Chapter 2 Project Description

This chapter provides a detailed description of the Proposed Project. The PWIMP provides a phased program for constructing improvements to the City's infrastructure facilities that will accommodate planned growth while maintaining treatment reliability, meeting future regulatory requirements, and optimizing costs through the planning horizon (2030). Specifically, the PWIMP addresses future planning needs including infrastructure additions and upgrades for the City's water, recycled water, wastewater, and stormwater utilities. The PWIMP builds upon previous planning efforts using a coordinated methodology, which will allow the City to take full advantage of potential linkages and synergies between the four water utility systems. In addition, the PWIMP is also coordinated with a streets plan in an attempt to allow timing of future streets upgrades to be tied together with infrastructure upgrades. Detailed below is a discussion of each utility Master Plan element (i.e. water, recycled water, wastewater, and stormwater utilities) including a brief overview of the existing system and the proposed improvements.

2.1 Water System Master Plan

The City provides a blend of surface and groundwater through its water distribution system, which consists of six blending stations (BS) that take water from each of the City's water sources and combine it before distributing it throughout the City.

In addition to the overall PWIMP goals established in Chapter 1, planning efforts identified specific goals for the water supply. These goals are as follows:

- Goal 1: Provide reliable/resilient supply to meet future conditions (i.e., changes to demand, regulations, and water quality).
- Goal 2: Meet the City's water quality objectives.
- Goal 3: Protect existing water rights by maximizing use of groundwater allocation.
- Goal 4: Minimize future reliance on imports by maximizing use of AWPF-produced water.
- Goal 5: Attract industry and jobs.
- Goal 6: Keep rates affordable.

This section will provide an overview of the existing water system and its strengths and vulnerabilities, as well as the regulatory requirements and climate change issues the system will face. This chapter also makes recommendations for meeting the defined goals.

2.1.1 DESCRIPTION OF EXISTING FACILITIES

2.1.1.1 Source of Supply

To serve its constituents, the City of Oxnard gets water from the following sources:

- *Groundwater* from local wells that draw from the Oxnard Plain Groundwater Basin (some of which are treated through reverse osmosis).
- *Groundwater* from the United Water Conservation District (UWCD), which draws from the

Oxnard Plain Forebay.

- *Surface Water* imported from the State Water Project via the Calleguas Municipal Water District (CMWD).
- *Recycled Water* from the Advanced Water Purification Facility (AWPF).

2.1.1.2 Treatment/Blending

Although the exact ratio of the blend at the City's blending stations varies, the City stated that future blending will be in a 1:1 (surface water to groundwater) ratio. This ratio produces water with a total dissolved solids (TDS) level between 600 and 700 mg/L, which meets the upper limit of the secondary drinking water standards (1,000 mg/L) at a fairly cost-effective unit rate.

Figure 2-1 is a schematic of the City's water system, showing how the six blending stations are linked together. Figure 2-2 is a map of the City's water system facilities, including the locations of the blending stations. Table 2-1 summarizes the major characteristics of each blending station. The City's individual facilities are all described in the following sections.

2.1.1.3 Distribution System

To reflect the system's ongoing growth, the City's transmission and distribution system consists of a variety of pipe types and sizes. To manage these pipes, the City has implemented an infrastructure management system (GIS database) that it continually populates with pipe attributes (diameter, material, year installed, etc.).

Based on the 2013 March GIS database, the distribution system includes nearly 613 miles, or 3.25 million linear feet, of pipe, the majority of which is between 6- to 12-inches in diameter. Figure 2-3 illustrates the City's existing water distribution system.

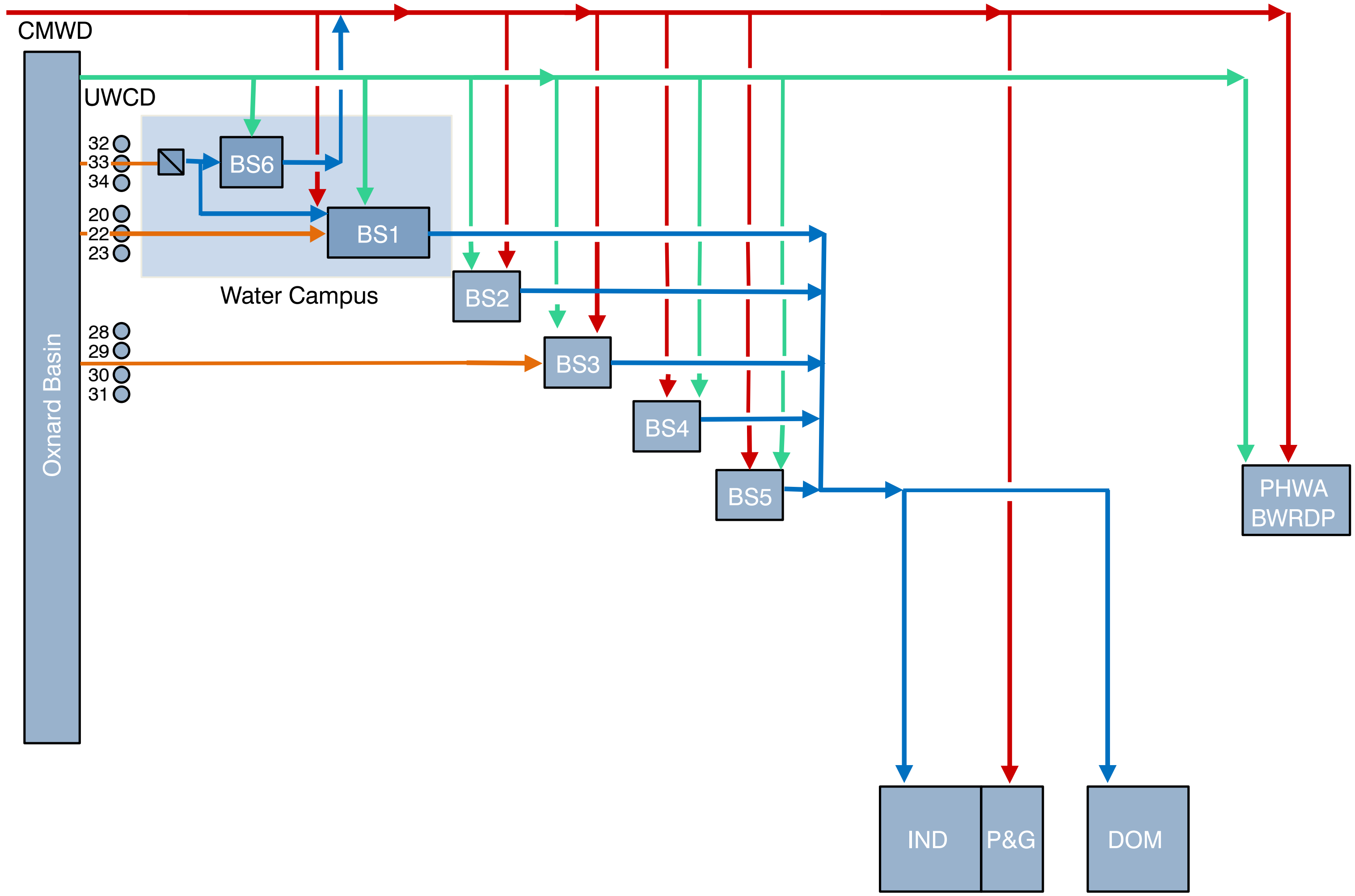
The City's water system currently operates in one pressure zone. However, some areas of the City have difficulties with pressures higher than the 80 pounds per square inch (psi) maximum pressure desired for the system while other areas need to be augmented to meet the minimum pressure targets.

The only above-ground engineered storage facilities within the system are the 600,000 gallons of permeate storage at Blending Stations (BS) No. 1 and No. 6, which are located adjacent to each other and referred to collectively as BS Nos. 1/6. The City also uses 70 percent of the 18.0 million-gallon (MG) Springville Reservoir owned by CMWD. In total, the City has 12.5 MG of above-ground storage.

2.1.1.4 Condition Assessment

A condition assessment was conducted to identify rehabilitation and replacement (R&R, or renewal) needs for the City's water system. For this effort, asset management methodology was used to identify existing water assets and to conduct a visual condition assessment of above-ground assets. The effort also included an evaluation of structures, a desktop evaluation of below-ground assets, and a cathodic protection system evaluation.

To prioritize the R&R needs, a risk assessment was also conducted that examined the vulnerability (likelihood of failure) and criticality (consequence of failure) for each asset. Consistent risk scoring methodology was applied to both above- and below-ground assets to prioritize each asset type.



OVERALL WATER SYSTEM SCHEMATIC

FIGURE 2-1

CITY OF OXNARD

ENVIRONMENTAL IMPACT REPORT

CITY OF OXNARD CALIFORNIA

SMB ENVIRONMENTAL

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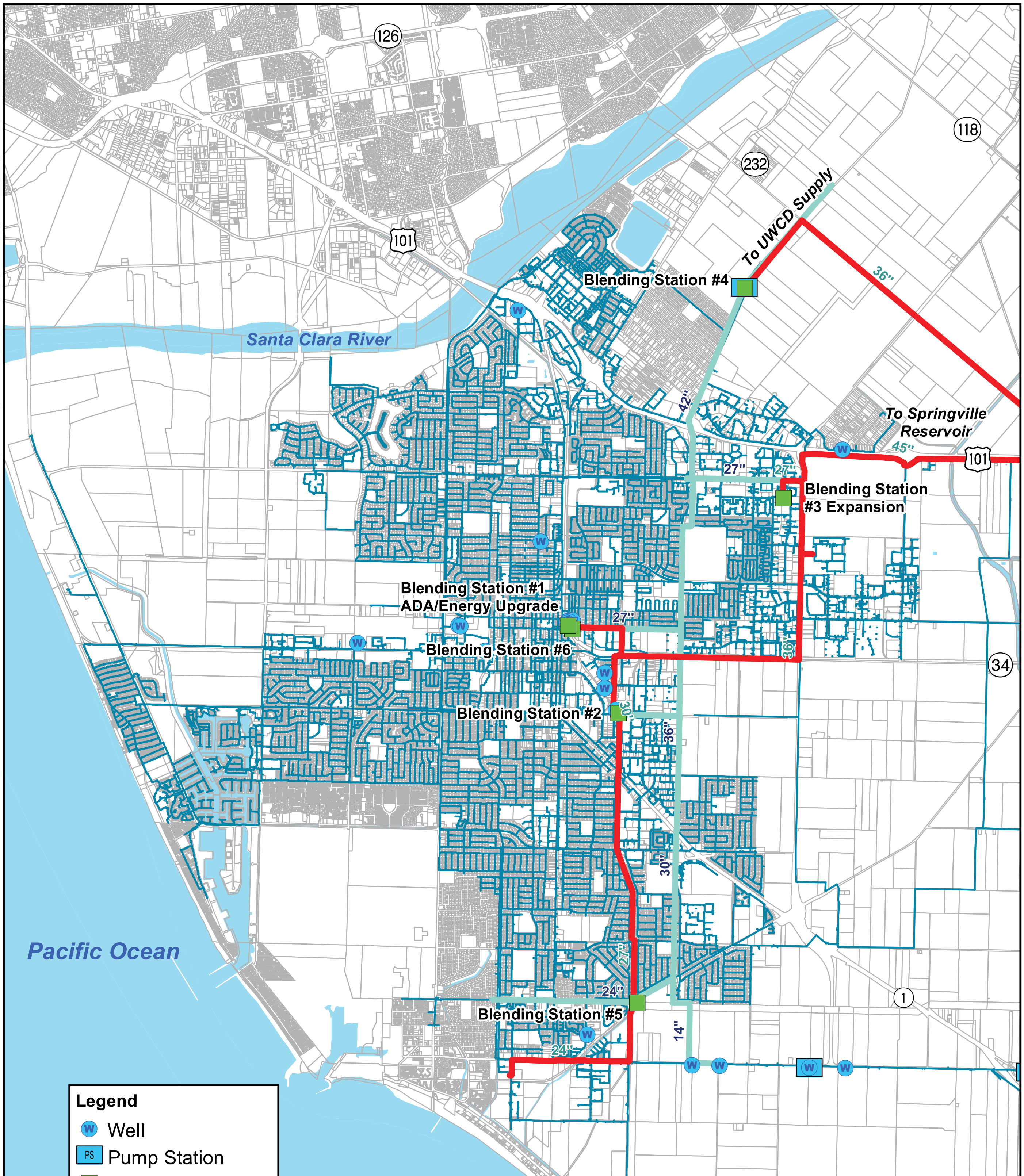

POTABLE WATER DISTRIBUTION SYSTEM

FIGURE 2-2

CITY OF OXNARD
ENVIRONMENTAL IMPACT REPORT

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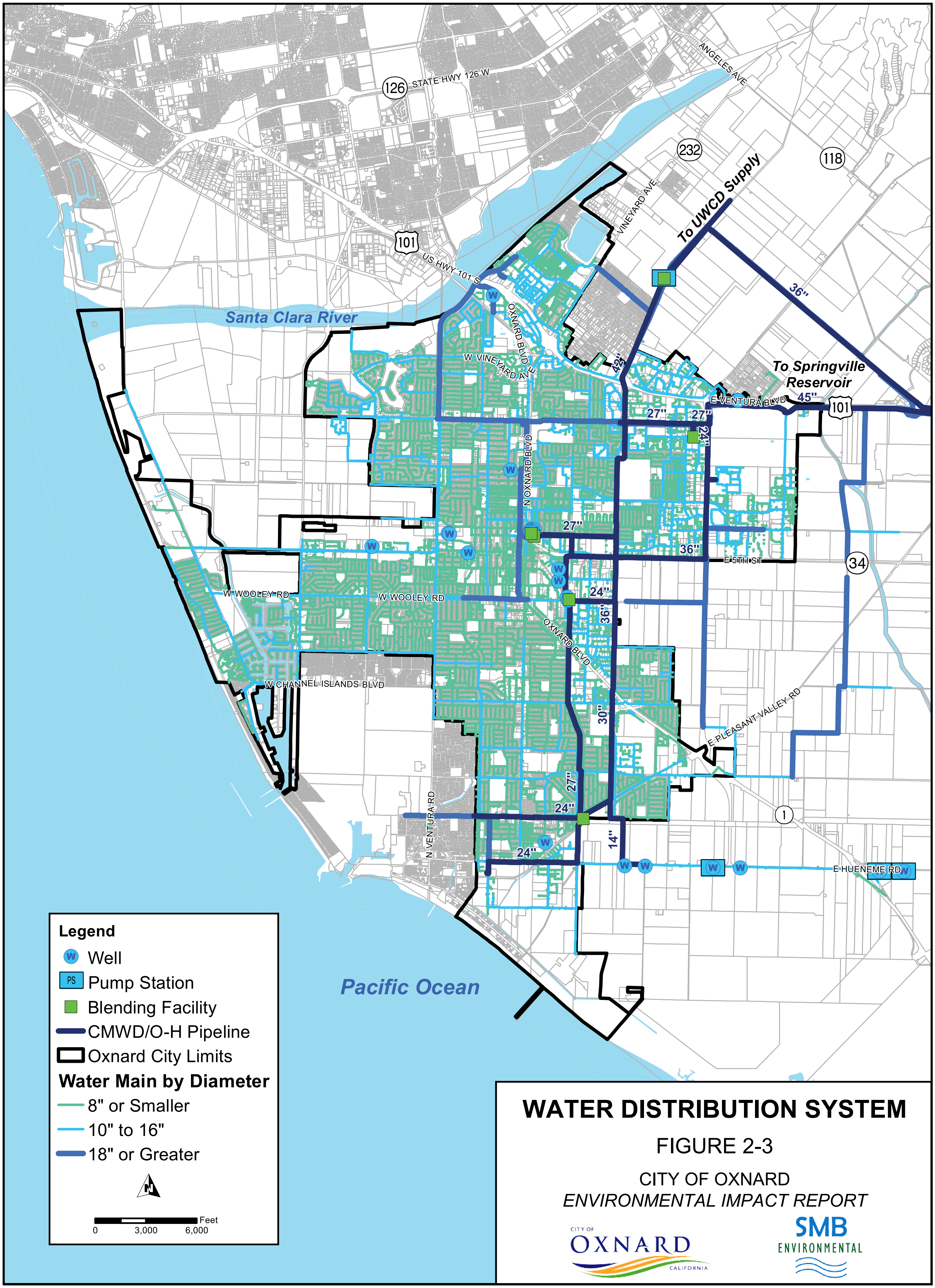

WATER DISTRIBUTION SYSTEM

FIGURE 2-3

CITY OF OXNARD

ENVIRONMENTAL IMPACT REPORT

CITY OF OXNARD CALIFORNIA

SMB ENVIRONMENTAL

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Table 2-1
Blending Station Facility Summary
Public Works Integrated Master Plan
City of Oxnard

	BS No. 1	BS No. 2	BS No. 3	BS No. 4	BS No. 5	BS No. 6
Location	Third Ave. & Hayes	E Wooley & Richmond Rd	Southwest of Gonzales Rd and Rice Ave.	N Rose Ave South of Central Ave.	Pleasant Valley Rd East of Saviers Rd.	Co-Located with BS No. 1
Status	Operational	Stand-By	Operational	Operational	Operational	Operational
Construction Date	1900 Updates in 1965, 1986, 2008	1971	1975 Update in 2006	1994	2007	2010
Local Wells Available	**Yes**	**No**	**Yes**	**No**	**No**	**Yes**
Well No. - Capacity gallons per minute (gpm)	20 – 2,900 22 – 3,000 23 – 2,800	--	28 – 2,000 29 – 3,000 30 – 2,000 31 – 2,000	--	--	32 – 2,000(1) 33 – 3,000(1) 34 – 2,500(1)
Total Well Capacity, mgd	12.5	--	13	--	--	10.8
Imported Water Available						
CMWD Capacity, mgd	29.5	18.7	42	27.8	8	--
UWCD Capacity, mgd	29.5	27.8	29.5	30.2	8	--
Treatment	**Yes**	**No**	**Yes**	**No**	**No**	**Yes**
Type	Desalting [reverse osmosis (RO)] & Chloriniation	--	Chlorination	--	--	Desalting [reverse osmosis (RO)] & Chlorination
Capacity, mgd	--	--	--	--	--	7.5 (permeate)
Permeate Storage, gallons	--	--	--	--	--	600,000
Backup Generator	Yes 3 @ 750 kW	No --	Yes 1 @ 1,000 kW	Yes 1 @ 500 kW	No --	No --

Notes:
(1) These wells are fed directly to the desalter at BS No. 6. Due to water quality, the wells are not able to blend directly into the City's distribution system.

Above Ground Facilities

In total, 165 above-ground assets were assessed, including structures and equipment owned and operated by the City. Approximately 11 building structures, 41 pumps, 16 wells, and a variety of other assets, with the recorded age of each asset varying from 1965 to the present were assessed. Each asset was placed into an inventory and categorized according to its asset type and discipline.

Table 2-2 lists the assets with the highest above-ground risk, which was determined from the assessment. The results of the condition assessment analysis are as follows:

- Water Campus BS No. 1/6 – fair to good condition with a few exceptions noted in Table 2-2.
- BS No. 2 – fair to poor condition.
- BS No. 3 – fair to very good condition, with two wells (Well Nos. 30 and 31) in need of minor rehabilitation.
- BS No. 4 – fair to poor condition, with three Variable Frequency Drives (VFDs), two pumps, electrical equipment, and a central valve train in disrepair.
- BS No. 5 – fair to good condition.
- Wells – fair to good condition, except as noted in Table 2-2.

Table 2-2
Highest Above-Ground Risk Asset
Public Works Integrated Master Plan City of Oxnard

Site/Asset	Risk(1)
Blend Station 2	
Supervisory Control and Data Acquisition (SCADA) System	2.01
Water Campus (BS1 and BS6)	
RO Building RO Filter (#1-3)	0.48
RO Building Cartridge Filter (#1-4)	0.48
Chemical Building Lab PLC	0.33
Well 18	
Motor Control Center (MCC) Single Box	0.40
Pump	0.36
Well 27	
MCC Cabinet	0.40
Pump	0.36
Blend Station 4	
Standby Generator	0.30
MCC	0.30
Switchboard	0.30

Note:
(1) Risk = Criticality x Vulnerability; Criticality = consequence of failure; Vulnerability = likelihood of asset failure.

Below Ground Assets

Using GIS data of the Oxnard distribution system, a desktop evaluation was conducted on the City's below-ground water system assets. The dataset included information on the diameters and materials used for 30,632 of the 39,341 segments. The year of installation for each asset was available for 38,065 of the 39,341 segments.

A pipe's useful life will vary based on several factors, with pipe age and material the easiest to quantify. The majority (72 percent) of the City's distribution piping is of two types: asbestos cement pipe and polyvinyl chloride, which have relatively long useful lives of 65 and 85 years, respectively. However, approximately 87 percent of the asbestos cement pipe installed in the City is more than 30 years old. The polyvinyl chloride piping is relatively newer, with the majority installed within the last 20 years.

2.1.1.5 Cathodic Protection

A survey was conducted on the City's water infrastructure to assess the existing level of cathodic protection. From this assessment, the following improvements were identified:

- Several Key Pipelines: Install new test stations and replace rectifiers and anode-ground beds (Del Norte Pipeline, Oxnard Conduit, Wooley Road/United, 3rd Street Lateral, Industrial Lateral).
- Water Treatment Facility at BS No. 1/6: Investigate requirements of electrical isolation and cathodic protection (CP) of buried piping; design and install as needed.
- 600,000 Gallon Steel Water Tank at the Water Treatment Facility: Install internal CP system.

