater aquifers managed by Orange County Water District (OCWD) that is pumped from City owned wells and imported water from Metropolitan that is provided by the Municipal Water District of Orange County (MWDOC).

Distribution pipelines within the City range in diameter between 4” and 18” and have a total length of approximately 200 miles. The majority of the water pipes throughout the City are 8” pipes and most of the pipelines were constructed in the 1960’s and 1970’s. See Figure 7 for the water infrastructure within the City and SOI.

2.3.2 Existing Water Demand

For existing land uses within the City and SOI area, water demands were estimated by employing water demand factors from the City’s 2013 Water System Master Plan (2013 WSMP). As no landscape water unit demand factors were available, these water demands were estimated based on similar landscape unit demand factors within the region.⁶ Acreages of the existing non-residential development (i.e. commercial, industrial, etc.) and number of residential dwelling units were utilized along with their corresponding demand factors to develop existing condition water demand estimates.

Table 5 Existing Water Demands

Existing Land Use Category	Total Acres	Housing Units	Building Acreage	Unit Demand Factor (gpd/unit) ¹	Water Demand (gpd)
Existing Land Uses within City Boundary					
Agriculture	55	--	0	3,000 ²	165,000
Commercial and Services	418	--	114.9	2,500	287,250
Education	238	--	0.9	2,500	2,250
General Office	77	--	25.4	2,500	63,500
Industrial	231	--	95.4	2,500	238,500
Mixed Commercial and Industrial	9	--	1.5	2,500	3,750
Mobile Homes	40	329	--	350	115,150
Multi-Family Residential	149	3,741	--	350	1,309,350

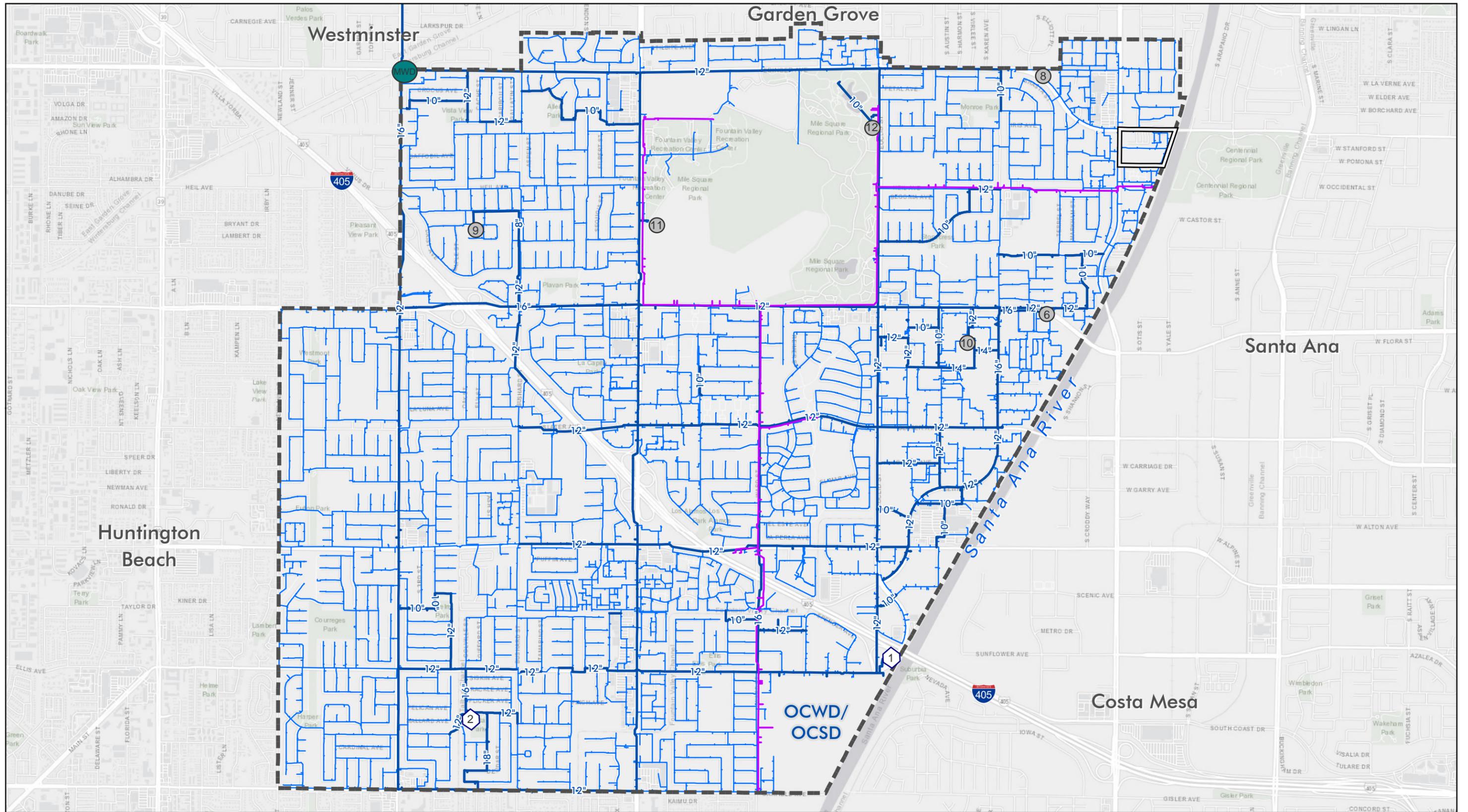
⁶ City of Santa Ana Design Guidelines for Water and Sewer Facilities (March 2017)