In addition to these projects, conducting an annual cathodic protection survey, providing a report for all City facilities, and bi-monthly rectifier monitoring is also recommended in the PWIMP.

2.1.1.6 Electrical Systems Protection

A study of the electrical systems for the existing six blending stations was performed. The study included a short circuit study, a protective device coordination evaluation, and an arc flash evaluation.

These evaluations were performed for distinct reasons. The short circuit study determined the short circuit current available at each piece of electrical equipment and identified underrated equipment. The protective device coordination evaluation identified protective devices (circuit breakers, fuses, etc.) that were not coordinated in the electrical system and might not minimize disruption of electrical power during a short circuit. The arc flash evaluation determined the maximum arc flash incident energy at each piece of electrical equipment and identified appropriate personnel protective equipment to be worn if work is performed on the equipment while it is being energized.

The results of the electrical systems investigation were then used to develop the electrical system study for each site. Study results identified pieces of existing electrical distribution equipment not sufficiently rated for the worst-case short circuit current and showed the arc flash incident energy at each piece of electrical equipment based on the existing protective device settings.

Concerns and code violations in the existing electrical equipment installations were observed and documented. Obsolete equipment and equipment nearing the end of its useful life were identified, as were equipment in need of repair and possible changes in the existing installation from code violations, such as equipment needing painting or relocation or incorrectly labeled equipment.

2.1.1.7 Operational Approach and Strategy of Existing System

Generally, the blending stations are operated to provide a target blended water quality and to meet system pressure. Table 2-3 shows the overall production breakdown by blending station as well as the approximate blend of the three major sources at each blending station.

Table 2-3
Operational Approach to Blend Station Source Breakdown[1]
Public Works Integrated Master Plan
City of Oxnard

	BS No. 1	BS No. 2	BS No. 3	BS No. 4	BS No. 5	Desalter Permeate Flow[2]
Overall Annual Production[3]	23%	0.1%	30%	13%	3%	13%
Production by Source						
CMWD	22%	39%	47%	53%	46%	0%
UWCD	60%	61%	26%	47%	54%	0.5%
Local Wells	18%		27%			99.5%

Notes:
(1) Based on annual average production data provided by the City from 2009-2012.
(2) Based on permeate from the BS No. 6 desalter.
(3) For these to add up to 100 percent, contributions to industrial from UWCD (4 percent) and CMWD (13 percent) need to be added.

2.1.2 FUTURE WATER SUPPLY FACILITY NEEDS

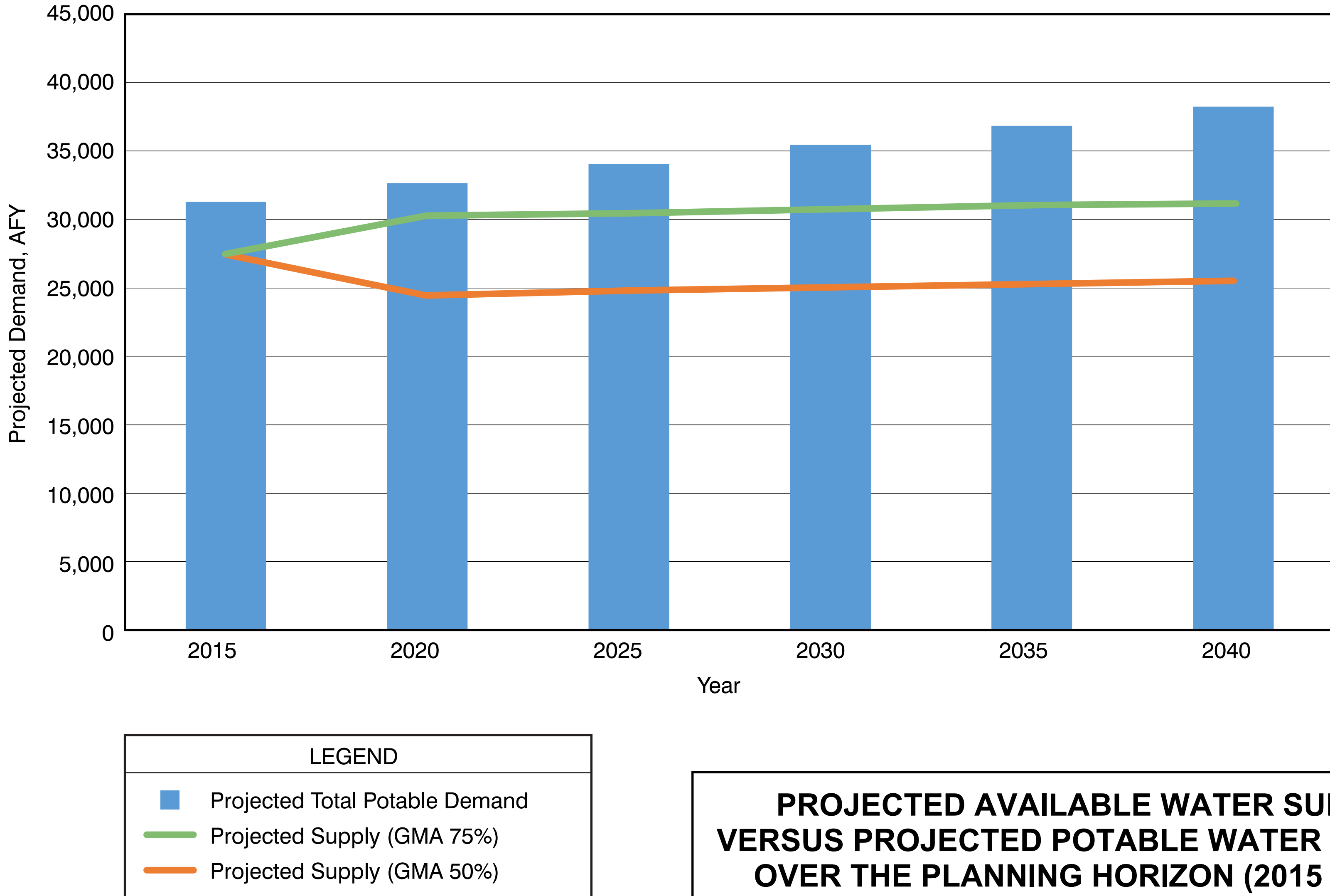
The existing water system's capacity and performance were compared with appropriate criteria to identify existing shortfalls in the system. Although the system generally has adequate capacity to meet current demand conditions, it does so with little reliability. Thus, if key components, such as pumps, wells, and/or treatment processes, are in disrepair, meeting demand requirements would be a challenge.

2.1.2.1 Water Supply

Volume of Supply – Though the City currently meets water demand requirements, projections for the PWIMP show a potential supply gap of between 3,800 and 10,700 AFY. This gap is based on available water quantity and groundwater pumping restrictions, which are expected to be between 50 and 75 percent of historical in the long-term. Figure 2-4 graphically compares the projected available supply with demand over the planning horizon.

Quality of Supply – From a water quality and regulatory standpoint, the system meets current regulations for drinking water quality. However, the City wishes to improve its taste and odor parameters.

Due to hardness in the water, many of the City's customers use point-of-use softeners that return salt to the wastewater system. As a result, the City aims for a more acceptable hardness level in the blended drinking water that would reduce or eliminate the need for point-of-use softeners.



PROJECTED AVAILABLE WATER SUPPLY VERSUS PROJECTED POTABLE WATER DEMAND OVER THE PLANNING HORIZON (2015 - 2040)

FIGURE 2-4

CITY OF OXNARD
ENVIRONMENTAL IMPACT REPORT

CITY OF OXNARD CALIFORNIA

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Because the groundwater (both local and UWCD) sources have relatively high hardness levels, the City's desire for a more acceptable hardness level directly affects the water supply analysis. However, the City can use low hardness water from the AWPF through indirect potable reuse (IPR) / direct potable reuse (DPR), which has a hardness of approximately 10 mg/L.

2.1.2.2 Water Distribution

The conveyance (distribution) system was also evaluated for its ability to meet future water demands, and assessed for its capacity and performance. As with any water distribution system, conducting regular routine maintenance is imperative for maintaining a reliable system for the long term. Routine maintenance includes flushing the water lines, exercising the valves, and also conducting an active leak detection program. These actions along with other required maintenance help to routinely rehabilitate the pipelines thereby extending the useful life of the system. For this evaluation, four major areas were assessed in addition to the R&R needs identified. These areas are as follows:

Capacity Improvements – Pipeline capacity improvements are needed to meet level of service criteria (LOS) and to accommodate growth that requires additional demands to serve new customers. To estimate growth projections, the hydraulic model was run for existing conditions and the years 2020, 2030, and 2040. Pressure and velocity results were also investigated, and when either pressure or velocity exceeded LOS criteria (see Table 4.11), improvements were included to accommodate the demands.

Pressure Zone Separation – Meeting system pressure targets with a single pressure zone is a challenge and is expected to worsen with increased demands. As a result, a pressure zone analysis was conducted using the updated and calibrated system hydraulic model to assess whether the City would benefit from being split into two or three pressure zones.

Hydraulic modeling was conducted under two conditions: PHD conditions to identify minimum system pressures and minimum hour demand (MinHD) conditions to identify maximum system pressures. During PHD conditions, the modeling found pressures under 40 psi in the City's northeastern portion. However, during MinHD conditions, pressures in excess of 80 psi were seen in the City's southern portion. Thus, when considering the City's target minimum and maximum pressures, pressure zone separation seems warranted.

Fire Flow Requirements – The fire flow analysis tool was used in the system hydraulic model to calculate the available pressure and flow at each fire flow node on a case-by-case basis. Based on this analysis, when each respective fire flow demand was applied, 100 of the 980 fire flow nodes resulted in residual pressures of less than 20 psi. To correct the fire flow conditions for these 100 nodes, 39 projects were identified.

Storage Needs – The City currently has only 600,000 gallons of above-ground engineered storage reservoirs and in addition, relies on the Springville Reservoir (owned by CMWD) for its distribution system storage, with rights to 12.5 MG of the 18 MG reservoir's capacity. As such, an analysis was conducted to determine whether the existing storage is sufficient for operational, fire, and emergency needs. Although the storage requirements used for the analysis were based on MDD, they do vary based on the type of storage considered.

Based on the analysis, by 2040, an additional 1.5 MG of above-ground storage is recommended to meet fire and operational needs. It is assumed that groundwater pumping can provide water under emergency conditions as long as the appropriate redundancy for backup power and sufficient well capacity are provided.

2.1.2.3 Summary of Water Supply Needs

Given the water system capacity and performance summary, future facility needs fell within four major categories:

- **Water Supply/Quality** – Includes system improvements needed to help the City maintain a sustainable water supply, meet projected demands, and sustain acceptable water quality through the planning period.
- **R&R** – Includes R&R of both the above- and below-ground assets deemed critical for reliable operation. Additional redundancy and reliability are also needed to provide a sustainable supply.
- **Operations Optimization** – Includes optimization projects that the City and AECOM identified for the City's water system operation.
- **Pressure Zone Separation** – Includes system improvements needed to separate the existing system into four distinct pressure zones.

2.1.3 PROPOSED WATER SUPPLY PROJECTS

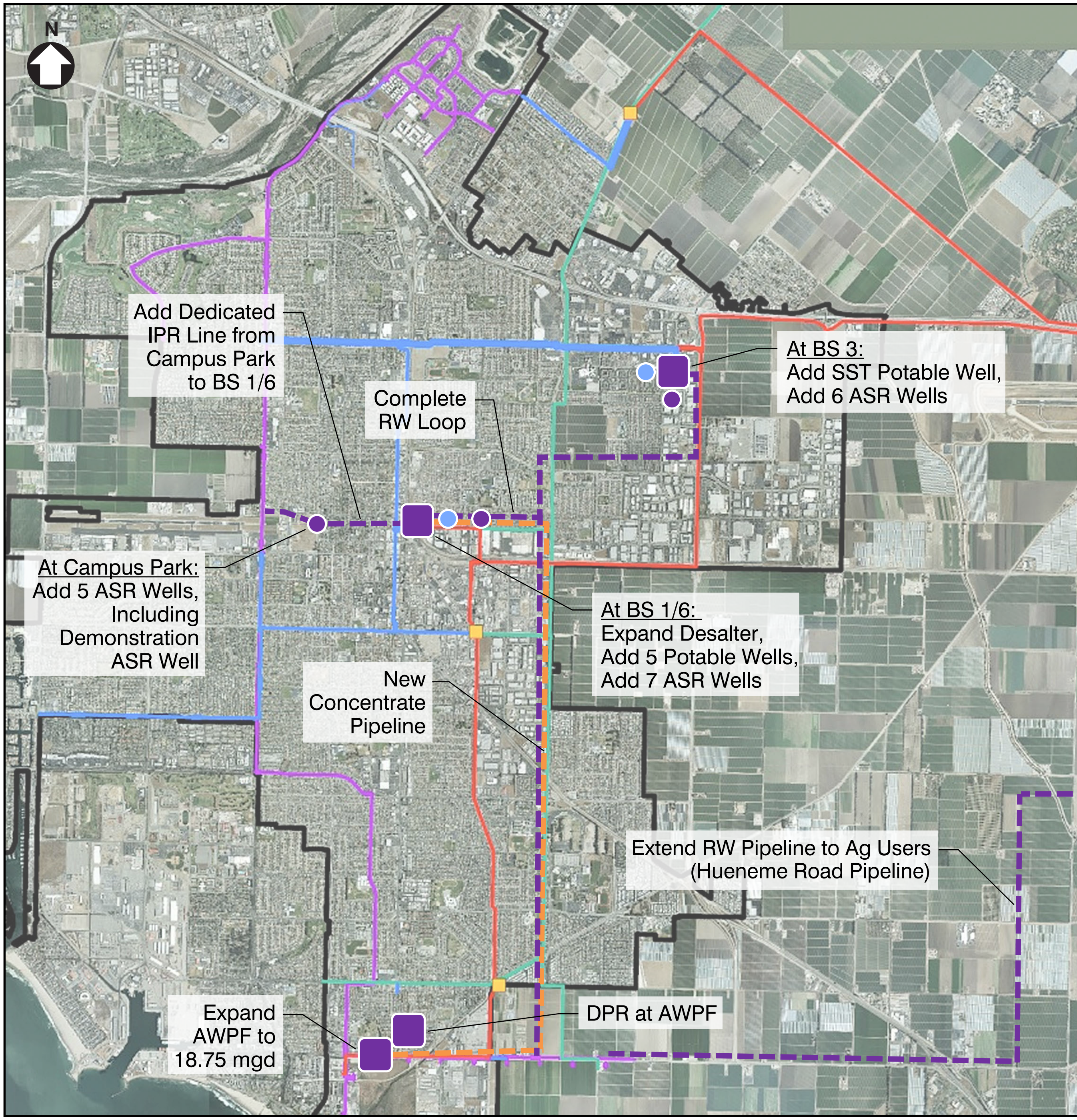
A combination of Groundwater and ASR/IPR was chosen as the recommended project for the water system plan. Given the unknown future of groundwater pumping within the Oxnard Basin, a groundwater pumping allocation of 50 percent of historical was assumed over the long-term. This means that approximately 12,000 AFY of additional supply is needed to cover the supply gap projected by 2040. Furthermore, it was assumed that a cap of 5,200 AFY could be presented to farmers with the hope of receiving pump-back groundwater credit. This means that more ASR wells will be needed to take full advantage of the AWPF effluent for IPR use.

Summarized in the following sections are the recommended projects for the water system's Capital Improvement Plan (CIP), which are based on the existing system condition assessment and capacity as well as the performance needs for meeting projected future demands and water quality objectives. These projects cover the needs through the planning period (2015-2040) and are summarized in Table 2-4 according to the project type or driver. Figure 2-5 illustrates the locations of the recommended water supply projects.

The projects were split into phases that loosely follow the project timing: 1) Phase 1 – Immediate Needs (First 2 years); 2) Phase 2 – Near-Term Needs (Years 2 to 10); and 3) Phase 3 – Long-Term Needs (Beyond 10 years).

The phases presented here are what are recommended based upon the technical needs identified within this assessment. However, the actual timing of implementation may defer when compared and balanced against the financial considerations of total implementation of the PWIMP.

Recycled water projects related to meeting water supply needs (e.g., AWPF expansion, ASR wells, etc.) are summarized in Section 2.2 below.



LEGEND

Existing Transmission Lines:
- CMWD Pipeline
- O-H Pipeline
- RW Distribution
- Potable Distribution

Recommended New Transmission Lines and Wells:
- New Concentrate Pipeline
- RW Distribution
- New Potable Wells
- New ASR Wells

RECOMMENDED WATER/RECYCLED WATER PROJECTS

FIGURE 2-5

CITY OF OXNARD
ENVIRONMENTAL IMPACT REPORT

ox0917rf6-9587(EIR-Fig2-5).ai

2.1.3.1 Water Supply/Quality

New potable water supply wells are needed to maintain the reliability of the City's local groundwater pumping operation and to add system reliability. These new wells will replace and bolster the City's current local groundwater pumping capacity. Because BS No. 1/6 and BS No. 3 are the most favorable locations for potable groundwater pumping and have significant infrastructure in place, these were the two sites identified to build new additional potable wells.

In general, most of the City's distribution system can handle current and future demand flows, with the exception of some pipes in the immediate vicinity of the blending stations where velocities exceeded LOS criteria. The list of recommended projects involves replacing these pipes; however, the exact year for replacement still needs to be determined after detailed year-by-year coordination with the other master plans included in the PWIMP.

Additional desalting of the groundwater will be needed in the future to meet the hardness objective of 100 mg/L. The existing 7.5 mgd desalter located at BS No. 1/6 is built to be expanded to a total permeate capacity of 15 mgd; therefore, expanding the desalter is more cost effective than building desalting capacity at another location.

To avoid taking brine from the desalter back to the OWTP, which would then affect the AWPF effluent and cost of operation, a dedicated concentrate line is recommended. This concentrate line could be routed from the Water Campus (BS No. 1/6) to the City's ocean outfall from the OWTP. However, the use of the City's outfall is predicated on the RWQCB's permit of policy. A possible option to the dedicated concentrate line is a connection to the Salinity Management Pipeline (SMP) and agreement with CMWD.

Figure 2-6 illustrates the locations of the water system improvements recommended for securing the City's water supply. These are also shown in conjunction with the recycled water improvements, since they work in concert with one another.

2.1.3.2 R&R

A number of R&R related projects were identified through the efforts of this Plan and City staff. These improvements are broken into the two broad categories: above-ground assets (blending station/treatment) and below-ground assets (distribution system piping).

Table 2-4
Recommended Projects to Meet Water Supply Needs through 2040
Public Works Integrated Master Plan
City of Oxnard

Facility/Location	Description	Phase	Quantity	Unit	Capacity
Water Supply/Quality - Treatment					
BS No. 1/6	Add potable water wells	2	5	wells	2,000 gpm (ea.)
BS No. 3	Add potable water well (stainless steel)	2	1	wells	2,000 gpm
BS No. 1/6	Expand existing desalter by 7.5 mgd (split into 2 phases at 3.75 mgd each)	2/3	1	--	Total: 15 mgd
BS No. 1/6	Construct a new permeate storage tank for operational storage	2	1	tank	2.0 MG
BS No. 1/6	Expand existing disinfection	2	1	--	--
BS No. 1/6	New connection to Oxnard-Hueneme (O-H)/UWCD Pipeline	2	--	--	--
Concentrate Conveyance	Construct brine line from OWTP to BS No. 1/6 (14 and 24 inch)	2	32,100	lf	--
Water Supply – Distribution System (Capacity Improvements)					

Table 2-4
Recommended Projects to Meet Water Supply Needs through 2040
Public Works Integrated Master Plan
City of Oxnard

Facility/Location	Description	Phase	Quantity	Unit	Capacity
(Location Varies)	Replace 8" Pipeline	1	322	lf	--
	Replace 12" Pipeline	1	238	lf	--
	Replace 14" Pipeline	1	164	lf	--
	Replace 30" Pipeline	1	3,804	lf	--
	Replace 6" Pipeline	2	69	lf	--
	Replace 8" Pipeline	2	391	lf	--
	Replace 10" Pipeline	2	1,101	lf	--
	Replace 12" Pipeline	2	2,447	lf	--
	Replace 6" Pipeline	3	32	lf	--
	Replace 8" Pipeline	3	233	lf	--
	Replace 10" Pipeline	3	1,243	lf	--
	Replace 12" Pipeline	3	997	lf	--
	Replace 14" Pipeline	3	2,453	lf	--
	Replace 24" Pipeline	3	937	lf	--
R&R – Blending Stations/Treatment					
BS No. 1/6	Replace Mechanical, Electrical, and AUX Equipment(1)	1	--	--	--
BS No. 2	Replace Mechanical, Electrical, and AUX Equipment(1)	1	--	--	--
Varies	Make Water SCADA System Improvements	1	--	--	--
BS No. 3	Replace Mechanical, Electrical, and AUX Equipment(1)	2	--	--	--
BS No. 4	Replace Mechanical, Electrical, and AUX Equipment(1)	2	--	--	--
BS No. 5	Replace Mechanical, Electrical, and AUX Equipment(1)	2	--	--	--
BS No. 1/6	Install electrical isolation at all steel and cast iron water risers (2)	2	--	--	--
BS No. 1/6	Add Cathodic Protection System for Steel Storage Tank(2)	2	--	--	--
R&R – Distribution System					
Varies	Replace Automatic Meter Reader (AMR) Devices	1	--	--	--
Del Norte Forced Main	Cathodic Protection - Install 20 missing test stations Replace rectifiers and anodes; resurvey(2)	1	--	--	--
Oxnard Conduit	Cathodic Protection - Replace deep anode beds and rectifiers #1, #2, and #3 (2)	1	--	--	--
Wooley Road/United	Cathodic Protection - Replace 5 test stations Replace rectifier and anode; resurvey(2)	1	--	--	--
3rd Street Oxnard Extension	Cathodic Protection - Replace deep anode bed and rectifier; bond UWCD pipeline to Oxnard extension at rectifier (2)	1	--	--	--
Freemont North Neighborhood	GREAT Program Pipeline Replacements(3)	1	--	--	--
Bryce Canyon South Neighborhood	GREAT Program Pipeline Replacements(3)	1	--	--	--
Redwood Neighborhood	GREAT Program Pipeline Replacements(3)	1	--	--	--
La Colonia Neighborhood	GREAT Program Pipeline Replacements(3)	1	--	--	--
Well 23 & 31 Rehab	Rehabilitate Wells(4)	1	--	--	--
Varies	Electrical and VFD Replacement(4)	1	--	--	--
(Location varies)	Fire Flow Improvements	1			
	Add 8 inch-diameter pipeline		18,500	feet	--
	Add 12 inch-diameter pipeline		13,500	feet	--

Table 2-4 Recommended Projects to Meet Water Supply Needs through 2040 Public Works Integrated Master Plan City of Oxnard					
Facility/Location	**Description**	**Phase**	**Quantity**	**Unit**	**Capacity**
	Add 14 inch-diameter pipeline		250	feet	--
Industrial Lateral	Cathodic Protection - Replace all test stations; resurvey(2)	2	--	--	--
Del Norte Force Main	Cathodic Protection - 48" & 36" CMCL PL - Locate and repair discontinuity near the ease end of Del Norte Pl(2)	2	--	--	--
3rd Street Oxnard Extension	Cathodic Protection - Locate and repair discontinuity near Chemical Building at BS No. 1/6(2)	2	--	--	--
Gonzales 36" Pipeline	Replace test station lids and test cathodic protection(2)	2	--	--	--
Oxnard Conduit	Install new test stations, conduct CIS, and locate/excavate/bond across approx. Add 3 points of electrical isolation.(2)	2	--	--	--
Del Norte Force Main	Cathodic Protection - Replace rectifiers and anodes; resurvey(2)	3	--	--	--
Del Norte Force Main	Cathodic Protection - Install new test stations and leads(2)	3	--	--	--
Wooley Road/United	Cathodic Protection - Replace test stations and install 2 additional stations(2)	3	--	--	--
Wooley Road/United	Cathodic Protection - Replace rectifier and anode; resurvey(2)	3	--	--	--
(Location Varies)	Age-Based Pipeline Replacements Replace 6" Pipeline	3	109,100	lf	--
	Replace 8" Pipeline		47,000	lf	--
	Replace 10" Pipeline		55,000	lf	--
	Replace 12" Pipeline		24,000	lf	--
	Replace 14" Pipeline		2,300	lf	--
	Replace 16" Pipeline		4,000	lf	--
	Replace 24" Pipeline		3,700	lf	--
	Replace 36" Pipeline		5,000	lf	--
	Replace 42" Pipeline		5,300	lf	--
	Replace 48" Pipeline		3,800	lf	--
Varies	Replace AMR Devices	1	--	--	--
Operations Optimization					
Well Nos. 30, 32, 33 & 34	Electrical Rehabilitation(4)	1	--	--	--
BS No. 1/6	Sodium Hypochlorite Piping Replacement(4)	1	--	--	--
BS No. 1/6	Emergency Turnouts Service(4)	1	--	--	--
BS No. 1/6	Generator and ATS Service(4)	1	--	--	--
Pressure Zone Separation					
North Zone Modification					
Three (3) locations on Gonzalez Road	Rehab 3 Pressure Reducing Station (PRS)	1	3	Valve	--
From BS#3 up Solar Road to Gonzalez Road	BS#3 Reconfigure 24" Pipeline to feed North Zone	1	--	--	--
Along Gonzalez Road	Make Minor Piping Modification	1	--	--	--
Coastal Zone Modification					
Three (3) locations on S. Victoria Avenue	Add 3 new PRS	1	3	Valve	--
S. Victoria Avenue	Add New 8" Parallel Pipeline	1	3,000	lf	--
Along S. Victoria Avenue	Make Minor Piping Modifications	1	--	--	--
South Zone Modifications					
Three (3) locations on	Add 3 new PRS	1	3	Valve	--

Table 2-4
Recommended Projects to Meet Water Supply Needs through 2040
Public Works Integrated Master Plan
City of Oxnard

Facility/Location	Description	Phase	Quantity	Unit	Capacity
E. Pleasant Valley Road					
E. Pleasant Valley Road	Add New 8" Parallel Pipeline	1	6,000	lf	--
Along E. Pleasant Valley Road	Make Minor Piping Modification	1	--	--	--

Notes:
* General Note: For the pipeline replacement projects, see the hydraulic models developed as part of the PWIMP to identify the exact pipeline locations.
(1) Projects based on R&R recommendations done through the Condition Assessment.
(2) Projects developed from the Cathodic Protection Assessments.
(3) As documented in the City's GREAT program CIP, February 18, 2015.
(4) Projects provided by AECOM

The blending station/treatment R&R includes routine repair and replacement of elements identified through the condition assessment effort and staff input. Replacing the cathodic protection systems is needed for the desalter and steel permeate storage tank, and the water Supervisory Control and Data Acquisition (SCADA) system is slated for complete replacement and upgrade.

In addition, distribution system piping improvements are needed to meet reliability and redundancy and to protect public health. For these improvements, methodically replacing pipes by size and age is proposed. New piping is also recommended to provide adequate fire flow water, and cathodic protection was identified for several key water mains throughout the City. Also, conducting required routine maintenance such as flushing water lines, exercising valves, and leak detection is imperative to continually help to rehabilitate the system and extend its useful life.

2.1.3.3 Operations Optimization

The City is working on several optimization projects for its water system operation. These projects were identified and are included as recommended projects in the CIP.

2.1.3.4 Pressure Zone Separation

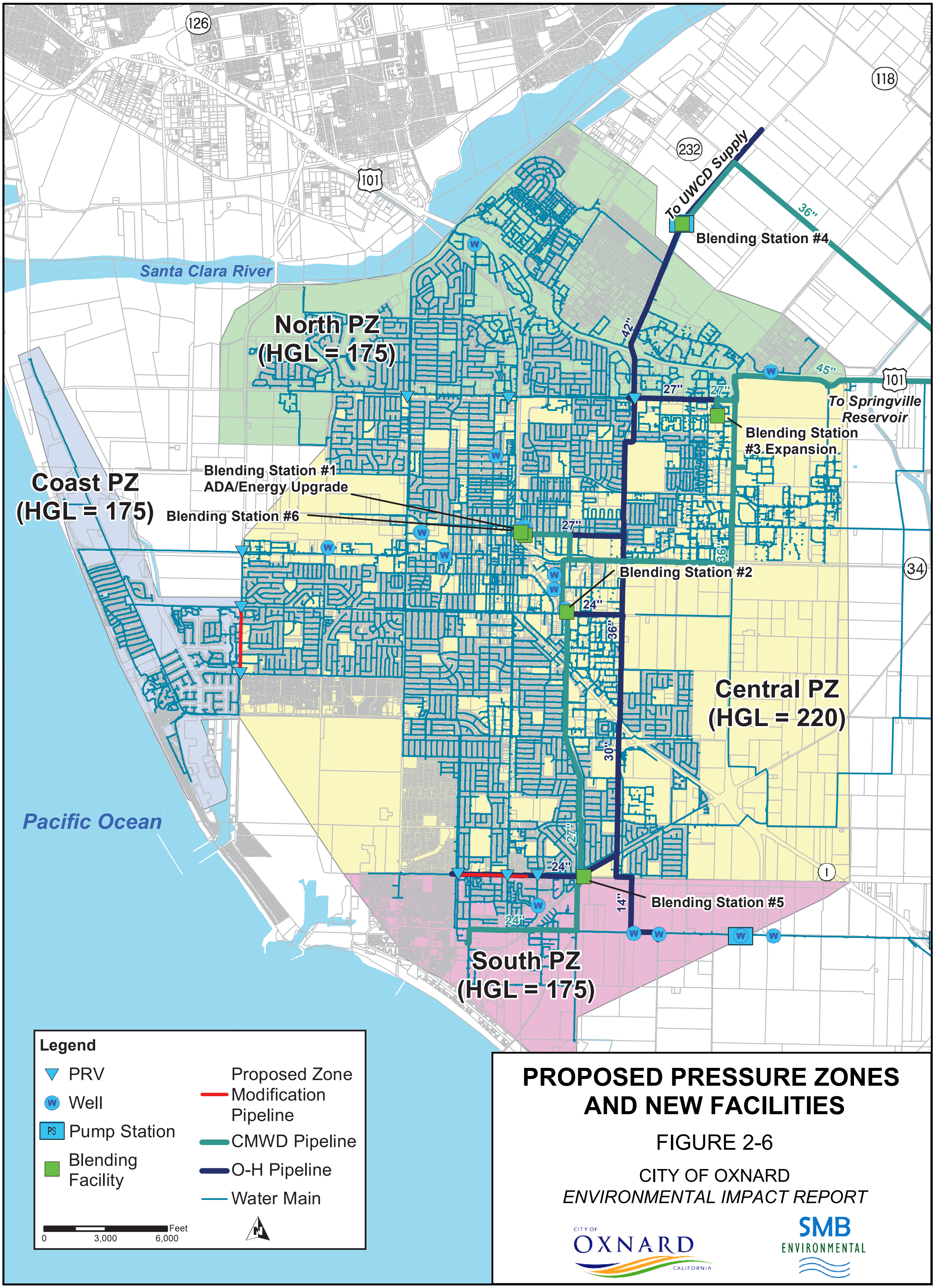
Based on the pressure zone analysis, it is recommended that the City reduce service pressures that exist outside of its established delivery pressure criteria by breaking the single pressure zone distribution system into four zones: the North, Coast, Central, and South. Figure 2-6 shows these pressure zone areas. The recommended improvements necessary for this conversion are summarized in Table 2-5.

2.1.3.5 Implementation Schedule

Figure 2-7 shows the implementation schedule for these water projects in the three phases previously described.

2.2 Recycled Water Master Plan

The City is committed to providing recycled water with its Groundwater Recovery Enhancement and Treatment (GREAT) Program, which gives the City access to a reliable and sustainable supply of high



PROPOSED PRESSURE ZONES AND NEW FACILITIES

FIGURE 2-6

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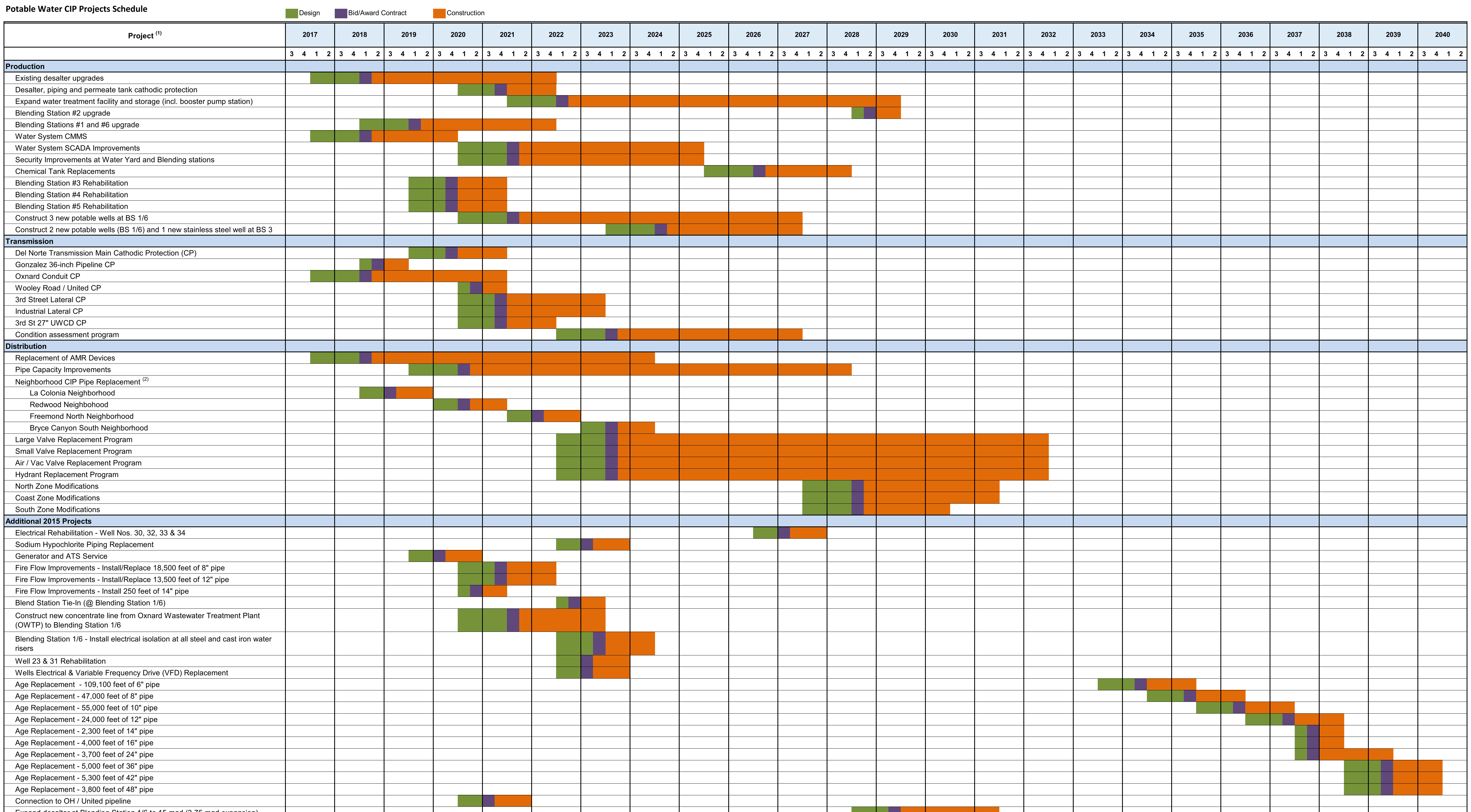


Notes:

(1) Project start years correspond to refinements and updates provided by City after Dec. 2015 publication date.

(2) Neighborhood CIP Replaement projects (La Colonia, Redwood, Freemont North, and Bryce Canyon South neighborhoods) combined into single project.

RECOMMENDED WATER PROJECTS SCHEDULE

FIGURE 2-7

CITY OF OXNARD

ENVIRONMENTAL IMPACT REPORT

quality water, thus decreasing the City's reliance on imported water. Key components of the GREAT program include the following:

- Recycled Water System - Treating and distributing wastewater to the most stringent levels [via the Advanced Water Purification Facility (AWPF)].
- Water Supply - Treating groundwater for total dissolved solids (TDS) and nitrate reduction through a desalter.
- Indirect Potable Reuse (IPR) / Direct Potable Reuse (DPR) Through Groundwater Injection - Adding wells that allow recycled water to be injected into and extracted from the local groundwater aquifer.
- Elements Related to the AWPF and Desalter - Collecting and treating concentrate (brine) from both AWPF and desalters.

A major part of the GREAT program is the use of recycled water, which the City has studied and made plans for over many years. When the GREAT program was formally established in 2002, its objectives were to:

- Increase the reliability of the water supply during drought.
- Reduce water supply costs.
- Secure the water supply's ability to meet a growing water demand.
- Enhance stewardship of the local water supply through recycling and reusing a substantial portion of the region's wastewater.
- Increase environmental benefits associated with developing and rehabilitating local saltwater wetlands.

Although the program has evolved over the years, it has generally maintained its support of water recycling and reuse, groundwater injection, storage and recovery, and groundwater desalination. Thus, the goal of the PWIMP is to build on the foundation already in place.

To build on this foundation, it's helpful to analyze past reports to understand the program's evolution. Two reports are of particular importance: *The 2002 Advanced Planning Study* and *The 2012 GREAT Program Update*. These reports are summarized below.

- 2002 – Advanced Planning Study (K/J, 2002) – This study recommended a series of projects aimed at providing a sustainable water supply for the City, including construction of tertiary and advanced recycled water treatment facilities, aquifer storage and recovery (both for IPR/DPR and seawater intrusion barrier), regional and local desalting to treat additional groundwater, and concentrate collection.
- 2012 – GREAT Program Update (City, 2012) – This report provided additional details for many of the projects established in 2002, updated the progress to date, and estimated costs for the program elements.

Over the years, utilities have shifted from using groundwater recharge for seawater intrusion barriers to using it for ASR. This is largely due to the high cost of the wells. In addition, because of recent pumping cutbacks from the Fox Canyon Groundwater Management Agency (FCGMA), access to more local groundwater through pump-back credits is not guaranteed and is therefore of little direct benefit to the City.

At the same time, the City began to look at IPR/DPR with renewed interest because of its benefit to the City and the impending regulatory acceptance for it. As a result, the PWIMP focuses on recycled water for irrigation use as well as for IPR/DPR.

2.2.1 DESCRIPTION OF EXISTING RECYCLED WATER FACILITIES

Wastewater from the Oxnard Wastewater Treatment Plant (OWTP) provides secondary treated wastewater to the AWPF for recycled water treatment. In general, the collected flow is residential. About 75 percent of all wastewater is domestic, with the remaining 25 percent from industrial users. Average secondary effluent flows (2009- 2013) from the wastewater facility are 20.5 mgd at average dry weather flow (ADWF) conditions and 22.9 mgd for an average day maximum month day flow (ADMMF). The OWTP is permitted at a capacity of 31.7 mgd ADWF.

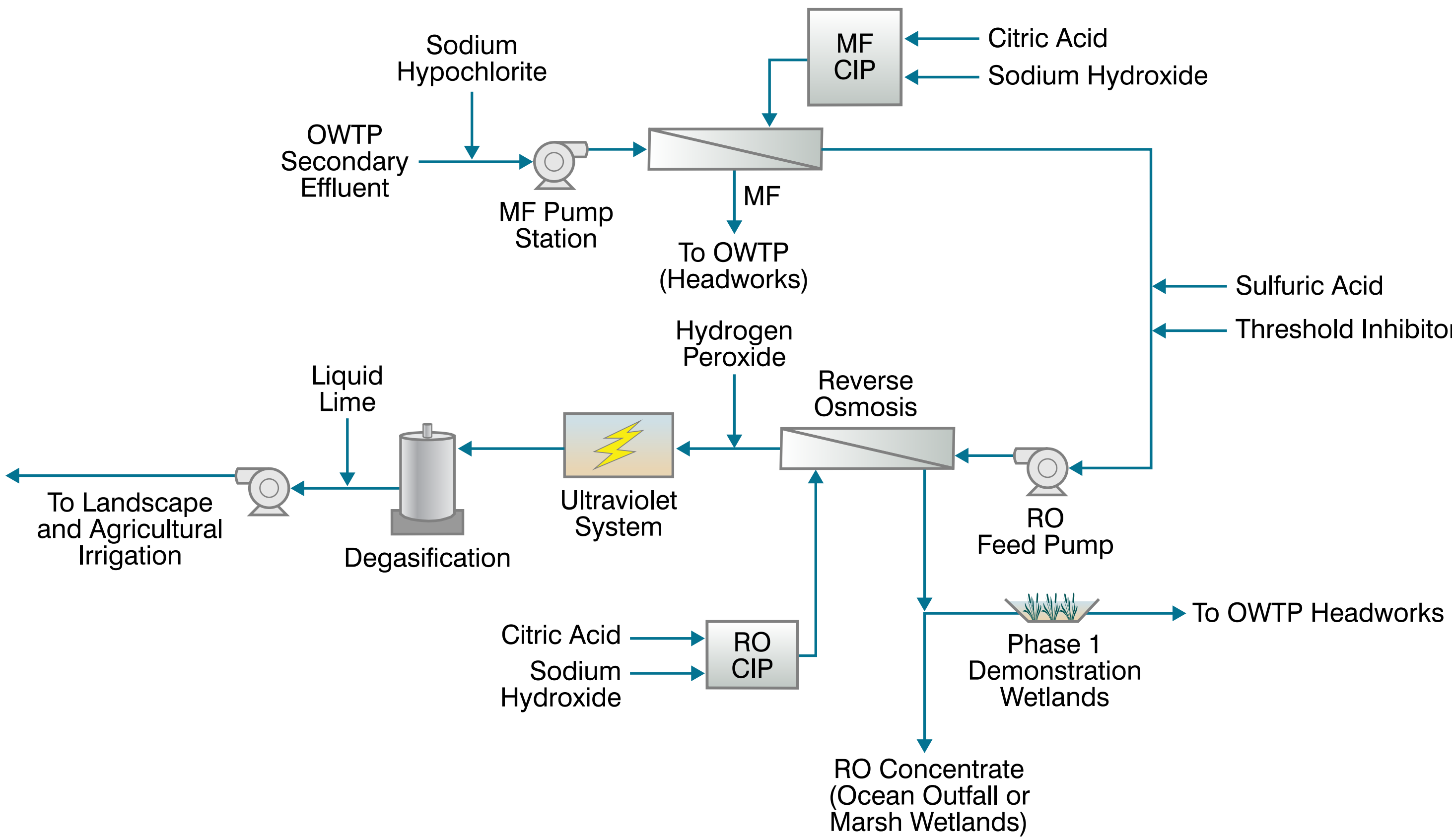
2.2.1.1 AWPF

The recycled water system currently consists of an AWPF and distribution pumping and conveyance. The AWPF consists of microfiltration (MF), reverse osmosis (RO), and advanced oxidation processes (AOP), including ultraviolet light and hydrogen peroxide and the necessary ancillary equipment for a fully functional facility. Figure 2-8 illustrates a schematic of the AWPF process in its current configuration.