Existing Land Use Category	Total Acres	Housing Units	Building Acreage	Unit Demand Factor (gpd/unit) ¹	Water Demand (gpd)
Single Family Residential – Detached	2,123	12,811	--	450	5,764,950
Single Family Residential - Attached	181	2,108	--	450	948,600
Open Space and Recreation	698	--	0.1	3,000 ²	300
Public Facilities	71	--	18	2,500	45,000
Religious Facilities	43	--	2.1	2,500	5,250
Total City Water Demands					8,948,850
Existing Land Uses within North Island SOI Boundary					
Commercial and Services	1	--	0.1	2,500	250
Mobile Homes	4	62	--	350	21,700
Multi-Family Residential	11	280	--	450	126,000
Single Family-Residential - Attached	1	24	--	450	10,800
Total North Island SOI Water Demands					158,750
Total within City and SOI	4,350	19,355	258		9,107,600
Notes					
¹ Water demand unit factors are from the 2013 WSMP.					
² Water demands were calculated for the existing Agricultural total acreage (rather than building acreage) of 55 acres.					

As shown above, the existing land uses within the City and SOI area have a combined water demand of approximately 9.1 million gallons per day (MGD) or 10,200 acre-feet per year (AFY). As described in the section below, the existing water infrastructure system is functioning effectively to deliver these demands and the City is currently studying the condition of the water infrastructure to ensure a robust water infrastructure network. Similar to sewer generation, approximately 98% of water demands originate within the City boundary and approximately 2% come from the North Island SOI.

It is anticipated that the water demand unit factors employed result in a conservative water demand estimate. This is due to the fact that there are only three (3) unit water demand factors from the 2013 WSMP that were applied to several different types of existing land uses. For example, a “commercial/industrial” unit water demand factor of 2,500 gpd was applied to General Office and Religious Facilities land uses which likely have a lesser demand than a

typical commercial or industrial land use. This is also supported by the estimated demands from the City's 2015 Urban Water Management Plan (UWMP) which quantified a 2015 City-wide demand of 8.4 MGD (9,420 AF).



City of Fountain Valley Existing Water System Facilities

City of Fountain Valley General Plan Update



- City Boundary
- North Island SOI

- City Water Lines**
- 8" and Below in Diameter
- 9" - 20" in Diameter

- OCWD Recycled Water Lines**
- Recycled Water Pipes

- City Water Infrastructure**
- Groundwater Well
- Reservoir with Booster/Pump Station

- Metropolitan Water District Connection



Figure 7

4/1/2019

2.3.3 Existing Water Capacity Assessment and Water Planning

2013 Fountain Valley Water System Master Plan

The 2013 Water System Master Plan (2013 WSMP) was developed by Black & Veatch consultants to better understand water supplies and demands and to create a hydraulic computer model to assess the capacity of the water infrastructure to ultimately update the City’s 20-year CIP.