2.2.1.2 Recycled Water Distribution System

The main components of the existing recycled water distribution system include the following:

- Recycled Water Backbone System (RWBS) - The constructed Phase 1 recycled water conveyance system is a combination of PVC and high-density polyethylene (HDPE) pipelines, with diameters ranging from 16-inches to 36-inches in the main transmission line and 6- to 8-inches in the distribution pipe to the River Park Development.
- Finished Recycled Water Pump Station - The AWPF recycled water pump station contains two variable frequency drive (VFD) pumps, each with a design capacity of 4,000 gallons per minute (gpm) with an output pressure of about 150 psi.
- Hueneme Road – Phase 1 - A 42-inch diameter pipeline was recently installed from the existing 36-inch diameter connection to the AWPF at the intersection of Hueneme Road and Perkins Road. The 42-inch diameter section of this pipeline continues to the intersection of Hueneme Road and Edison Drive. From there, a 36-inch diameter recycled water pipeline continues down Hueneme Road until the intersection at Olds Road where it terminates. A Phase 2 Hueneme Road pipeline, beginning where Phase 1 left off, is in the planning stages.
- Temporary Salinity Management Pipeline (SMP) Line - Because the Hueneme Road - Phase 2 pipeline will not be constructed and operational for several years, the City will temporarily deliver recycled water to the agricultural customers in the Oxnard Plain through the SMP. This is for two reasons: 1) the SMP's route runs parallel to the City's planned Hueneme Road pipeline, and 2) the SMP is underutilized at this time. For this to occur, the Los Angeles Regional Water Quality Control Board (LARWQCB) amended the City's Waste Discharge Requirements (WDRs), Order No. R4-2011-0079-A01 and Monitoring and Reporting Program, R4-2008-A01, in July of 2015 to allow the SMP to temporarily deliver AWPF effluent to farmers. Construction and planning for the temporary SMP connection are complete, with water



AWPF SCHEMATIC

FIGURE 2-8

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- delivery currently taking place.
- Ocean View Pump Station - This Pump Station contains two VFD pumps, each with a design capacity of 2,210 gpm with an output pressure of about 50-psi. These pumps will be used to supply the SMP Line.

Currently, no storage tanks are in the distribution system, meaning peak demands must be met directly from the AWPF. A map of the existing recycled water distribution system is shown in Figure 2-9 along with major users

2.2.1.3 ASR Demonstration Well

The City is constructing an ASR Demonstration well that is expected to be completed in 2018. The construction of this well is grant funded and will serve as a test well for the City to understand how ASR/IPR will work moving forward.

Initially, the ASR Demonstration well will be used as an ASR well for the recycled water system. Recycled water from the AWPF will be injected into the ground and then extracted and put back into the City's recycled water system for irrigation use. Ultimately, once all of the required start-up testing and monitoring are complete, the well will switch to IPR operation, and the extracted water will be conveyed to the BS No. 1/6 nearby for disinfection and injection into the potable system.

Elements of this ASR Demonstration Well installation include the following:

- One IPR/ASR well at the Campus Park site.
- Three monitoring wells (two shallow and one deep aquifer) for the one IPR/ASR well.
- 2,000 linear feet (lf) of recycled water piping connecting the IPR/ASR well to the Recycled Water Backbone piping located in Ventura Road.
- 4,000 lf of piping to convey IPR water from Campus Park to BS No. 1/6 for blending into the potable system, which will eventually be converted to a potable line when the IPR/ASR operation is fully approved.

A hydrogeological study was conducted (Hopkins, 2016) to assess the proposed location and capacity for this well at Campus Park. This study recommended an injection and extraction capacity of approximately 2,000 gpm and recommended operating the well on a 3-month rotation of recharge, retention, and recovery. Figure 2-10 illustrates the location of the proposed ASR well at Campus Park.

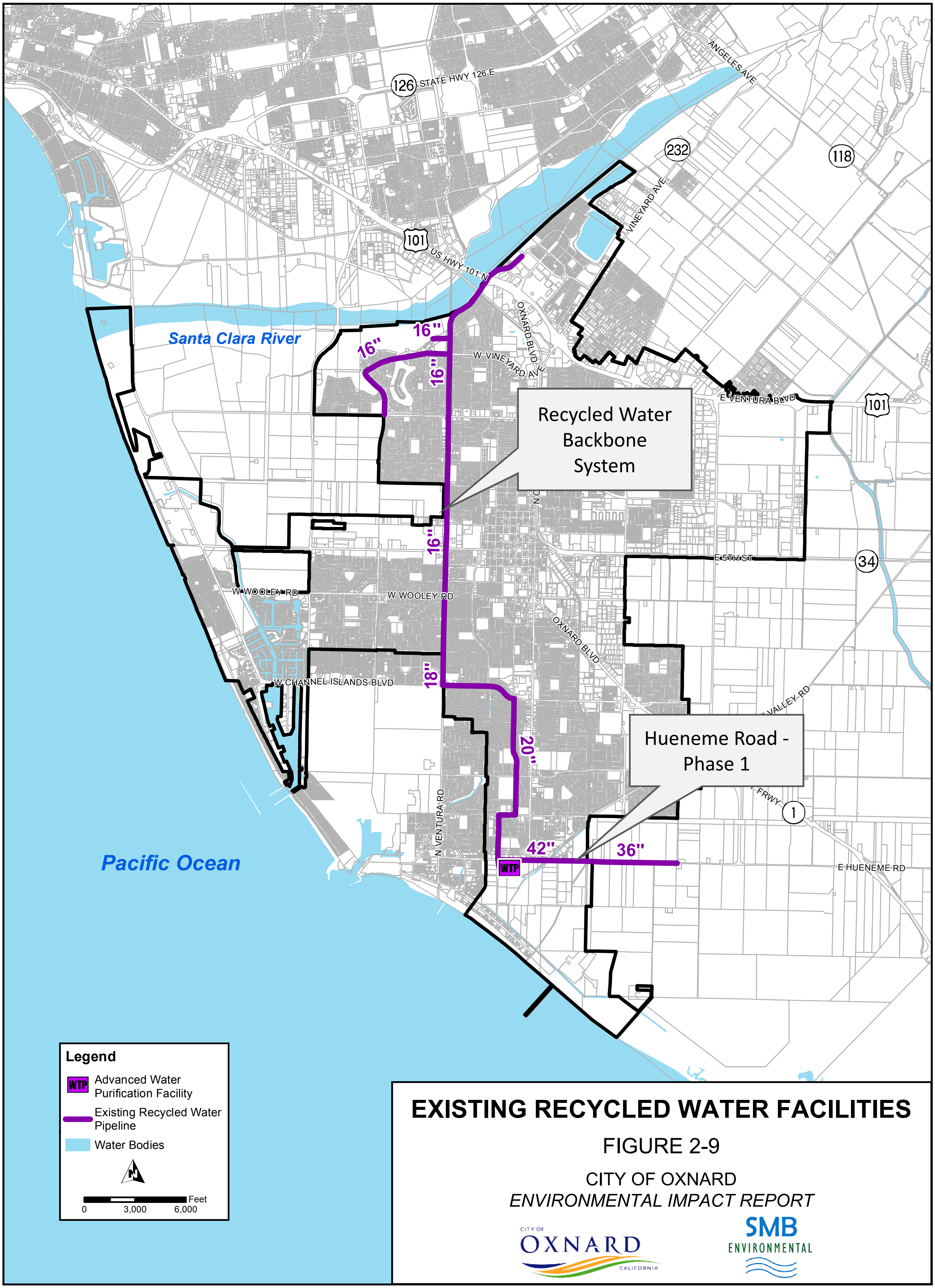
2.2.2 CURRENT RECYCLED WATER NEEDS

Detailed below is a summary of the current and projected recycled water demands.

2.2.2.1 Current Recycled Water Demands

The City projects that in the initial phases of the GREAT Program, approximately 7,000 AFY (acre-feet per year), or 6.25 mgd, of AWPF water will be produced. The City has an approved Full Advanced Treatment Recycled Water Management and Use Agreement, A-7651. According to this agreement, the following significant demands are accounted for:

- The City has the right to the first 1,500 to 1,800 AFY, which will be delivered to existing customers in lieu of potable water and to the River Ridge Golf Club. In addition, the City will deliver recycled water to River Park Development and New Indy Container Board for a total of approximately 2,800 AFY, or 2.5 mgd in Phase 1A. This recycled water will be used to offset



EXISTING RECYCLED WATER FACILITIES

FIGURE 2-9

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LEGEND

- Proposed ASR Well Location
- # Proposed Monitoring Well Locations

DEMONSTRATION ASR WELL PROPOSED LOCATION

FIGURE 2-10

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- potable water demand along the completed RWBS that would otherwise be served through the City's potable water system.
- For Phase 1B, an additional 2,000 AFY, or 1.8 mgd, of AWPF water is dedicated to agricultural users along the (future) Hueneme Road Pipeline.
- According to Agreement A-7651, using the remaining 7,000 AFY of recycled water available from the AWPF is to be determined by the City, United Water Conservation District (UWCD), and Pleasant Valley County Water District (PVCWD).

Table 2-5 summarizes the existing and future recycled water demands as they are currently known. The City is also in the early stages of planning to implement 40 to 50 small urban recycled water irrigation projects along the RWBS to offset further potable use. The implementation would be phased over several years. Figure 2-11 illustrates the locations of the existing and planned customers, as they are known that this time.

2.2.2.2 Projected Recycled Water Demands

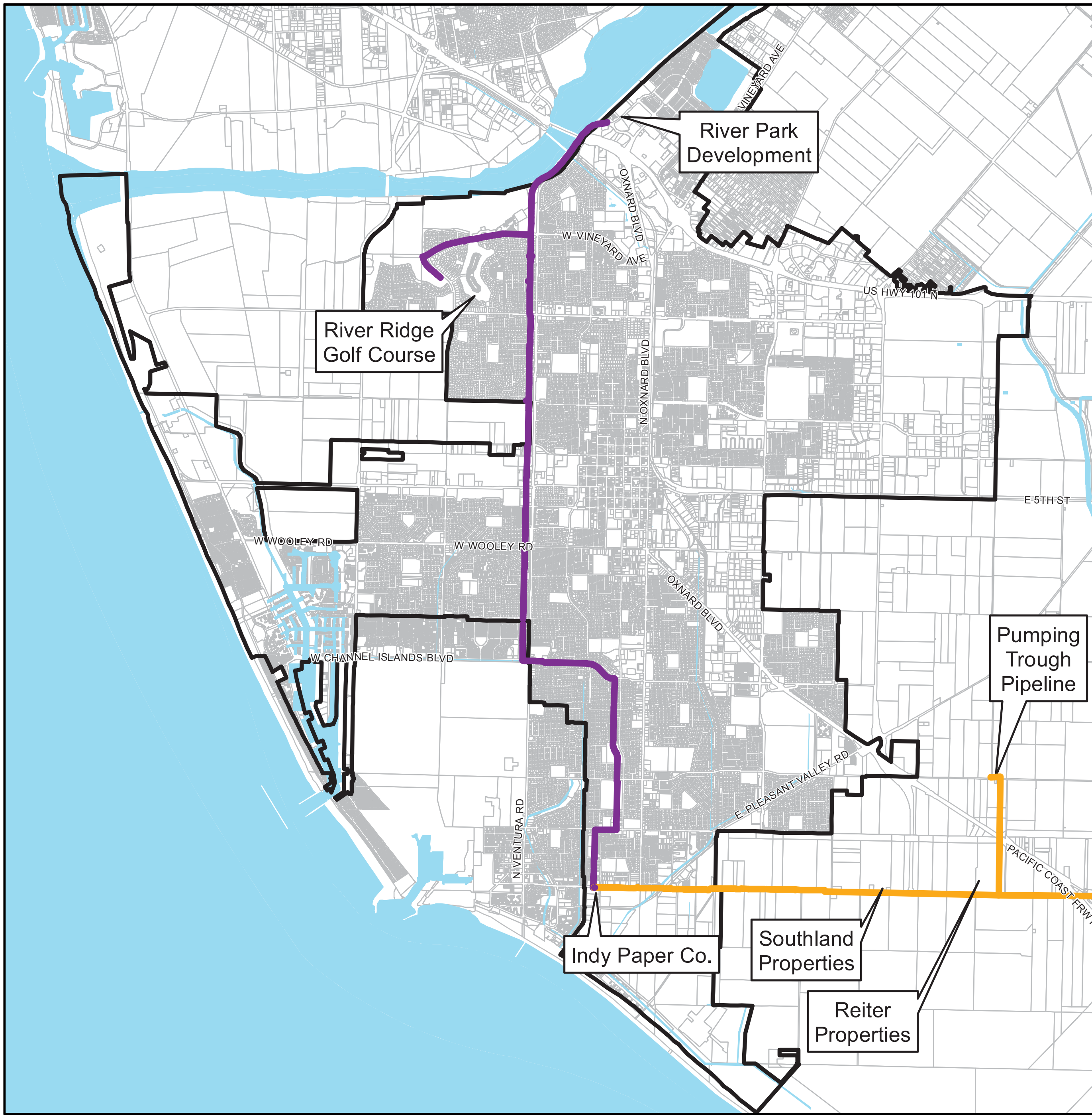
Under the GREAT Program, construction of the AWPF is planned in four phases that result in AWPF capacities of 7,000, 14,000, 21,000 and 28,000 AFY. As previously noted, the first phase of 7,000 AFY, which has been completed, is largely accounted for through urban and agricultural irrigation uses.

As subsequent phases of the AWPF come online, AWPF effluent will go first to recycled water users currently under contract, then to IPR/DPR, and then to additional agricultural users, which would benefit the City in the form of groundwater pump-back credits. Therefore, Phase 2 and 3 recycled water demands are shown as additional ASR capacity.

Table 2-5
Existing and Future Recycled Water Demands
Public Works Integrated Master Plan
City of Oxnard

Phase	Location	Recycled Water Use	Average Day Demand (gpm)	Delivery Pressure (psi)	Daily Demand Timing
1A	New Indy Paper Company	Irrigation	456	60	Constant
1A	River Park Development	Irrigation	651	60	10:00 a.m. - 6:00 p.m.
1A	River Ridge Golf Course	Irrigation	1,057	20(2)	Constant
1B	Houweling Nursery	Irrigation	1,000	60	6:00 p.m. - 6:00 a.m.
1B	Southland Sod	Irrigation	1,000	60	6:00 a.m. - 6:00 p.m.
1B	Reiter	Irrigation	1,400	60	6:00 a.m. - 6:00 p.m.
2	Blending Station (BS) 1/6	IPR	8,000(1)	20(3)	Constant
2	Campus Park	IPR	6,000(1)	20(3)	Constant
3	BS 3	IPR	8,000(1)	20(3)	Constant

Notes:
(1) There is no required amount for IPR; the required flow listed is equal to the maximum proposed capacity based on the recommended projects needed for water supply, per PM 2.5; IPR is to be maximized using excess flow after customer contracted flows are delivered.
(2) The customer pumps recycled water a lake onsite after delivery; therefore, lower delivery pressures are acceptable.
(3) Recycled water is delivered for ASR; lower delivery pressures are acceptable.



EXISTING AND PLANNED RW CUSTOMERS

FIGURE 2-11

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2.2.2.3 Recycled Water Supply (Secondary Effluent)

The AWPF's water supply source is secondary effluent from the OWTP. Therefore, it is necessary to assess whether enough OWTP effluent exists to feed into the AWPF as capacity increases. In general, the AWPF's capacity cannot be expanded beyond what the OWTP can supply.

Table 2-6 summarizes the amount of OWTP effluent needed for the planned capacity expansions at the AWPF. Based on the future wastewater flow projections by 2040, ADWF to the OWTP is expected to reach only 27.4 mgd. Given this, it is unlikely that there would be sufficient supply to the AWPF for the Phase 4 expansion (see Table 2-6).

It is equally important to consider the diurnal variation of the average daily flow. While the AWPF is optimally operated at a constant (or relatively constant) flow, secondary effluent flow from the OWTP varies throughout the day. Therefore, storing secondary effluent may be required to allow the AWPF to draw a consistent supply. Table 2-7 summarizes the results of that analysis.

The OWTP currently has 5 MG of secondary effluent storage, which it uses for peak shaving of its effluent pumping. Based on the required storage noted in Table 2-7, it is believed that the existing secondary effluent storage will be sufficient to serve as both AWPF storage and peak shaving for effluent pumping.

Table 2-6
Secondary Effluent Storage Needs
Public Works Integrated Master Plan
City of Oxnard

AWPF Phase	AWPF Capacity, mgd	Secondary Effluent Needed (Avg Day), mgd(1)	Secondary Effluent Storage Required, MG
1	6.25	8.2	--
2	12.5	16.3	0.7
3	18.75	24.5	2.3
4	25	32.7	(2)

Notes:
(1) Estimated based on a MF recovery of 90% and RO recovery of 85%.
(2) Based upon wastewater flow projections for the PWIMP (by 2040, the average day flow is expected at 27.4 mgd), it is unlikely there will be enough secondary effluent flow to support an expansion of the AWPF up to 25 mgd.

Table 2-7
Recycled Water System Expansion Approach
Public Works Integrated Master Plan
City of Oxnard

Phase	AWPF Flow (mgd)	Recycled Water Distribution System(1)	ASR Well Capacity
Phase 1A	6.25	Recycled Water Backbone System Pipeline (completed) Hueneme Road Phase 2 Pipeline	1 Demonstration Well
Phase 1B	6.25	Pipeline from RWBS to Campus Park Pipeline from Campus Park to BS No. 1/6	1 Demonstration Well
Phase 2	12.50	• Complete Pipeline for Recycled Water Loop	4 duty + 4 standby
Phase 3	18.75	N/A	6 duty + 3 standby

Note:
(1) Additions are to the existing recycled water described in Section 6.8; each additional phase includes the addition of previous phases.

2.2.3 PROPOSED RECYCLED WATER PROJECTS

This section summarizes the proposed projects for the recycled water system based on the existing system capacity and performance needs for meeting projected future demands and water quality objectives. These projects cover needs through the PWIMP's planning period (2015-2040). The proposed projects are summarized in Table 2-8 and organized by project type. Figure 2-11 in Section 2.1.3 above illustrates all of the water and recycled water projects recommended for water supply purposes. For further details, refer to that figure.

The projects were split into phases that loosely follow the projects' timing: Phase 1 – Immediate Needs (First 2 years), Phase 2 – Near-Term Needs (Years 2 to 10), and Phase 3 – Long-Term Needs (Beyond 10 years).

The phases presented here are what are recommended based upon the technical needs identified within this assessment. However, the actual timing of implementation may defer when compared and balanced against the financial considerations of total implementation of the PWIMP.

2.2.3.1 Treatment

Phase 1 of the AWPF is already completed, with only minor improvements slated as immediate needs. A UV/AOP treatment system for the RO concentrate from the AWPF is recommended to address water quality-related issues.

Phase 2 will involve expanding the existing Phase 1 AWPF facility by an additional 6.25 mgd. The existing 6.25 mgd facility was constructed to allow for modular expansion of the MF, RO, and UV/AOP treatment trains without adding ancillary equipment (i.e., cleaning and support systems). Phase 3 will require adding more treatment and ancillary equipment to reach the 18.75 mgd capacity.