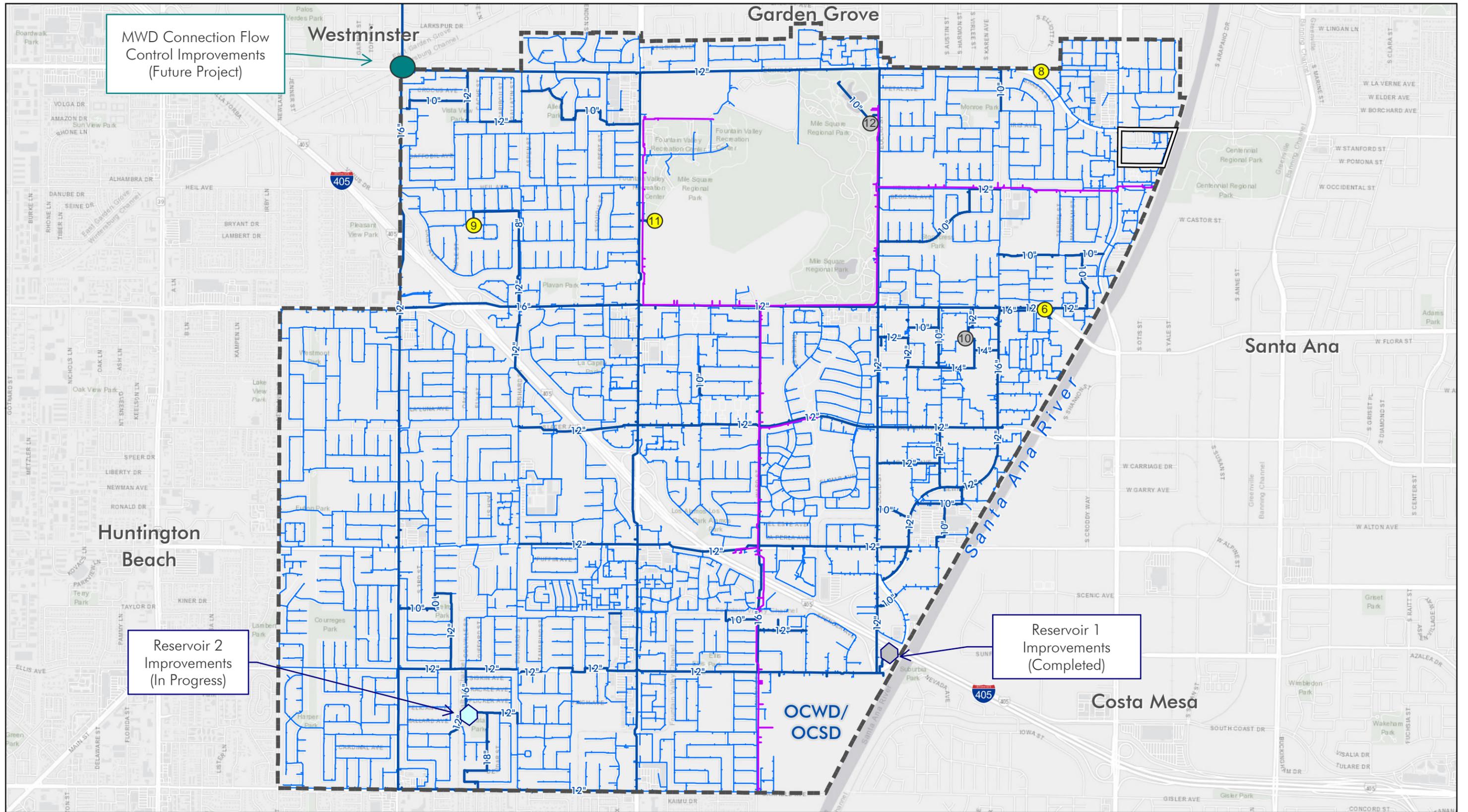
In general, the distribution system was found to have adequate pressures, does not have excessive velocities and provides adequate fire flow for normal and emergency operations. The reservoir storage system was found to also be adequate and there is currently no need for additional storage to meet existing or projected water demands. Currently, the projects identified in the WSMP are also included in the 10-year CIP from 2017-2027 as shown below.

Table 6 Water System Projects

Project Name	CIP Year	Project Summary	Status
Well No. 6	2019/20	Pump Replacement and Casing Rehabilitation	Future project, not yet started.
Well No. 8	2020/21	Casing Rehabilitation; Pump Replacement; Emergency Generator Installation; VFD Installation ¹	Future project, not yet started.
Well No. 9	2017/18	Pump Replacement and Casing Rehabilitation	Completed
Well No. 9	2022/23	VFD Replacement	Future project, not yet started.
Well No. 10	2017/18	Pump Replacement and Casing Rehabilitation	Completed
Well No. 10	2023/24	VFD Replacement	Future project, not yet started.
Well No. 11	2021/22	Casing Rehabilitation; Pump Replacement; Emergency Generator; VFD Replacement	Future project, not yet started.
Well No. 12	2017/18	Casing Rehabilitation, Pump Replacement; VFD Installation ¹	Completed
Reservoir No. 1	2015/16	Replacement of existing booster pump station	Completed