Table 2-8
Proposed Recycled Water Projects to Meet Water Supply Needs through 2040
Public Works Integrated Master Plan
City of Oxnard

Facility/Location	Description	Phase	Quantity	Unit	Capacity
Recycled Water Treatment					
AWPF	Phase 1 Improvements (Disinfection conversion, security, A/V upgrade) (1)	1	--	Unit	--
AWPF	UV/AOP Brine Treatment	1	1		
AWPF	Phase 2 Expansion to 12.5 mgd (including backup power)	2	1	ea	6.25 mgd
AWPF	Phase 3 Expansion to 18.75 mgd	3	1	ea	6.25 mgd
Recycled Water Distribution					
Various	Recycled Water Distribution System Retrofits(2)	1	--	--	--
Campus Park to RWBS	Connect Initial ASR Well to RWBS Line in Ventura Road – 20"pipe(1	1	2,000	Lf	--
Campus Park to BS No. 1/6	Construct Dedicated IPR Pipeline along 2nd Street - 24" pipe(1)	1	4,000	lf	--
AWPF	Ag Recycled Water Storage	2	1	--	--
Hueneme Road - Phase 2 (to Ag Users)	24" pipe – Along Wood Road from Hueneme Road to Laguna Road and east on Laguna terminating before Lewis Road	2	20,700	Lf	--
Hueneme - Phase 2 (to Ag Users)	36" pipe – Along Hueneme Road from Olds Road to Wood Road	2	16,000	Lf	--
Recycled Water Loop	24" pipe – Along 2nd St to N Rose Ave	2	9,000	Lf	--

Table 2-8 Proposed Recycled Water Projects to Meet Water Supply Needs through 2040 Public Works Integrated Master Plan City of Oxnard					
Facility/Location	**Description**	**Phase**	**Quantity**	**Unit**	**Capacity**
(to ASR Sites)					
Recycled Water Loop (to ASR Sites)	30" pipe – Along N Rose Ave from 2nd St to Hueneme Road	2	19,700	Lf	--
AWPF	DPR Storage Tanks	3	3	MG	3.1
Recycled Water Loop (to	24" pipe – North along N Rose Avenue from 2nd St. to Camino	3	10,600	LF	--
ASR Sites)	Del Sol; then east on Camino Del Sol to N Rice Ave; North along N Rice Ave to Wankel Way				
IPR/DPR					
Campus Park	Demonstration ASR Well(3)	1	1	Ea	2,000 gpm
BS No. 1/6 & BS No. 3	Land Acquisition and Improvements	1	10	Ac.	--
Campus Park	Recycled Water Pond for Off-Spec Water	1	1	MG	1.9
Campus Park	2 duty + 2 standby ASR wells(3)	2	4	Ea	2,000 gpm
BS No. 1/6	2 duty + 2 standby ASR Wells(3)	2	4	Ea.	2,000 gpm
BS No. 1/6	Chemical Feed Expansion	2	1	Ea.	--
BS No. 1/6	Operational Storage	2	1	MG	1
BS No. 1/6	Booster Pumping	2	1	HP	500
Well 18 @ Golf Course	Rehab to Groundwater Recharge Well	2	1	Ea.	3,000 gpm
BS No. 1/6	2 duty + 1 standby ASR Wells(3)	3	3	Ea.	2,000 gpm
BS No. 3	4 duty + 2 standby ASR Wells(3)	3	6	Ea.	2,000 gpm
BS No. 3	Chemical Feed Expansion	3	1	Ea.	--
BS No. 3	Operational Storage	3	1	MG	1
BS No. 3	Booster Pumping	3	1	HP	500

Notes:
(1) As documented in the City's GREAT program CIP, February 18, 2015.
(2) Assumed 10 retrofits per year for 4 years.
(3) Each ASR well installed will have 3 associated monitoring wells installed.

2.2.3.2 Distribution

Phase 1B of the recycled water distribution system expansion focuses on delivering recycled water to the agricultural users east of the City, which will be accomplished with Phase 2 of the Hueneme Road Pipeline. The pipeline's alignment will start at the end of the Hueneme Road Phase 1 Pipeline, at the intersection of Hueneme Road and Olds Road.

The 36-inch diameter pipeline continues east down Hueneme Road to Wood Road and then transitions to a 24-inch pipeline, heading north on Wood Road until the intersection of Wood Road and Laguna Road. From there, it runs east on Laguna Road where it terminates just before Lewis Road. The Hueneme Road Phase 2 pipeline will supply an agricultural demand to the farmers of up to 5,200 AFY or 3,225 gpm depending on the recycled water supply available.

Phase 2 involves constructing the recycled water loop that will feed the proposed ASR locations at Campus Park and BS Nos. 1/6. The recycled water Loop tees off the existing 16-inch RWBS pipeline at the intersection of S Ventura Road and W 2nd Street. From this location, a 20-inch diameter pipeline continues east down W 2nd Street to the Campus Park ASR Facility where it increases to a 24-inch pipeline and continues past Campus Park and into BS No. 1/6. Once past BS No. 1/6, the 24-inch diameter pipeline continues east along E 2nd Street, intersecting at N Rose Avenue. There, it turns south on N Rose Ave, increasing to a 30-inch pipeline until it connects to the existing 36-inch Hueneme Road Pipeline.

Phase 3 involves constructing a 24-inch pipeline connecting BS No. 3 to the recycled water Loop. The pipeline starts from the recycled water Loop at the intersection of E 2nd Street and N Rose Avenue.

This 24-inch pipeline continues north on N Rose Avenue, then east on Camino Del Sol, and then north on N Rice Avenue to Wankel Way where it terminates at BS No. 3. Figure 2-12 shows the routings of these pipelines.

2.2.3.3 IPR/DPR

Implementing IPR as a supplemental water supply will occur in steps. The City is constructing one demonstration ASR well currently. With this demonstration well, the City can assess the feasibility of the IPR process in real time and refine the assumptions surrounding aquifer capacity and extracted water quality.

In addition, the well will establish the process for regulatory approval for the IPR process. A Title 22 Engineer's Report (Carollo, 2016) and a Report of Waste Discharge (ROWD) (Carollo, 2016) Report were developed for this demonstration ASR well.

Phase 2 contains the majority of the ASR installations for supplemental water supply use, which will also happen in steps. First, the Campus Park site will be built-out. Four additional ASR wells will be added, each with their own set of monitoring wells (i.e., 3 per ASR well). Currently, a built-out ASR site will also consist of operational storage, sized to offset PHDs, booster pumping, and additional conditioning facilities (i.e., disinfection and fluoride addition). However, because the Campus Park site is near BS No. 1/6, it makes more sense to house the ancillary equipment at BS No. 1/6. Thus, extracted IPR water will be conveyed from Campus Park to BS No. 1/6 for storage and conditioning.

After build-out of the Campus Park ASR wells, four ASR wells will be added near the BS No. 1/6 site. Additional property near BS No. 1/6 will need to be acquired, which the City has already discussed with property owners. Adding these wells will correspond to the Phase 2 expansion of the AWPF and should help to meet potable water demands through approximately 2030.

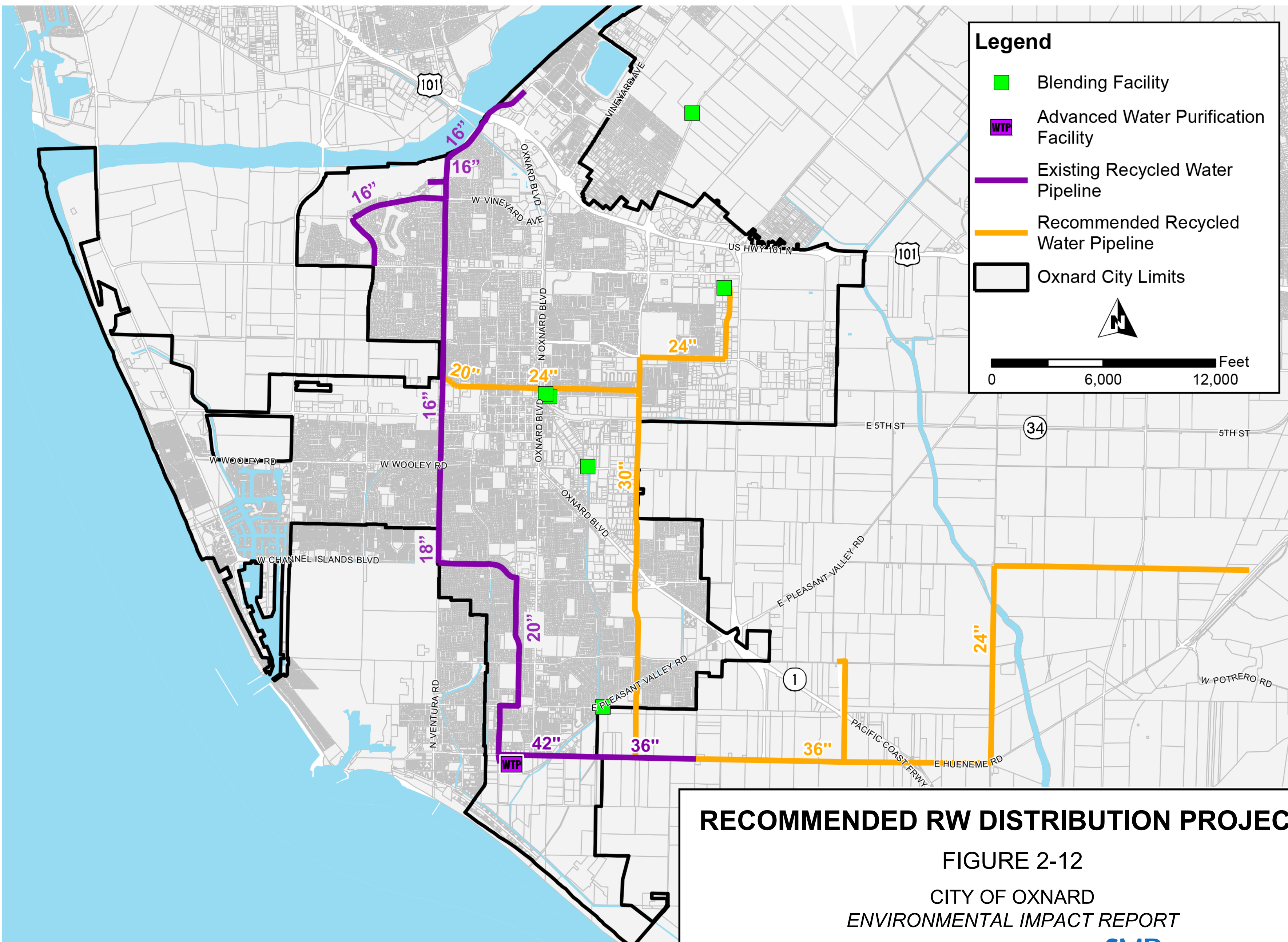
Phase 3 will then continue to expand the City's ASR capacity and will correspond to expanding the AWPF to 18.75 mgd. Build-out of the BS No. 1/6 site with the addition of three ASR wells will occur next, followed by the construction of six ASR wells at BS No. 3. As with BS No. 1/6, additional property will need to be acquired near BS No. 3 to make this feasible. Operational storage, booster pumping, and conditioning facilities will need to be added to BS No. 3 as well.

2.2.4 RECYCLED WATER SYSTEM IMPLEMENTATION SCHEDULE

Implementing these recycled water projects will occur in conjunction with the water system master plan projects as described in Section 2.1 above. The proposed schedule for these improvements is included in Figure 2-13.

2.3 Wastewater System Master Plan

The City owns and operates the Oxnard Wastewater Treatment Plant (OWTP) and the associated wastewater collection system. Through the OWTP, the City provides wastewater treatment to Oxnard and



RECOMMENDED RW DISTRIBUTION PROJECTS

FIGURE 2-12

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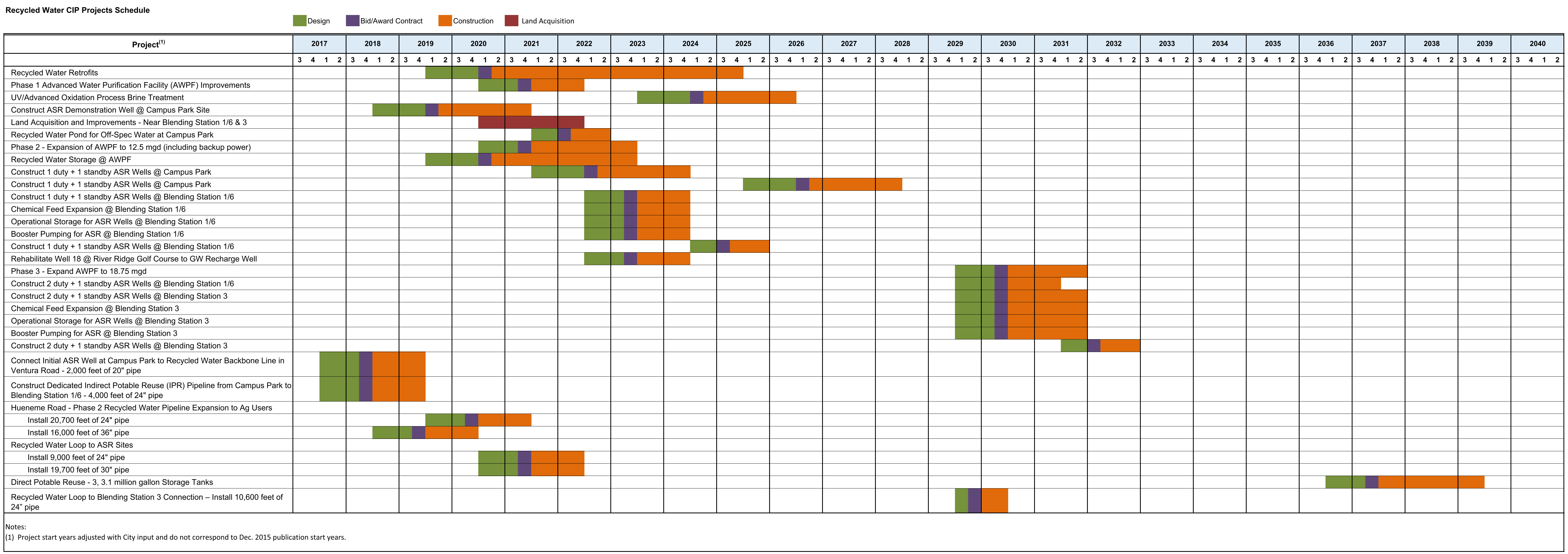

RECOMMENDED RECYCLED WATER SYSTEM PROJECTS SCHEDULE

FIGURE 2-13

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several surrounding communities (the City of Port Hueneme, the Port Hueneme Water Agency, the Naval Base Ventura County facilities at Port Hueneme and Point Mugu, Ventura Regional Sanitation District, Crestview Mutual Water Company, Nyeland Acres, and Las Posas Estates) and is permitted to discharge treated wastewater to the Pacific Ocean. In addition, a portion of the treated wastewater is used as recycled water after additional treatment through the City's Advanced Water Purification Facility (AWPF).

While considering improvements to the OWTP, a number of goals were established to help develop possible improvement scenarios. Consistent with the overall Master Plan goals established in Chapter 1, the five main goals for the City's wastewater facilities are as follows:

- Goal 1: Provide a compliant, reliable, resilient, and flexible system.
- Goal 2: Manage assets effectively (economic sustainability).
- Goal 3: Mitigate and adapt to the potential impacts of climate change.
- Goal 4: Protect and enhance environmental and resource sustainability.
- Goal 5: Investigate green and gray infrastructure with an emphasis on energy efficiency.

2.3.1 DESCRIPTION OF EXISTING WASTEWATER FACILITIES

This section describes the city's existing wastewater facilities.

2.3.1.1 Wastewater Collection System

The City's existing sanitary sewer collection system is comprised of roughly 384 miles of gravity collection system pipe ranging from 4- to 60-inches in diameter. As is typical for a community this size, most of the sewers (67 percent) are 8-inches in diameter and most (70 percent) are made of vitrified clay pipe. The rest (22 percent) are made of polyvinyl chloride.

The City currently operates and maintains 15 lift stations located throughout the City. Except for the Patterson & Hemlock Wastewater Lift Station, which has a wet well configuration, all of the lift stations utilize a submersible pump configuration. All of the pump stations have a duty and a standby pump.

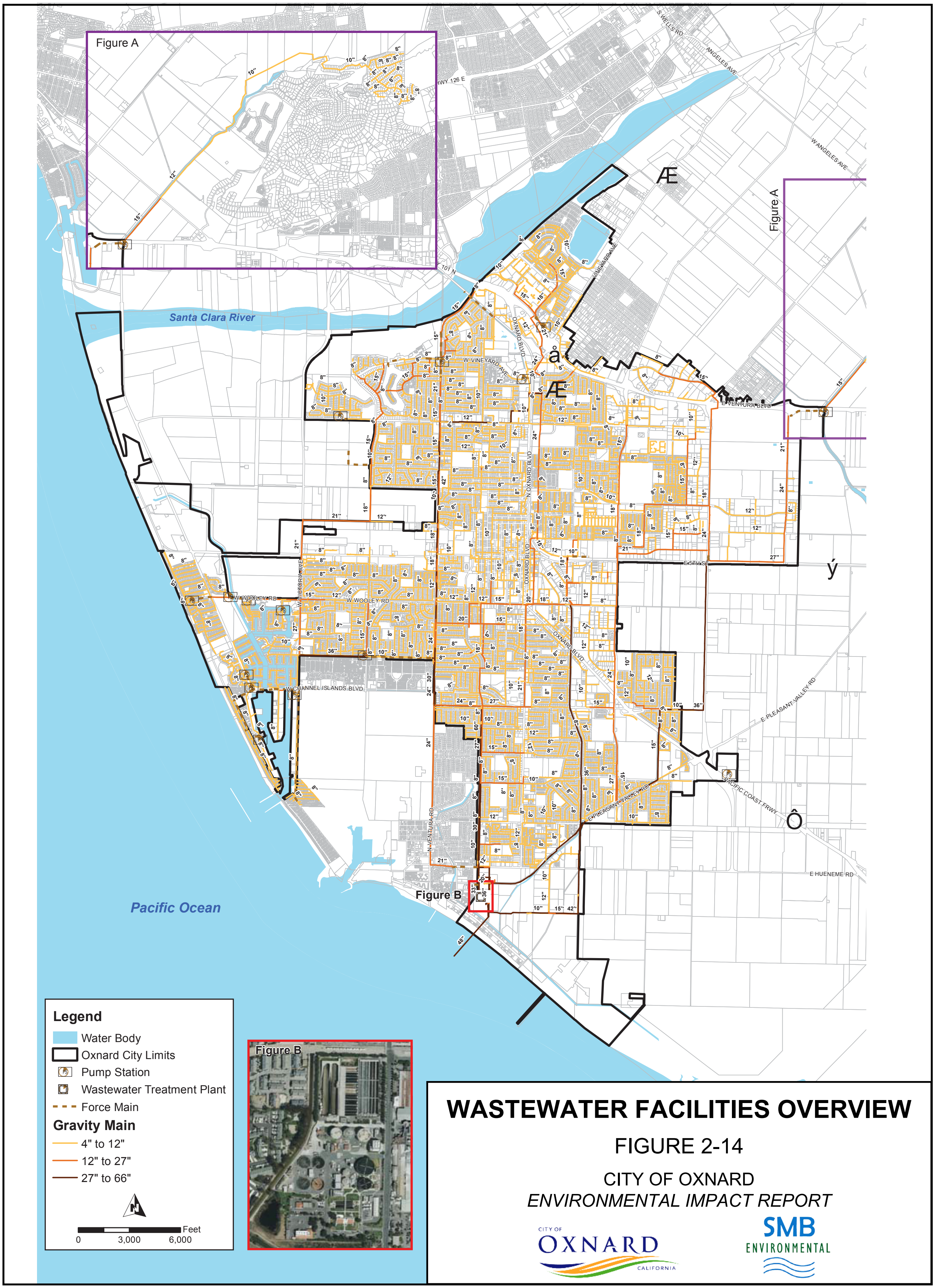
The force mains associated with the wastewater lift stations consist of approximately 4.7 miles of pressurized pipe ranging from 4- to 20-inches in diameter. The majority (67 percent) are 6- and 10-inches in diameter. Force main pipe are between 6 and 46 years old. Figure 2-14 shows the existing wastewater collection system infrastructure.

2.3.1.2 Wastewater Treatment Plant

The City's existing OWTP has a permitted capacity of 31.7 mgd and treats wastewater for discharge to the existing ocean outfall. The OWTP provides preliminary, primary, and secondary treatment, which are described below. Figure 2-15 provides a schematic of the OWTP process.

Preliminary treatment includes bar screens, screenings conveyance, grit removal, and grit conveyance to remove solids that might damage downstream equipment. After preliminary treatment, flow is gravity fed to the influent pump station wet well, which includes six dry-pit submersible pumps. Three of the six pumps are on duty during normal operations.