Project Name	CIP Year	Project Summary	Status
Reservoir No. 2	2017/18	Replacement of existing booster pump station	In Progress (2020 anticipated completion)
Pipeline Condition Assessment	2017-2021	Recommendation to perform a condition assessment and prioritize distribution system projects	In Progress (2021 anticipated completion)
Pipeline Replacement	2021-2027	Distribution system project implementation	Future project, not yet started.
MWD Connection	2022/23	Rehabilitation of MWD Flow Control Station	Future project, not yet started.
Notes			
VFD installation refers to the replacement of constant speed motors to increase the wells operational flexibility			

These projects are shown in Figure 8 below.



City of Fountain Valley Water System Projects

City of Fountain Valley General Plan Update



City Boundary

North Island SOI

City Water Lines

- 8" and Below in Diameter
- 9" - 20" in Diameter

OCWD Recycled Water Lines

- Recycled Water Pipes

6 Groundwater Wells with Future Projects

10 Groundwater Wells with Completed Projects

Figure 8

4/1/2019

2.4 WATER QUALITY

2.4.1 Existing Regulations

Basin Plan for the Santa Ana Region

The City is within the SAR and ABHH watersheds and falls under the Santa Ana Regional Water Quality Control Board (RWQCB) and its Basin Plan. See Figure 9 that highlights the watersheds and receiving waters of the Fountain Valley GPU area. The Basin Plan specifically (i) designates beneficial uses for surface waters and ground waters, (ii) sets narrative and numerical objectives that must be met in order to protect the beneficial uses and conform to the state’s antidegradation policy, and (iii) describes implementation programs to protect all waters in the Region. The Santa Ana RWQCB Basin Plan provides all relevant information necessary to carry out federal mandates for the antidegradation policy, 303(d) listing of impaired waters, and related Total Maximum Daily Loads (TMDLs), and provides information relative to National Pollutant Discharge Elimination System (NPDES) and Waste Discharge Requirement (WDR) permit limits. See more details below for specifics on these items.

Total Maximum Daily Loads (TMDLs)

Once a water body has been listed as impaired on the 303(d) list, a TMDL for the constituent of concern (pollutant) must be developed for that water body. A TMDL is an estimate of the daily load of pollutants that a water body may receive from point sources, non-point sources, and natural background conditions (including an appropriate margin of safety), without exceeding its water quality standard. Those facilities and activities that are discharging into the water body, collectively, must not exceed the TMDL. In general terms, Municipal Separate Storm Sewer System (MS4) and other dischargers within each watershed are collectively responsible for meeting the required reductions and other TMDL requirements by the assigned deadline.

The 303(d) list and TMDLs are presented below for the regional channels and water bodies that receive flows from the Fountain Valley GPU area. TMDLs are pending approval for several receiving waters as shown in Table 7.