From the influent pump station wet well, raw wastewater flows to four primary sedimentation basins for primary treatment. The primary treatment process includes facilities in which ferric chloride are added to



WASTEWATER FACILITIES OVERVIEW

FIGURE 2-14

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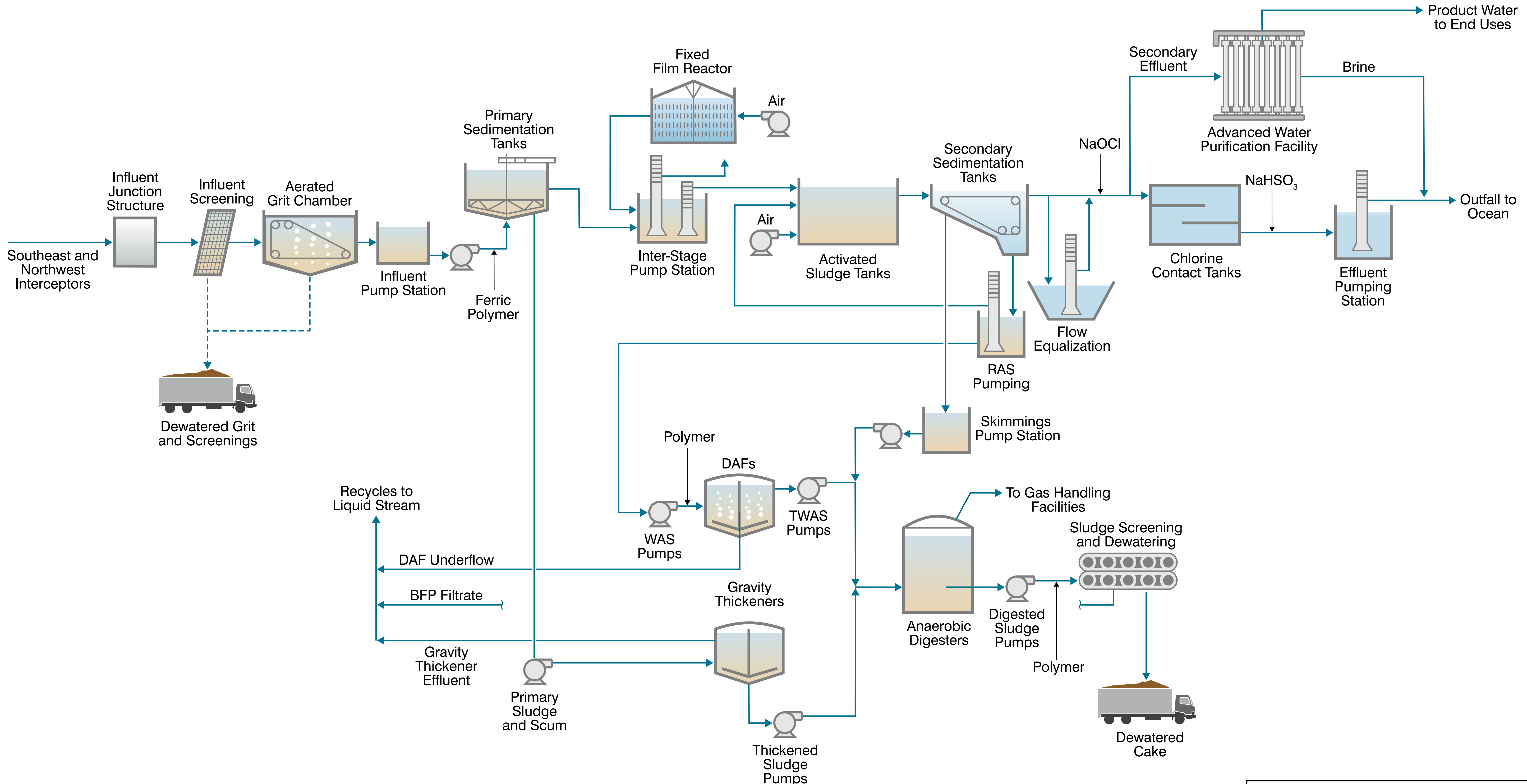

OWTP PROCESS SCHEMATIC

FIGURE 2-15

CITY OF OXNARD

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CITY OF OXNARD CALIFORNIA

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enhance sedimentation. A polymer storage and feed system is planned to further enhance primary treatment performance.

After primary treatment, flow enters the secondary treatment system, which uses a fixed-film secondary treatment process followed by an air-activated sludge process to remove organic material. The City's discharge permit for the facility does not currently require nitrogen or phosphorus removal.

The secondary treatment system is comprised of two biotowers, two three-pass activated sludge tanks (ASTs), and 18 secondary sedimentation basins (SSTs). A plant utility water pumping station is provided downstream of the secondary sedimentation basins.

The maximum hydraulic capacity of the ocean outfall is 50 mgd, so two 2.5-million gallon (MG) secondary effluent equalization basins (EQ Basins) were included as part of the activated sludge facilities to equalize the portion of secondary effluent flows greater than 50 mgd during wet weather events. (Currently, plant staff also operates the EQ Basins during the dry weather season to equalize secondary effluent during the peak power cost period of the day to minimize the cost of final effluent pumping to the ocean outfall.)

Secondary effluent leaving the SSTs and/or EQ Basin either flows by gravity or is pumped through a 48-inch secondary effluent line to two three-pass chlorine contact tanks (CCTs).

Each pass is 145-feet long. Disinfected effluent is then pumped to the 6,800-linear feet (1.3 mile) ocean outfall from the effluent pump station, which has two engine-driven pumps, two electric motor variable frequency drive (VFD) pumps, and an additional motor-driven pump.

The solids handling facilities consist of 2 gravity thickeners for primary sludge thickening, two dissolved air flotation thickeners (DAFTs) for waste activated sludge (WAS) thickening, three anaerobic digesters, and 4 belt filter presses (BFPs) for dewatering.

2.3.1.3 Condition Assessment

To identify the City's wastewater system's R&R needs, a condition assessment was conducted. This effort involved using asset management methodology to identify existing water assets and conduct a visual condition assessment of above-ground assets, a seismic evaluation of structures, a desktop evaluation of below-ground assets, and a cathodic protection system evaluation.

To prioritize the R&R needs, a risk assessment was also conducted to examine the vulnerability, or likelihood of failure, and criticality, or consequence of failure, for each asset. Consistent risk scoring methodology was applied to both above- and below-ground assets to prioritize each asset type.

Above Ground Assets

Above-ground assets included structures and equipment owned and operated by the City. To assess and value all above-ground assets, a consistent approach was used regardless of whether they were in the treatment system or collection system. The above-ground asset inventory included approximately 26 structures, 160 pumps, 15 wet wells, and a variety of other assets across the OWTP and collection system. The recorded age of each asset varied from 1955 to the present.

Several tables summarize the results of the condition assessment analysis. Table 2-9 lists the OWTP's assets, including the highest above-ground risk determined from this assessment. Table 2-10 lists the assets at the collection system Lift Stations, including the highest above-ground risk determined from the assessment.

Below are the findings of the condition assessment for above-ground assets:

- Headworks - The headworks is in fair to good condition, with some concrete deterioration noted.
- Primary Clarification - Structurally, the primary sedimentation building and clarifier basins were found to be in fair to poor condition. Mechanical and electrical assets were in poor to very poor condition.
- Biofilters - The biofilters were in poor to very poor condition.
- Interstage Pumping Station - The pumps were found to be in fair to poor condition. The structure itself is in fair condition.
- Secondary Treatment - The structures were found to be in fair to poor condition. The equipment was found to be in very poor condition.
- Disinfection Facilities - These facilities are in fair condition; concrete repairs are needed.
- Effluent Pumping - Structurally, this facility is in poor condition. Mechanical assets were rated from fair to poor condition. Electrical assets were in very poor condition.
- Thickening - The facilities are in poor to very poor condition.
- Digestion - The facilities are in poor to very poor condition, and Digester 2 is currently non-operational.
- Dewatering - The facilities are in fair to poor condition.
- Cogeneration - The facilities are in fair to poor condition.
- Electrical Facilities - The facilities are in good to very poor condition. The emergency power facility is aging.

Table 2-9
High-Risk Assets at the OWTP
Public Works Integrated Master Plan
City of Oxnard

Process/Asset	Risk[1]
Primary Treatment	
Primary Clarifiers (1-4) Collector Drive, Walkways, and Launders	4.48
Sludge Pump Tanks (1-4)	3.85
MCCs-DPIA, DPIB, DP2B, EDPIA	3.85
Scum Ejectors	3.22
Primary Clarifiers (2 & 4)	1.7
Large Isolation Valves	1.04
Biofilters	
Recirculation Pumps Mag Drive 1 and 2	3.4
Distributors and Drives	2.17
Biofilter Tanks 1 and 2	1.7
Biofilter Media Tanks (1 & 2)	0.8
Secondary Treatment	

Table 2-9
High-Risk Assets at the OWTP
Public Works Integrated Master Plan
City of Oxnard

Process/Asset	Risk[1]
Collector, Skimmer, and Drives (17-18)	1.54
Effluent Pump Station	
MCCs	3.85
Gravity Thickening	
MCCs-DP3C, DP3D Thickened Sludge Pumps (1-3)	3.85 0.51
Digestion	
Digester Heat Exchanger No. 2 Digester No. 2 Tank	3.22 1.52
Digested Sludge Pumps (1-3) Digester Control Building Digester Hot Water Pump 1 Digester Mixing Equipment and Draft Tubes Nos. 1-3 MCCs (DP2C, EDPIC, GF)	0.51 1.46 0.51 0.51 0.46
Dewatering	
Conveyors Belt Filter Press 1-4 Dewatering Feed Pump 5 Washwater Booster Pumps (1-4)	2.8 2.8 0.51 0.51
Electrical	
Effluent Electrical Building Switchgear Main Electrical Building Large Standby Generators Effluent Electrical Building (DP2A, EBPIB) Main Electrical 500 kW Generator Older Transformers (1 & 2) Main Electrical Building MCCs (DP4, DP4B, GB, GC, GD) Administration Building MCCs (DP2D, DP3A, EDPIE, HG)	5.11 4.69 3.85 0.7 0.51
Buildings	
Main Switchgear Building Plant Control Center Building Vacuum Filter Blower Building	(1.46) Seismic[2] (1.46) Seismic[2] (1.46) Seismic[2] (1.1) Seismic[2]

Note:
(1) Risk = Criticality x Vulnerability; Criticality = consequence of failure; Vulnerability = likelihood of asset failure
(2) Indicates a seismic deficiency that requires concrete testing, further Tier 2 evaluation, or replacement.

Table 2-10
High Risk Assets at Lift Stations
Public Works Integrated Master Plan
City of Oxnard

Site/Asset	Risk[1]
Lift Station 23 Wagon Wheel	
Submersible Pumps (1-2)	4.27

**Table 2-10
High Risk Assets at Lift Stations
Public Works Integrated Master Plan
City of Oxnard**

Site/Asset	Risk(1)
MCC	3.85
Wet Well Structure	2.56
SCADA Panel	2.25
Valve Vault	0.68
Lift Station 6 Canal	
Submersible Pumps (1-2)	0.51
MCC	0.46
Lift Station 04 Mandalay & Wooley	
SCADA Panel	0.51
MCC	0.46

Note:
(1) Risk = Criticality x Vulnerability; Criticality = consequence of failure; Vulnerability = likelihood of asset failure.

Below Ground Assets

For the City's below-ground wastewater system assets, a desktop evaluation relying on GIS data from the Oxnard collection system was conducted. Collectively, only 18 percent of the collection system piping had a known installation year, with no year available for 206 of the 263 segments for sewer force mains and 7,123 of the 8,686 segments for sewer gravity mains. Because so few installation years were available, an installation year of 1965, which was based on a conservative estimate of development in the area, was assumed.

2.3.1.4 Seismic Assessment

Performing a seismic assessment of the OWTP structures established each structure's anticipated performance level during a seismic event and recommended retrofit strategies to meet established performance objectives for deficiencies identified. With Tier 1 screening, Tier 2 assessments of the buildings, and a seismic assessment of the water-retaining structures at the OWTP, structural and non-structural seismic vulnerabilities could be identified and evaluated. A seismic assessment was completed for a total of 18 buildings and eight water-retaining structures. The results of this analysis can be found in Table 2-11.

**Table 2-11
Summary of Seismic Assessment and Preliminary Screening
Public Works Integrated Master Plan
City of Oxnard**

Structure	Recommendations
Tier 1 Evaluation	

Table 2-11
Summary of Seismic Assessment and Preliminary Screening
Public Works Integrated Master Plan
City of Oxnard

Structure	Recommendations	
Primary Sedimentation	Replace	
Main Electrical/Main Switchgear Building	Replace	
Digester Control Building	Replace	
Operations Center/Plant Control Center Building	Replace	
Effluent Pumping Station	Replace	
Generator/Co-Generation Building	Replace	
Storage-Vacuum Filter Building	Replace	
Storage-Butler Building	Replace	
Tier 2 Evaluation		
	Structural Components	**Non-Structural Components**
Headworks Building	No Deficiencies	Retrofit Needed
Grit Screenings Building	No Deficiencies	Retrofit Needed
Blower Building	No Deficiencies	Retrofit Needed
North Area Electrical Building	No Deficiencies	Retrofit Needed
Solids Processing Building	No Deficiencies	Retrofit Needed
Maintenance Building	Retrofit Recommended: wall-to-diaphragm connection	Retrofit Needed
Collection System Maintenance Building	Retrofit Recommended: wall-to-diaphragm connection	Retrofit Needed
Chemical Handling Facilities	Retrofit Recommended: wall-to-diaphragm connection	Retrofit Needed
16 kW Switchgear/Effluent Electrical Building	Replace structure based on condition assessment and plant considerations.	--
Administration Building	No Deficiencies	Retrofit Needed
Concrete Testing and Assessment		
Activated Sludge Tanks/Aeration Basin	Repair/seal cracks	
Secondary Sedimentation Basin	Repair/seal cracks	
Flow Equalization Basin	Repair areas of damaged/cracked concrete; apply corrosion inhibitor to concrete surfaces	
Primary Clarifier Tanks	Repair areas of damaged/cracked concrete; coat interior surfaces of tank with 100 percent epoxy or polyurethane coating	
Gravity Thickeners	Replace	
Digester Nos. 1, 2 and 3	Replace structure based on condition assessment and plant considerations.	
DAF Tanks	Replace structure based on condition assessment and plant considerations.	
Chlorine Contact Tank	Remove and replace existing coating in the next 10 years.	

2.3.1.5 Cathodic Protection

A survey was conducted on the City's wastewater infrastructure to assess the existing level of cathodic protection. From this survey, the following needed improvements were identified:

- General Wastewater Treatment Plant: Almost all piping tested did not meet National Association of Corrosion Engineers Criteria for protection related to pipe-to-soil potentials. Thus, immediately replacing the entire cathodic protection system plantwide is recommended.
- Clarifiers and Digesters: Currently, no cathodic protection exists at these facilities. Thus, cathodic protection for the submerged surfaces of metallic components is recommended.

In addition to these projects, the project team recommends conducting an annual cathodic protection survey and report for all City facilities as well as bi-monthly rectifier monitoring.

2.3.1.6 Arc Flash Assessment

An electrical system study was also conducted for the existing OWTP. This study was comprised of a short-circuit study, a protective device coordination evaluation, and an arc flash evaluation.

Each analysis was performed for a particular reason. The short circuit study determined the available short circuit current at each piece of electrical equipment and identified underrated equipment. The protective device coordination evaluation identified protective devices (circuit breakers, fuses, etc.) not coordinated in the electrical system and not likely to minimize disruption of electrical power during a short circuit. The arc flash evaluation determined the maximum arc flash incident energy at each piece of electrical equipment and identified appropriate personnel protective equipment to be worn if working on the equipment while it is energized.

The results of the electrical systems investigation were used to develop the electrical system study for each site. With these results, pieces of existing electrical distribution equipment (e.g., the main breaker for PNL DP4) not sufficiently rated for the worst-case short circuit current could be identified. The results also showed the arc flash incident energy at each piece of electrical equipment based on the existing protective device settings.

Concerns (e.g., equipment that is damaged, scratched, rusty or not functioning, such as a broken indicator light) and code violations (e.g., insufficient working space around electrical equipment in the existing electrical equipment installations were observed and documented. Obsolete equipment (approximately 40 percent) and equipment nearing the end of its useful life (approximately 30 percent) and in need of repair were identified, and possible changes in the existing installation from code violations were noted as well. For example, electrical equipment installed prior to 1989 was identified and recommended for replacement due to obsolescence and poor condition.

2.3.2 FUTURE WASTEWATER FACILITY NEEDS

The existing wastewater system's capacity and performance were analyzed to locate system shortfalls. In general, the system has adequate capacity to meet current demand conditions but with little reliability. Much of the existing OWTP is in need of major rehabilitation and repair and is reaching the end of its remaining useful life.

This means that without substantial investment into the existing treatment system, the City has a high risk of treatment failure and regulatory fines.

2.3.2.1 Wastewater Collection System

Capacity

To determine the necessary collection system capacity, the existing collection system model was recalibrated with recent wastewater flow data and included both dry and wet weather flow monitoring. Dry weather flow monitoring occurred from August 2, 2014, to August 24, 2014, and wet weather flow monitoring occurred from December 9, 2014, to February 25, 2015.

The collection system capacity was assessed during existing and projected dry and wet weather flow conditions. According to this assessment, the existing system can adequately convey both peak dry and wet weather flow conditions using the level of service (LOS) criteria. However, as flows increase over time, the system will require upgrades to meet capacity restrictions. By 2040, certain sewers are expected to surcharge during peak dry weather flow conditions, which is not acceptable per the LOS criteria. Therefore, pipelines in these areas that exhibited potential capacity deficiencies should be upsized to convey peak dry weather flow without surcharge.

The collection system was also evaluated under peak wet weather flow conditions. The analysis indicated that no improvements are needed through 2040 based on the 10-year design storm event. Surcharging does occur throughout the system during these conditions. However, the peak hydraulic grade line is more than 3-feet above the manhole's rim elevation, meaning it does not violate the LOS criteria. Thus, since no sewers violated the peak wet weather flow criteria, no sewers require upgrades.

The pump stations within the system were also evaluated to determine if upgrades were necessary for projected flows. The City provided pump curves for the pump stations but could not provide the start and stop elevations within the wet wells for the pump operation. In general, the pump stations appear able to adequately convey future flows. However, without the actual stop and start elevations, it is difficult to definitively assess this.

R&R

Because of the limited information available on the existing condition and age of the collection system piping, a detailed system rehabilitation program could not be practically developed for the PWIMP. Instead, the CIP recommendations for rehabilitation projects are based on the City's understanding of project needs.

2.3.2.2 Wastewater Treatment Plant

R&R

As discussed in the condition assessment section, a large portion of the OWTP is in poor condition and reaching the end of its useful life. Because of this, major investment in R&R is needed in the near future for reliable plant operations and plant safety concerns.

Replacement is recommended for a number of process facilities, namely the primary clarifiers, DAFTs, digesters, interstage pump station, effluent pump station, and cogeneration facility. All of these facilities are nearing the ends of their useful lives. Additionally, due to safety concerns, demolishing the biotowers is recommended as soon as possible.

Process Performance

The performance assessment of the OWTP assessed the following:

- The plant's overall treatment performance for meeting discharge limits and other effluent requirements.
- Each unit process' historical loading and performance.

Approximately 1 to 3 years of daily operating data were reviewed to characterize the OWTP's overall performance. During the review period, the OWTP complied with all regulated conventional pollutants. However, while the OWTP met all the limits for conventional pollutants, there was one violation for benzidene cited in the fact sheet of the 2013 NPDES permit because the reported detection limit was greater than the discharge limit.

In general, the unit processes at the OWTP have operated at loading rates well within their original design values or typical operating ranges. In addition, performance has been adequate and there are a sufficient number of units in some of the unit processes to maintain a standby unit out of service for maintenance.

Removing the biotowers because they are a safety hazard will change the OWTP's treatment train configuration. The biotowers were originally designed to provide secondary treatment in the 1970s. In the 1980s, they were retained as part of the activated sludge system to reduce the organic load to the downstream aeration tanks. Currently, a significant portion of the biotower influent is untreated because of seal failures within the biotower itself. With the removal of the biotowers, the existing aeration tanks need to be modified to accommodate the increased organic load. As most of the increased organic load will be soluble BOD, it is recommended to add submerged baffle walls to create a biological selector zone in each aeration tank. The selector zone would be mechanically mixed, but unaerated, to maintain good sludge settling characteristics. Step feed capabilities, included as part of the original aeration basin design, can be used together with these recommended modifications to operate in a sludge reaeration (step feed) configuration to limit secondary clarifier sludge loading rates during periods of high wet weather flows and low sludge settleability. With these minor alterations, the aeration basins can treat higher loadings without expanding their footprint.

Capacity

As part of the PWIMP, the capacity of each unit process at the OWTP was assessed. This assessment considered a range of parameters, including flow, influent wastewater characteristics, treatment objectives, process configurations and limitations, and desired redundancy.

The peak hour wet weather flow (PHWWF) capacity was estimated for facilities that use peak flow to establish sizing. These facilities include the headworks, influent pumping, primary clarifiers, biotowers, and interstage pumping. Whereas pumping capacities are determined with the largest unit out of service, peak capacities for process units are determined with all units in service. Figure 2-16 summarizes the PHWWF capacity for each process.

Figure 2-17 illustrates the required EQ basin volume needed for the design storm based on flow rate treated at the OWTP. At the permitted capacity of 31.7 mgd, approximately 4.95 MG of storage will be needed in 2040, which is just under the available storage capacity. Historically, the EQ basins have never been filled to capacity. However, in 2040, the EQ basin capacity will approach its limit. Thus, determining whether additional capacity is needed will depend on how the EQ basins are operated as well as the needs of both the AWPF and the outfall.

The ADWF capacity was estimated for facilities using average flows or influent BOD_5 and TSS loading to establish sizing. To estimate this capacity, a plant process model was developed and calibrated to historical operating data from 2013. Figure 2-16 summarizes the capacity for each process.

As shown in Figure 2-17, all of the liquid treatment processes have sufficient capacity for projected flows through 2040. However, although the existing secondary treatment process has sufficient treatment capacity to meet the City's NPDES BOD_5 limits through the planning horizon, it does not have sufficient capacity to nitrify with or without denitrification. The City's existing NPDES permit is not expected to require nitrification/denitrification in the near future, but increased recycled water production by the AWPF will increase constituent concentrations, particularly ammonia, above those in the secondary effluent.