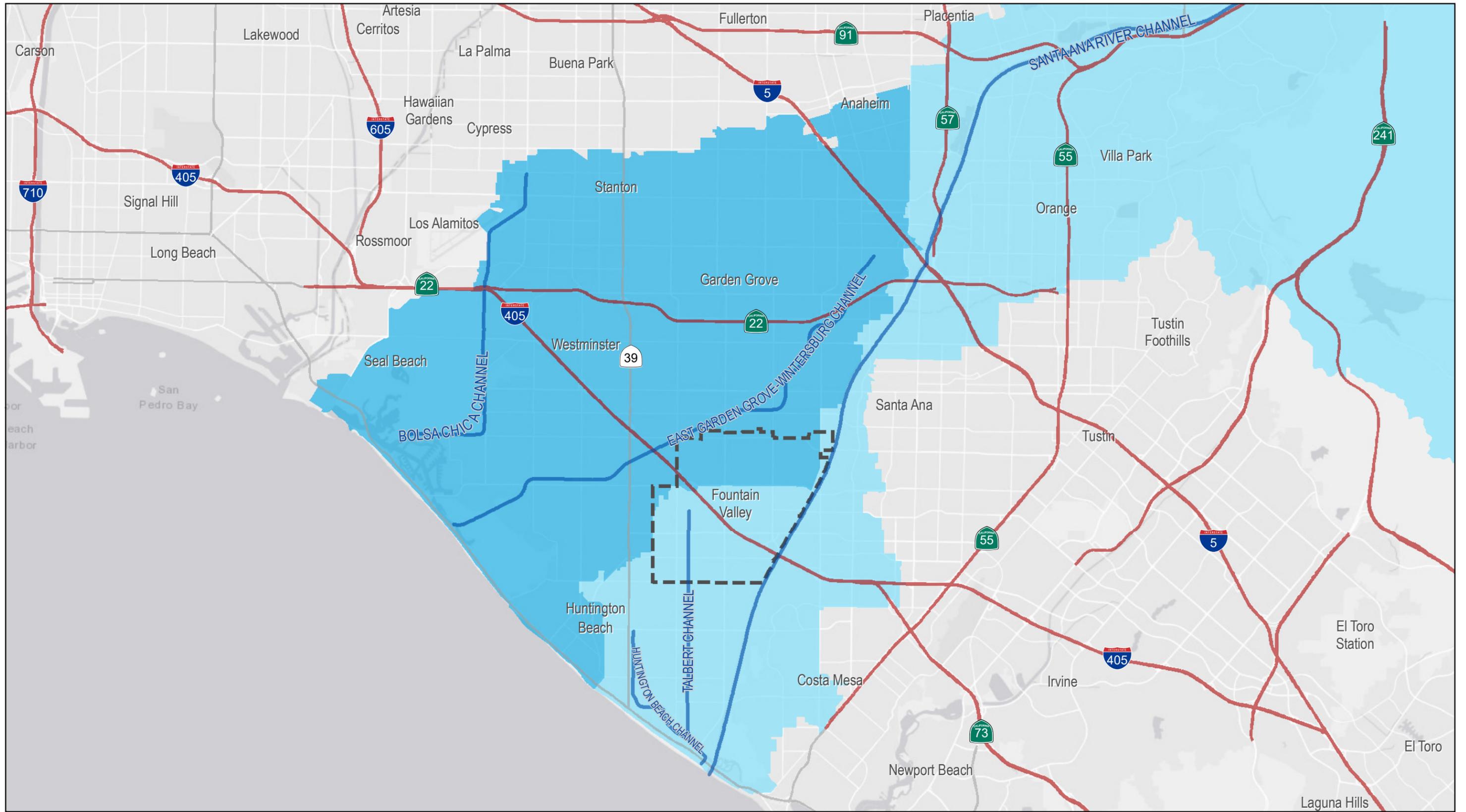
Table 7 List of 303(d) Impairments and TMDLs

Water Body/Channel	List of 303(d) Impairments	TMDL
East Garden Grove Wintersburg Channel	Ammonia (Unionized)	Pending 2021 TMDL Establishment for Ammonia
Bolsa Chica Ecological Reserve/Bolsa Bay Marsh	Toxicity	Pending 2027 TMDL Establishment for Toxicity
Talbert Channel	Toxicity	Pending 2029 TMDL Establishment for Toxicity

Water Body/Channel	List of 303(d) Impairments	TMDL
Newport Slough	Indicator Bacteria	Pending 2021 TMDL Establishment for Indicator Bacteria
Huntington Beach State Park	Polychlorinated Biphenyls (PCBs)	Pending 2019 TMDL Establishment for PCBs
Source: 2014-2016 California 303(d) List of Water Quality Limited Segments. Retrieved September 2018: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2014_2016.shtml		

In addition, the California State Water Resources Control Board (State Board) has adopted the statewide Trash Provisions⁷ that requires implementation of best management practices (BMPs) that mitigate or abate trash within Priority Land Use Areas (PLUs). PLUs are defined as, “high density residential, industrial, commercial, mixed urban, and public transportation stations.” The purpose of the Trash Provisions is to establish a statewide water quality objective that ensures the quality of surface waters that enter storm drains and eventually lead out to major water ways are free of trash. The City is currently undergoing the process to comply with these new Trash Provisions over the next 10 years.

⁷ State Water Resources Control Board - Statewide Water Quality Control Plans for Trash. Found here: https://www.waterboards.ca.gov/water_issues/programs/trash_control/



City of Fountain Valley Regional Watersheds

City of Fountain Valley General Plan Update



City Boundary

Anaheim Bay-Huntington Harbour Watershed

Santa Ana River Watershed

Figure 9

4/25/2019



County of Orange MS4 Permit, Drainage Area Management Plan (DAMP), & Local Implementation Plans (LIP)

In May 2009, the Santa Ana RWQCB re-issued the North Orange County MS4 Storm Water Permit as WDR Order R8-2009-0030 (NPDES Permit No. CAS618030) to the County of Orange, the incorporated cities of Orange County, and the Orange County Flood Control District within the Santa Ana Region. Pursuant to this “Fourth-Term” MS4 Permit, the Co-permittees were required to update and implement a Drainage Area Management Plan (DAMP) for its jurisdiction, as well as Local Implementation Plans (LIPs), which describe the Co-permittees’ urban runoff management programs for their local jurisdictions.

Under the City’s LIP, land development policies pertaining to hydromodification and low impact development (LID) are regulated for new developments and significant redevelopment projects. The term “hydromodification” refers to the changes in runoff characteristics from a watershed caused by changes in land use condition. More specifically, hydromodification refers to “the change in the natural watershed hydrologic processes and runoff characteristics (i.e., interception, infiltration, overland flow, interflow and groundwater flow) caused by urbanization or other land use changes that result in increased stream flows and sediment transport.” The use of LID Best Management Practices (BMPs) in project planning and design is to preserve a site’s predevelopment hydrology by minimizing the loss of natural hydrologic processes such as infiltration, evapotranspiration, and runoff detention. LID BMPs try to offset these losses by introducing structural and non-structural design components that restore these water quality functions into the project’s land plan. These land development requirements are detailed in the County-wide Model Water Quality Management Plan (WQMP) and Technical Guidance Document (TGD), approved in May 2011, which cities have incorporated into their discretionary approval processes for new development and redevelopment projects.

The LID hierarchy requires new developments and re-developments to implement BMPs under the LID hierarchy as described in the TGD. The LID hierarchy requires new projects to first infiltrate, then harvest and reuse, then biofilter stormwater runoff from their project site depending on site constraints. New projects and redevelopments within the City will follow the set hierarchy of BMP selection, and more runoff throughout the City will be effectively treated as development occurs.

2.4.2 Existing Surface Water Conditions

As described above, the Fountain Valley GPU area is within the SAR and ABBH Watersheds and drains to various different regional drainage conveyance channels. Some of those channels have prescribed beneficial uses and water quality objectives to protect water quality within the receiving waters. Details on the beneficial uses and water quality objectives are presented below for the surface waters that receive runoff from the Fountain Valley GPU area.

Beneficial Uses

According to the Santa Ana RWQCB Basin Plan, beneficial uses have been established for several of the water bodies that receive runoff from the Fountain Valley GPU area. These are listed below.

Table 8 List of Receiving Waters and Beneficial Uses

Lower Santa Ana River Basin– Santa Ana River Reach 1	
MUN – Municipal and Domestic Supply GWR – Groundwater Recharge REC 1 – Water Contact Recreation REC 2 – Non-Contact Water Recreation	WARM – Warm Freshwater Habitat WILD – Wildlife Habitat RARE – Rare, Threatened, or Endangered Species
Bolsa Chica Ecological Reserve	
REC 1 – Water Contact Recreation REC 2 – Non-Contact Water Recreation BIOL – Biological Habitat of Significance EST – Estuarine Habitat	RARE – Rare, Threatened, or Endangered Species WILD – Wildlife Habitat SPWN – Spawning, Reproduction, and Development MAR – Marine Habitat
Huntington Beach Wetlands	
REC 1 – Water Contact Recreation REC 2 – Non-Contact Water Recreation BIOL – Biological Habitat of Significance	RARE – Rare, Threatened, or Endangered Species WILD – Wildlife Habitat SPWN – Spawning, Reproduction, and Development MAR – Marine Habitat
Santa Ana River Salt Marsh	
REC 1 – Water Contact Recreation REC 2 – Non-Contact Water Recreation BIOL – Biological Habitat of Significance	RARE – Rare, Threatened, or Endangered Species WILD – Wildlife Habitat MAR – Marine Habitat EST – Estuarine Habitat
Tidal Prisms of Flood Control Channels Discharging to Coastal or Bay Waters	
REC 1 – Water Contact Recreation REC 2 – Non-Contact Water Recreation COMM – Commercial or Sport Fishing	WILD – Wildlife Habitat MAR – Marine Habitat
Tidal Prism of Santa Ana River and Newport Slough	
REC 1 – Water Contact Recreation REC 2 – Non-Contact Water Recreation COMM – Commercial or Sport Fishing	WILD – Wildlife Habitat RARE – Rare, Threatened, or Endangered Species MAR – Marine Habitat
Sources: -California Regional Water Quality Control Board, Santa Ana Region. 1995 Water Quality Control Plan for the Santa Ana River Basin (Updated 2016). Retrieved September 2018 from https://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/2016/Chapter_3_Feb_2016.pdf	

Water Quality Objectives

General water quality objectives have been prescribed in the Basin Plan for all surface waters within the Santa Ana River Region. There are currently no numeric water quality objectives for Fountain Valley GPU receiving waters.