Table 2-12
Recommended Collection System Projects
Public Works Integrated Master Plan
City of Oxnard

Project	Location	Driver	Start Year	Years to Implement
Central Trunk Manhole Rehabilitation Phase 1	Rehabilitate 47 existing manholes	R&R	2018	1
Headworks Meter Vault/Vortex Structure Coating Rehabilitation		R&R	2018	1
Harbor Blvd Manhole Rehabilitation	Rehabilitate 12 existing manholes	R&R	2019	1
Pleasant Valley Manhole Rehabilitation	Rehabilitate 14 existing manholes	R&R	2019	1
Redwood Tributary Manhole Rehabilitation	Rehabilitate 38 existing manholes	R&R	2019	1
Existing asbestos concrete pipe (ACP) Replacement	Various locations throughout the collection system	R&R	2019	8
Annual Existing Pipe Repair	Various locations throughout the collection system based on sewer inspection	R&R	2019	8
Collection System Chemical Addition	Various locations throughout the collection system	Performance	2019	2
Devco Development Lift Station	Devco development, Village (Wagon Wheel) developments.	R&R Performance	2019	1
Existing Lift Station #4 (Mandalay & Wooley) Rehabilitation	Lift Station #4	R&R	2019	1
Existing Lift Station #6 (Canal) Rehabilitation	Lift Station #6	R&R	2019	1
Existing Lift Station #20 (Beardsley) Rehabilitation	Lift Station #20	R&R	2019	1
Central Trunk Manhole Rehabilitation Phase 2	Rehabilitate 27 existing manholes	R&R	2020	1
Rice Avenue Sewer Improvement	Rice Avenue from Latigo to Camino Del Sol	R&R	2020	2
Existing Sewer Deficient Capacity Replacement	Ventura Road Trunk Sewer from Doris Avenue to Oxnard Airport	Capacity	2020	2
	Conduit 4943	Capacity	2020	2
	Conduit 4956	Capacity	2020	2
	Conduit 1429	Capacity	2020	2
	Conduit 1431		2020	2
	Conduit 1432	Capacity	2020	2
	Conduit 1443	Capacity	2020	2
	Conduit 4276	Capacity	2020	2
	Conduit 1460	Capacity	2020	2
	Conduit 1461	Capacity	2020	2
	Conduit 1462	Capacity	2020	2
	Conduit 1463	Capacity	2020	2
Existing Sewer Deficient Capacity Replacement	Sewers in the La Colonia Neighborhood, Third Street & Navarro Street	Capacity	2021	1
	Conduit 2888	Capacity	2021	1

Table 2-12
Recommended Collection System Projects
Public Works Integrated Master Plan
City of Oxnard

Project	Location	Driver	Start Year	Years to Implement
	Conduit 2889	Capacity	2021	1
Annual Existing Manhole Rehabilitation	Various locations throughout the City based on sewer inspection	R&R	2022	5
Project 3: S Victoria Ave and W Hemlock St	Sewers in the Channel Islands Neighborhood Conduit 501	Capacity	2027*	2
	Conduit {74B96752-98B2- 4F5D-AF2A-21B06EE4909C}	Capacity		2
	Conduit P-2471	Capacity	2027*	2
Phase 1 Central Trunk Replacement		R&R	2033**	2
Phase 2 Central Trunk Replacement		R&R	2036**	2

Notes:
(1) 2017 Project ID's were arbitrarily assigned for Project ease. C = Collection system project.
* Projects start year correspond to refinements and updates provided by City after Dec. 2015 publication date.
** Projects start year was adjusted by City at 8/7/17 meeting, based on recent CCT inspection.
General Note: For the pipeline replacement projects, see the hydraulic models developed as part of this integrated master plan to identify the exact pipeline locations.

One way to address the insufficient capacity is to nitrify and denitrify in the secondary treatment process. To accommodate this, the OWTP may need to consider expanding the secondary treatment capacity or switching to an alternative process configuration such as membrane bioreactors (MBR), should the conversion be necessary with AWPF expansion.

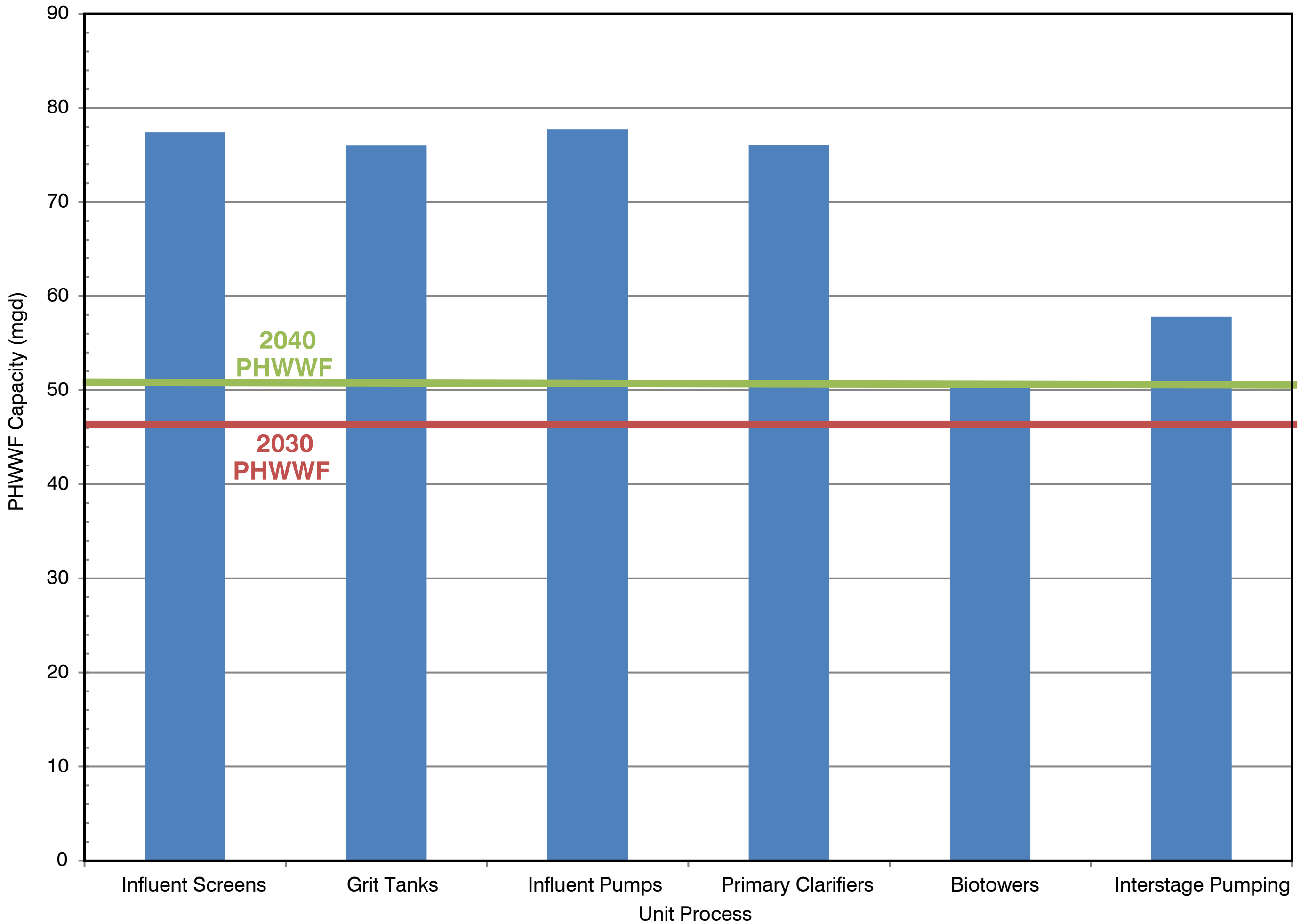
According to Figure 2-18, the solids handing facilities do not have sufficient capacity. OWTP sludge production is expected to increase, in part because the biotowers will need to be removed and an anaerobic selector will need to be added in the ASTs. Because of the anticipated changes to sludge production, additional DAFT units, digesters, and dewatering units are needed.

2.3.3 PROPOSED WASTEWATER PROJECTS

This section summarizes the proposed projects for the wastewater system. These projects are based on the existing system condition assessment and capacity and performance needs for meeting projected future demands and discharge requirements through the PWIMP's planning period. The projects and phasing here represent one possible solution to upgrading the Oxnard Wastewater Treatment Plant. Between the times of original publication of the Final Draft PWIMP in 2015 and the Revised Final Draft PWIMP publication in 2017, the City continued to review and optimize the recommended policies, projects, and programs. Therefore, certain wastewater projects have been refined and updated. However, the overall intent is the same – to upgrade the facilities that have served their useful life to achieve improved financial and implementation strategies, to accommodate technology updates, and address climate change strategies. It should be noted that these refinements and optimizations were generally not related to capacity needs.

The projects were each assigned a phase that loosely follows when they will be implemented. These phases include Phase 1 – Immediate Needs; Phase 2 – Near-Term Needs; and Phase 3 – Long-Term Needs. The phases were recommended based on the technical needs identified from the condition assessment.

Note that the actual timing of implementation may differ when compared with and balanced against the financial considerations for the PWIMP's total implementation.



OWTP PEAK HOUR WET WEATHER FLOW CAPACITY BAR GRAPH

FIGURE 2-16

CITY OF OXNARD
ENVIRONMENTAL IMPACT REPORT

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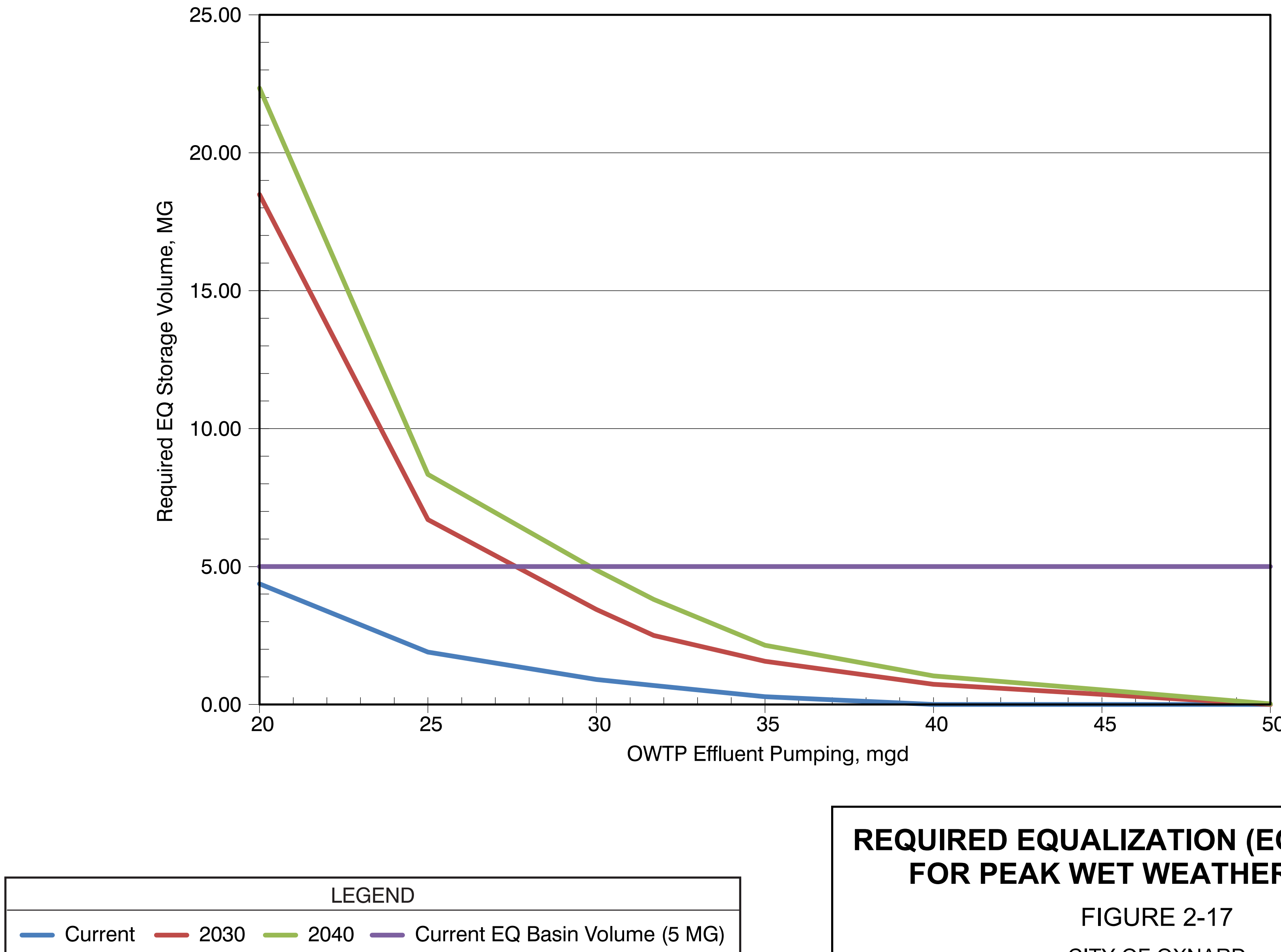

REQUIRED EQUALIZATION (EQ) STORAGE FOR PEAK WET WEATHER FLOWS

FIGURE 2-17

CITY OF OXNARD

ENVIRONMENTAL IMPACT REPORT

CITY OF OXNARD CALIFORNIA

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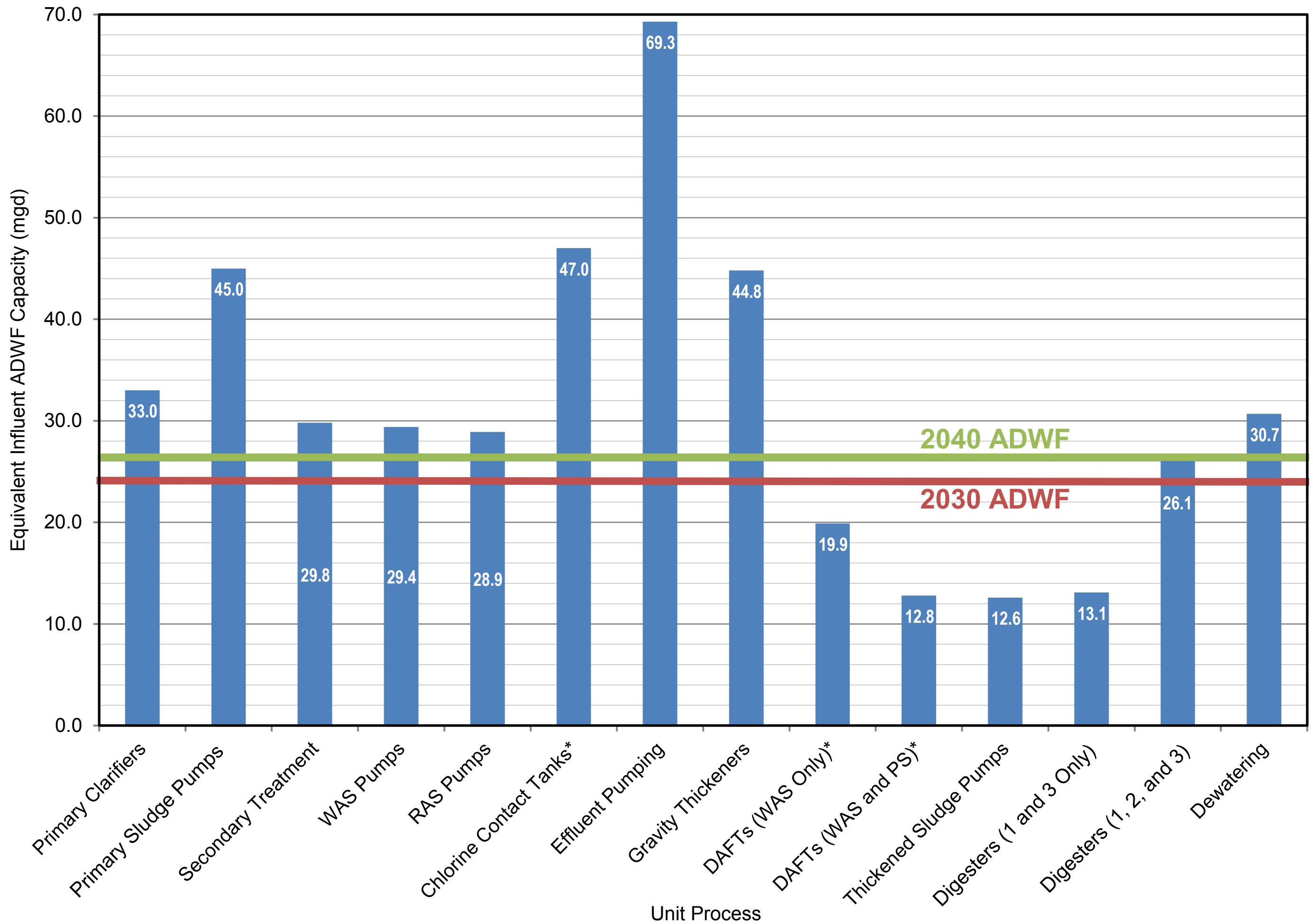

**All unit processes assume the largest unit is out of service except for those starred.*

OWTP AVERAGE DRY WEATHER FLOW CAPACITY BAR GRAPH

FIGURE 2-18

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2.3.3.1 Wastewater Collection System

Collection system improvements, based on collection system modeling, focused on capacity needs, R&R needs, and conversations with the City. Using the capacity, three main capacity projects and fifteen R&R and performance-based projects were identified. Each project is summarized in Table 2-12.

2.3.3.2 Wastewater Treatment Plant

The City has two options for implementing improvements needed at the OWTP. The first is to invest in the existing plant, and the second is to relocate most facilities. Both options require investing in a different set of wastewater treatment-related improvement projects. If the City chooses to invest in the existing plant, the proposed improvement projects will focus on rehabilitating aging infrastructure. If the City chooses to relocate the plant, the proposed improvement projects will focus on investing in new facilities. Table 2-13 provides a summary of the proposed projects for within the fence-line of the existing wastewater treatment plant if the City decides to invest in the existing plant.

Table 2-13
Recommended Projects for Within Fence-line Wastewater System
Public Works Integrated Master Plan
City of Oxnard

Project	Driver	Start Year	Years to Implement
Accelerated design for renewal improvements (year 6-10)[2]		2018	6
Preliminary Treatment / Headworks			
Headworks Odor Control System[3]	Small Equipment Replacement	2018	1
Headworks Fiberglass Covers Replacement & Concrete Coating Repair[3]	R&R	2018	2
Headworks Rehabilitation[3]	R&R	2020	2
Small Equipment Replacement - Headworks 2	Small Equipment Replacement	2023*	3
Non-hazardous Waste Receiving Station	Performance	2026	1
Primary Treatment			
Primary Clarifier Rehabilitation	R&R	2017	1
Primary Clarifier Abandonment	R&R	N/A	0
Primary Clarifiers, Old Headworks Structure and Primary Building Demolition[3]	R&R	2025	1
Secondary Treatment			
Biotowers Rehabilitation	R&R	2017	1
Activated Sludge Tank (AST) Rehabilitation[3] Biotower Demolition[3]	R&R	2017	1
Activated Sludge Tank (AST) Upgrades	R&R, Performance	2023	1
Modify Activated Sludge Tank (AST) for MBR or other technology operation	Performance	2023	2
Remove existing Secondary Clarifiers and prepare for new MBR or other Technology	R&R	2023	2
New MBR or other technology Tanks	R&R, Resource Sustainability	2023	2
MBR or other Technology Building	Resource Sustainability	2023	2
Convert Activated Sludge Tanks conversion to Flow Equalization Tank	R&R, Performance	2024	1
Convert Existing Secondary Clarifier to Screening & Transfer Pump Station	R&R	2024	1
Disinfection and Effluent Pumping	Small Equipment Replacement, R&R	2024	1
Relocate Existing Primary Influent Piping	R&R	2024	1
Convert Secondary Clarifiers to Primary Clarifiers	R&R	2025	1
Small Equipment Replacement - wet weather storage 2	Small Equipment Replacement R&R	2026*	3
Add UV/AOP after MBR	Resource Sustainability	2026*	2
Add Baffle Walls in ASTs	R&R	2027*	1
Coating Replacement on Chlorine Contact Tanks	R&R	2028*	2
Solids Treatment			
Replace Belt Filter Presses & Conveyor	R&R	2017	4

Table 2-13
Recommended Projects for Within Fence-line Wastewater System
Public Works Integrated Master Plan
City of Oxnard

Project	Driver	Start Year	Years to Implement
Digester 2 Cover Replacement and Clean Digesters 1 & 3[3]	R&R	2019	3
Digesters 1 and 3 Rehabilitation[3]	R&R	2025	2
Sludge Thickening Facility[3]	R&R, Performance	2026	1
FOG Receiving Station[3]	R&R	2026	1
Demolish Operations Center and Vac Filter Bld	R&R	2027*	1
New Digester Control Building	R&R	2029*	5
New Digester 2	R&R	2030*	3
Move Dewatering Facility and add New Centrifuges	Performance	2030*	3
Add Dewatering Capacity	Performance	2030*	3
Add Sludge Silos	Performance	2032*	3
Pump Station			
Effluent Pump Station Rehabilitation	R&R	2019	3
Interstage Pump Station Rehabilitation[3]	R&R	2020	2
Electrical / Instrumentation			
Electrical Building ARC Flash Protection	Performance	2017	2
Cogenerators Rehabilitation[3]	R&R	2017	3
Electrical/Instrumentation Manhole Rehabilitation	R&R	2017	1
Computerized Maintenance Management System (CMMS)	R&R	2017	1
Supervisory Control and Data Acquisition and (SCADA) System	R&R	2017	1
Emergency Standby Generator Replacement[3]	R&R	2020	2
Plant Motor Control Center (MCC) Panel Replacement[3]	R&R	2020	2
New Main Electrical Building[3]	R&R	2020	2
New SCADA System	R&R	2020	2
New North Electrical Building	R&R	2024	2
Site Electrical Improvements	R&R	2024	2
New Supervisory Control and Data Acquisition (SCADA) system	R&R	2024	3
Small Equipment Replacement - Cogen	Small Equipment Replacement	2026*	2
Small Equipment Replacement - Electrical 1	Small Equipment Replacement	2026*	3
New Cogen Building	R&R	2032*	
Small Equipment Replacement - Electrical 2	Small Equipment Replacement	2032*	2
Small Equipment Replacement - Electrical 3	Small Equipment Replacement	2036*	2
Site Work			
Site Security	R&R	2019	2
Storm water Site Improvements	R&R	2019	3
Site Piping Replacements	R&R	2020	5
Building			
Laboratory HVAC Unit	R&R	2017	1
Administration Building and Laboratory Rehabilitation[3]	R&R	2025	1
Plant Control Center Building Rehabilitation	R&R	2025	1
New Chemical Storage Building[3]	R&R	2026	1
Collection System Maintenance Building Rehabilitation[3]	R&R	2026	1
Maintenance Building Rehabilitation	R&R	2026	1
Storage Warehouse Building	R&R	2026	1
Rehab Grit Screening Building - Seismic Retrofit	R&R	2027*	2
Solar or Alternative Energy Facility	Resource Sustainability	2027*	10
Plant Paving Resurfacing	R&R	2030*	3
Seawall	Resource Sustainability	2033	5

Notes:
(1) 2017 Project ID's were arbitrarily assigned for Project ease. T = Treatment system project.
(2) Cost added by City consultant after Dec. 2015 publication during facilities pre-design/planning.
(3) Projects correspond to refinements and updates provided by City after Dec. 2015 publication date.