2.4.3 Existing Groundwater Conditions

The GPU area lies within the Orange County Groundwater Basin (OC Basin).⁸ The OC Basin is the source of approximately 60 to 70 percent of the water supply for 2.3 million people. OCWD is responsible for managing the OC Basin. To maintain groundwater quality, OCWD conducts an extensive monitoring program that serves to manage the OC Basin’s groundwater production, control groundwater contamination, and comply with all required laws and regulations. A network of nearly 700 wells provides OCWD a source for samples, which are tested for a variety of purposes. OCWD collects 600 to 1,700 samples each month to monitor Basin water quality. These samples are collected and tested according to approved federal and state procedures as well as industry-recognized quality assurance and control protocols.

The OC Basin also has prescribed beneficial uses and water quality objectives as stated in the Santa Ana RWQCB Basin Plan that are described below.

Beneficial Uses

According to the Santa Ana RWQCB Basin Plan, beneficial uses have been established for the Orange Groundwater Management Zone which underlies the Fountain Valley GPU area. These are listed below.

Table 9 Beneficial Uses of the OC Basin

Lower Santa Ana River Basin– Orange Groundwater Management Zone	
MUN – Municipal and Domestic Supply AGR – Agricultural Supply	IND – Industrial Service Supply PROC – Industrial Process Supply

Water Quality Objectives

Numeric water quality objectives within the Basin Plan have been established for the OC Basin and are listed below⁹:

Table 10 Numeric Water Quality Objectives

Basin Plan – Orange Groundwater Management Zone	
Water Quality Objective	Numeric Objective (mg/L)
Total Dissolved Solids	580
Nitrate as Nitrogen	3.4

⁸ Map of the Orange County Groundwater Basin. Found here:
<https://www.ocwd.com/media/3656/threelayerbasinmodeextent.pdf>

⁹ Santa Ana RWQCB Basin Plan. Orange Groundwater Management Zone. Found here:
https://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/2016/Chapter_4_Feb_2016.pdf

Salinity is a significant water quality problem in many parts of southern California, including Orange County. Salinity is a measure of the dissolved minerals in water including both TDS and nitrates. The portions of the OC Basin with the highest levels are generally located in the Cities of Irvine, Tustin, Yorba Linda, Anaheim, Placentia, and Fullerton. OCWD continually monitors the levels of TDS in wells throughout the OC Basin. The TDS concentration in the OC Basin is expected to decrease over time as the TDS concentration of Groundwater Replenishment System (GWRS) water used to recharge the OC Basin is approximately 50 mg/L.

Nitrates are one of the most common and widespread contaminants in groundwater supplies, originating from fertilizer use, animal feedlots, wastewater disposal systems, and other sources. The MCL for nitrate in drinking water is set at 10 mg/L. OCWD regularly monitors nitrate levels in groundwater and works with producers to treat wells that have exceeded safe levels of nitrate concentrations. OCWD manages the nitrate concentration of water recharged by its facilities to reduce nitrate concentrations in groundwater.

Other contaminants that OCWD monitors within the OC Basin include:

- Methyl Tertiary Butyl Ether (MTBE)
- Volatile Organic Compounds (VOC)
- NDMA
- 1-4-Dioxane
- Perchlorate
- Selenium
- Constituents of Emerging Concern (CEC)

Sustainable Groundwater Management Act

The California Sustainable Groundwater Management Act (“SGMA”), a three-bill package signed into law in 2014, creates a framework for the management of groundwater sources throughout the state. Under SGMA, local agencies form Groundwater Sustainability Agencies (“GSAs”) and create Groundwater Sustainability Plans (GSPs). If a GSA is not formed, special act districts, such as OCWD, can submit “Alternative Plans” to GSPs. Timelines and requirements are based upon basin priority. Under SGMA, the Orange County Groundwater Basin (Basin 8-1) is considered a medium-priority basin.

In January 2017 OCWD, the city of La Habra, and Irvine Ranch Water District submitted the Basin 8-1 Alternative Plan. The Alternative Plan incorporates the requirements of GSPs and is considered to be “functionally equivalent” to a GSP. The Alternative Plan analyzes existing basin conditions and demonstrates that the Basin has been operated within its sustainable yield for more than 10 years without degrading water quality, reducing storage, or lowering groundwater levels. The Alternative Plan will be updated and resubmitted every 5 years as part of SGMA requirements.

Under the Alternative Plan, four management areas have been created for the Orange County Groundwater Basin. Each of these management areas has slightly different management goals and strategies based on the government bodies that serve them. The management areas are as follows:

- *La Habra-Brea Management Area* – Includes the northern portion of the Basin located outside of the OCWD service area.
- *OCWD Management Area* – Includes OCWD’s service area, covering approximately 89% of the Basin.
- *South East Management Area* – Includes the southern and southeastern portions of the Basin that are outside of OCWD’s service area.
- *Santa Ana Canyon Management Area* – Includes the eastern portion of the Basin outside of OCWD’s service area.

As the OC Basin is a medium priority basin, details regarding sustainable groundwater basin management will be required for future projects within the Fountain Valley GPU area that trigger Senate Bill 610 and the development of a Water Supply Assessment (WSA). Projects that require the development of a WSA include residential developments over 500 dwelling units, shopping centers having 500,000 sf or more of floor space, a hotel with more than 500 rooms, a commercial office building with 250,000 sf of floor space, an industrial type land use over 40 acres of land or 650,000 sf of floor area, or a mixed use project that includes any combination of the limits noted above.

3. TECHNICAL APPENDICES

Appendix A Sewer Flow Calculations

Appendix B Water Demand Calculations

APPENDIX A

SEWER FLOW CALCULATIONS

Sewer Flow Calculation Sheet

Existing Land Use Category	Total Acres	Housing Units	Building Acreage	Unit Flow Factor (gpd/unit)	Sewage Generation (gpd)
Existing Land Uses within City Boundary					
Agriculture	55	--	0	200	0
Commercial and Services	418	--	114.9	1,600	183,840
Education	238	--	0.9	1,600	1,440
General Office	77	--	25.4	1,600	40,640
Industrial	231	--	95.4	1,300	124,020
Mixed Commercial and Industrial	9	--	1.5	1,600	2,400
Mobile Homes	40	329	--	245	80,605
Multi-Family Residential	149	3,741	--	245	916,545
Single Family Residential – Detached	2,123	12,811	--	245	3,138,695
Single Family Residential - Attached	181	2,108	--	245	516,460
Open Space and Recreation	698	--	0.1	200	20
Public Facilities	71	--	18	1,600	28,800
Religious Facilities	43	--	2.1	1,600	3,360
Total City					5,036,825
Existing Land Uses within North Island SOI Boundary					
Commercial and Services	1	--	0.1	1,600	160
Mobile Homes	4	62	--	245	15,190
Multi-Family Residential	11	280	--	245	68,600
Single Family-Residential - Attached	1	24	--	245	5,880
Total SOI					89,830
Total within City and SOI					
Total within City and SOI	4,350	19,355	258		5,126,655

APPENDIX B

WATER DEMAND CALCULATIONS

Water Demand Calculation Sheet

Existing Land Use Category	Total Acres	Housing Units	Building Acreage	Unit Demand Factor (gpd/unit)	Water Demand (gpd)
Existing Land Uses within City Boundary					
Agriculture	55	--	0	3,000	165,000
Commercial and Services	418	--	114.9	2,500	287,250
Education	238	--	0.9	2,500	2,250
General Office	77	--	25.4	2,500	63,500
Industrial	231	--	95.4	2,500	238,500
Mixed Commercial and Industrial	9	--	1.5	2,500	3,750
Mobile Homes	40	329	--	350	115,150
Multi-Family Residential	149	3,741	--	350	1,309,350
Single Family Residential – Detached	2,123	12,811	--	450	5,764,950
Single Family Residential Attached	181	2,108	--	450	948,600
Open Space and Recreation	698	--	0.1	3000	300
Public Facilities	71	--	18	2,500	45,000
Religious Facilities	43	--	2.1	2,500	5,250
City Water Demand					8,948,850
Existing Land Uses within North Island SOI Boundary					
Commercial and Services	1	--	0.1	2,500	250
Mobile Homes	4	62	--	350	21,700
Multi-Family Residential	11	280	--	450	126,000
Single Family-Residential Attached	1	24	--	450	10,800
SOI Water Demand					158,750
Total within City and SOI					
	4,350	19,355	258		9,107,600