Existing Site

Recommended projects to keep the existing OWTP operational include R&R projects for almost every unit process. This includes replacing equipment and making structural repairs. Facilities that are unsafe or are at the end of their useful lives, including the primary clarifiers, DAFTs, digesters, interstage pump station, effluent pump station, and cogeneration facility, will also need to be replaced. Presented here is one process treatment option for replacing the OWTP and aged facilities. Several options will be considered and screened during the facilities' pre-design phase.

In addition to these recommendations, a major electrical system overhaul is recommended to provide more reliable backup power and to replace many plant MCCs and electrical buildings. A new dewatering facility, a new operations center and administration building, a non-hazardous liquid receiving station, a FOG receiving station, and a water quality early warning system are also recommended. Furthermore, in the future, the City should consider switching to MBR, adding an ultraviolet/advanced oxidation process (UV/AOP), constructing a solar facility, and adding a sea wall as needed. Figure 2-19 illustrates a layout of the proposed wastewater projects color-coded by phase. Figures 2-20A and 2-20B present a schedule for the recommended projects.

New Location

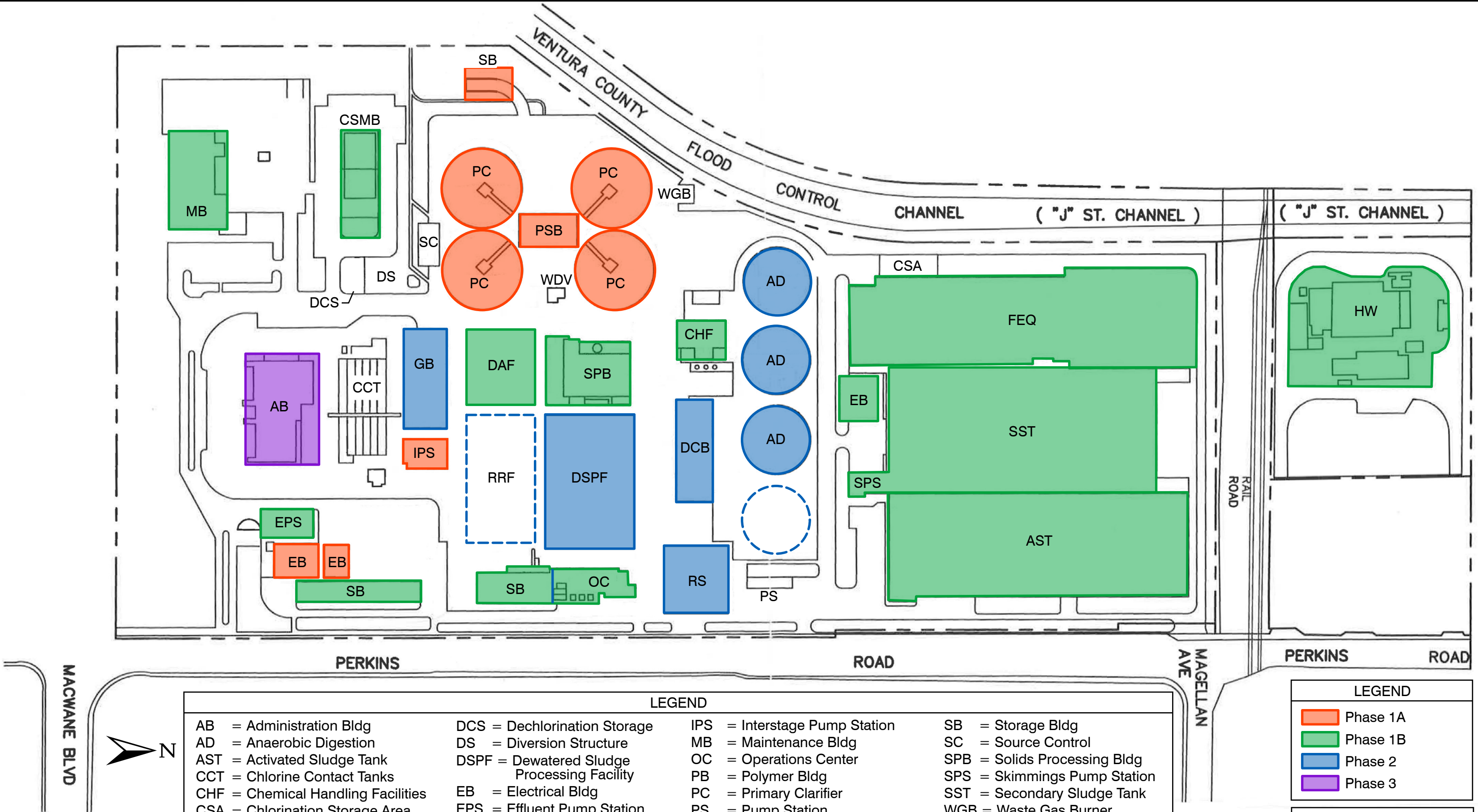
To move many of the OWTP facilities to a new location, the City would need to consider the move's feasibility, taking into account the regulatory, timing, and financial needs. It is estimated that this upfront work could take approximately five to ten years to complete.

Given this timeframe and the condition of many of the existing OWTP facilities, a number of critical improvement projects at the OWTP will need to occur regardless of whether the OWTP is relocated. Table 2-14 shows a list of the projects requiring immediate attention (Phase 1).

Table 2-14
Immediate CIP Project Needs at the OWTP to Keep the Plant Operational For 5 - 10 Years
Public Works Integrated Master Plan
City of Oxnard

Project Name	Driver	Phase	Years to Implement
Headworks Odor Control with Screen Walls, Concrete Repair, and Cover Replacemen	Immediate Need	1	3
Headworks Below Cover Coating Repairs	Immediate Need	1	4
Replace Primary Clarifier Equipment and secure launders	Immediate Need	1	2
Demolish Biotowers	Immediate Need	1	1
Add Baffle Walls in ASTs	Immediate Need	1	1
Replace/Refurbish Interstage and Effluent Pump Station Pumps	Immediate Need	1	2
Clean Digesters #1 and #3, add Dystor Cover to #2	Immediate Need	1	2
Rebuild/Rehab the Gravity Thickeners	Immediate Need	1	1
Refurbish the Belt Filter Presses	Immediate Need	1	1
Refurbish 2 of 3 Cogen Units	Immediate Need	1	2
Replace Standby Generators	Immediate Need	1	3
Replace Some Plant MCCs	Immediate Need	1	5
Plantwide Utilities	Immediate Need	1	2
SCADA System Upgrades	Immediate Need	1	1

For relocating the plant, a phased approach would be recommended. The City would start Phase 2 after implementing the projects with immediate needs (Phase 1). Phase 2 would involve moving all primary



LEGEND

AB = Administration Bldg	DCS = Dechlorination Storage	IPS = Interstage Pump Station	SB = Storage Bldg
AD = Anaerobic Digestion	DS = Diversion Structure	MB = Maintenance Bldg	SC = Source Control
AST = Activated Sludge Tank	DSPF = Dewatered Sludge Processing Facility	OC = Operations Center	SPB = Solids Processing Bldg
CCT = Chlorine Contact Tanks	EB = Electrical Bldg	PB = Polymer Bldg	SPS = Skimmings Pump Station
CHF = Chemical Handling Facilities	EPS = Effluent Pump Station	PC = Primary Clarifier	SST = Secondary Sludge Tank
CSA = Chlorination Storage Area	FEQ = Flow Equalization Basins	PS = Pump Station	WGB = Waste Gas Burner
CSMB = Collection System Maintenance Bldg	GB = Generator Bldg	PSB = Primary Sedimentation Bldg	WDV = Wastewater Distribution Valve Box
DAF = Disolved Air Flotation	GT = Gravity Thickening	PST = Propane Storage Tank	
DCB = Digester Control Bldg	HW = Headworks	RRF = Resource Recovery Facility	
		RS = Receiving Station (FOG)	

LEGEND

- Phase 1A
- Phase 1B
- Phase 2
- Phase 3

Plant-wide Improvements:

- Upgrade of electrical/SCADA
- Add solar or alt. energy
- Potential Additonal of Seawall

Note: Some facilities require work in multiple phases. The phase indicated here is when the majority of the work is planned.

RECOMMENDED WASTEWATER TREATMENT PLANT PROJECTS BY PHASE

FIGURE 2-19

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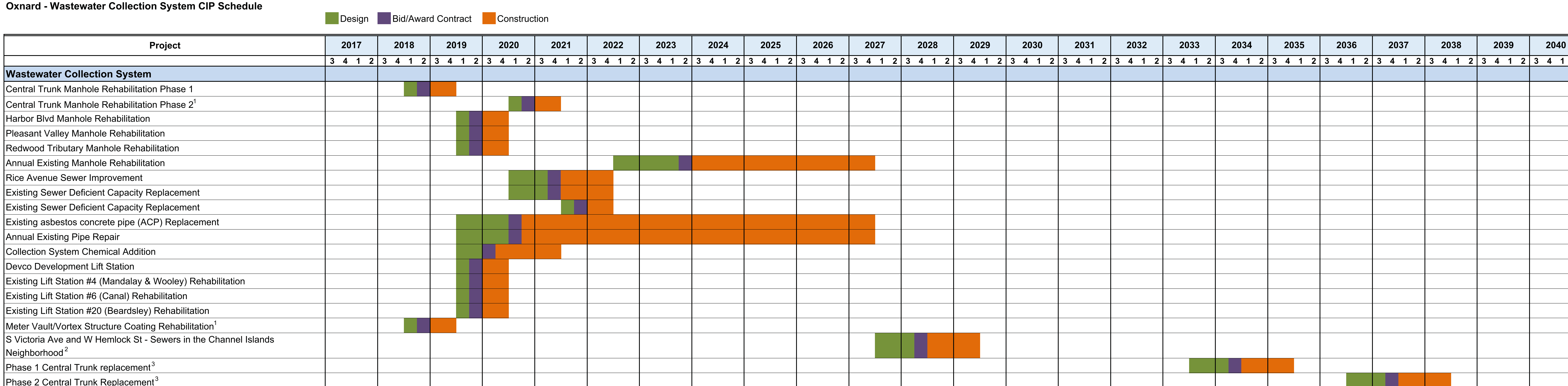
Oxnard - Wastewater Collection System CIP Schedule



Notes:

(1) Projects correspond to refinements and updates provided by City after Dec. 2015 publication date.

(2) Projects start year correspond to refinements and updates provided by City after Dec. 2015 publication date.

(3) Projects start year was adjusted by City at 8/7/17 meeting, based on recent CCT inspection.

RECOMMENDED COLLECTION SYSTEM PROJECTS SCHEDULE

FIGURE 2-20A

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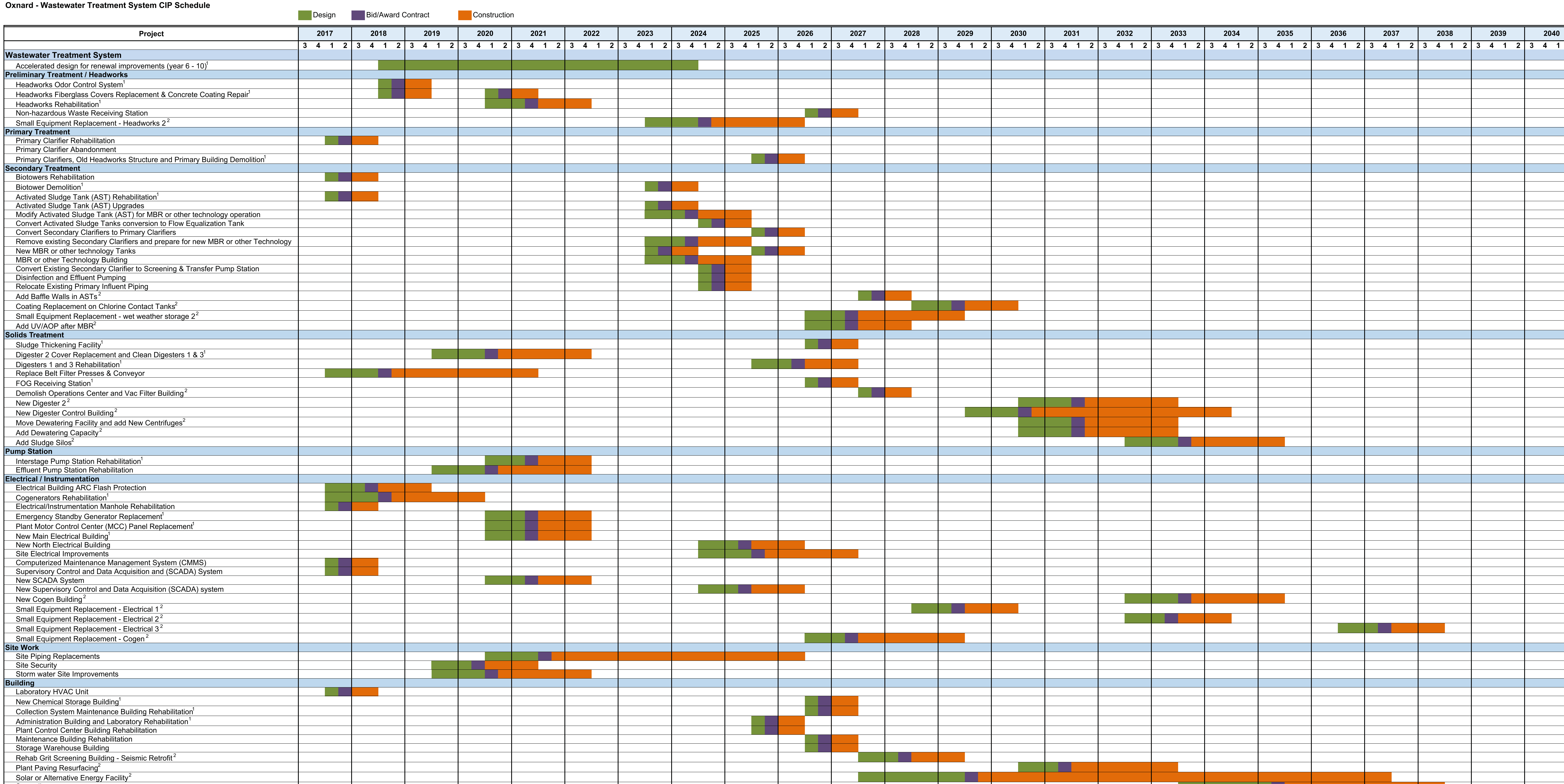
Oxnard - Wastewater Treatment System CIP Schedule



Notes:
(1) Projects correspond to refinements and updates provided by City after Dec. 2015 publication date.
(2) Projects start year correspond to refinements and updates provided by City after Dec. 2015 publication date

RECOMMENDED WASTEWATER SYSTEM PROJECTS SCHEDULE

FIGURE 2-20B

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treatment, solids handling, and support facilities to the new site as well as rehabilitating facilities remaining in their existing location until Phase 3. These facilities include secondary treatment, disinfection, and effluent pumping facilities. The biotowers and gravity thickeners should also be demolished and the headworks rehabilitated. Assuming that the permitting and the environmental process takes five to ten years, Phase 2 could start around 2023, and Phase 3 could start around 2035.

At this time, the new plant location is assumed to be less space-limited than the existing site. Thus, to reduce costs, conventional activated sludge treatment and chlorine disinfection could be installed for secondary treatment instead of MBR and ultraviolet light (UV) facilities. All other new facilities recommended for the existing plant option, such as a FOG receiving station and Chemically Enhanced Primary Treatment (CEPT), are still recommended with this option. Table 2-15 lists the details of these projects.

Table 2-15
List of Projects Needed with New Relocated Treatment Plant Option
Public Works Integrated Master Plan
City of Oxnard

Project Name	Driver	Phase
New Primary Clarifiers	R&R	2
CEPT	Performance	2
New Digesters	R&R	2
New DAFTs	Performance	2
New Chemical Handling Facilities	R&R	2
New Primary Sedimentation Building	R&R	2
New Chemical Handling Building	R&R	2
New Non Hazardous Liquid Receiving Station	Performance	2
New FOG Receiving Station	Resource Sustainability	2
New Digester Control Building	R&R	2
New Polymer Building	R&R	2
New Solids Processing Facility	Performance	2
New Sludge Silos	Performance	2
New Cogeneration Facility	R&R	2
New Operations Center and Lab Building	R&R	2
New Collection System Maintenance Building	R&R	2
New Storage/Warehouse	R&R	2
New Effluent Electrical Building	R&R	2
New North Area Electrical Building	R&R	2
New Main Electrical Building	R&R	2
Solar Facilities	Resource Sustainability	2
SCADA System Upgrade	R&R	2
AST Blower and Diffuser Replacement	R&R	2
Secondary Small Equipment Replacement	Small Equipment Replacement	2
Secondary Sedimentation Tanks Replace Skimmers, Collectors, Drives and RAS Pumps	R&R	2
EQ Basin Small Equipment Replacement	Small Equipment Replacement	2
AST Concrete Rehabilitation	R&R	2
SST Concrete Rehabilitation	R&R	2
EQ Concrete Rehabilitation	R&R	2
Chlorine Contact Tanks Rehabilitation	Small Equipment Replacement	2
Chlorine Contact Tanks Coating	R&R	2
Effluent Pump Station Rehabilitation	R&R	2
CMMS	R&R	2
New Activated Sludge Tanks	R&R	3
New Secondary Sedimentation Tanks	R&R	3
New EQ Basin	R&R	3
New Chlorine Contact Tanks	R&R	3
New Effluent Pump Station	R&R	3
Headworks Rehabilitation	R&R	3

2.4 Stormwater Master Plan

The City's stormwater system serves the City and surrounding areas that drain into Oxnard, approximately 35 square miles in drainage area. Within this system, the City maintains a network of storm drains comprised of gravity pipes, force mains, lift stations, and additional infrastructure associated with a stormwater drainage system.

The Ventura County Watershed Protection District (VCWPD) has either partial or complete jurisdiction over each of the City's drainage channels. As such, the City's drainage facilities discharge either directly into the ocean or into the VCWPD facilities first and then into the ocean.

When evaluating improvements to the stormwater collection system, a number of goals were established to help develop scenarios. Consistent with the overall goals established in the PWIMP, the five main goals for stormwater improvements are as follows:

- Goal 1: Provide a compliant, reliable, resilient, and flexible system.
- Goal 2: Manage assets in a way that maximizes economic sustainability.
- Goal 3: Mitigate and adapt to the potential impacts of climate change.
- Goal 4: Protect and enhance environmental and resource sustainability.
- Goal 5: Investigate green and gray infrastructure with an emphasis on energy efficiency.

As shown, these goals aim for more than simply maintaining the existing system. Instead, they seek to produce stormwater projects that can enhance the quality of stormwater entering the environment and potentially harvest some of it as an additional water supply. In doing this, the City aims for a more robust, adaptable, and cost-efficient system overall.

This section provides an overview of the existing stormwater system, including its strengths and vulnerabilities, as well as the regulatory requirements and climate change issues the system might face. This section also defines the proposed stormwater projects for meeting the defined goals.

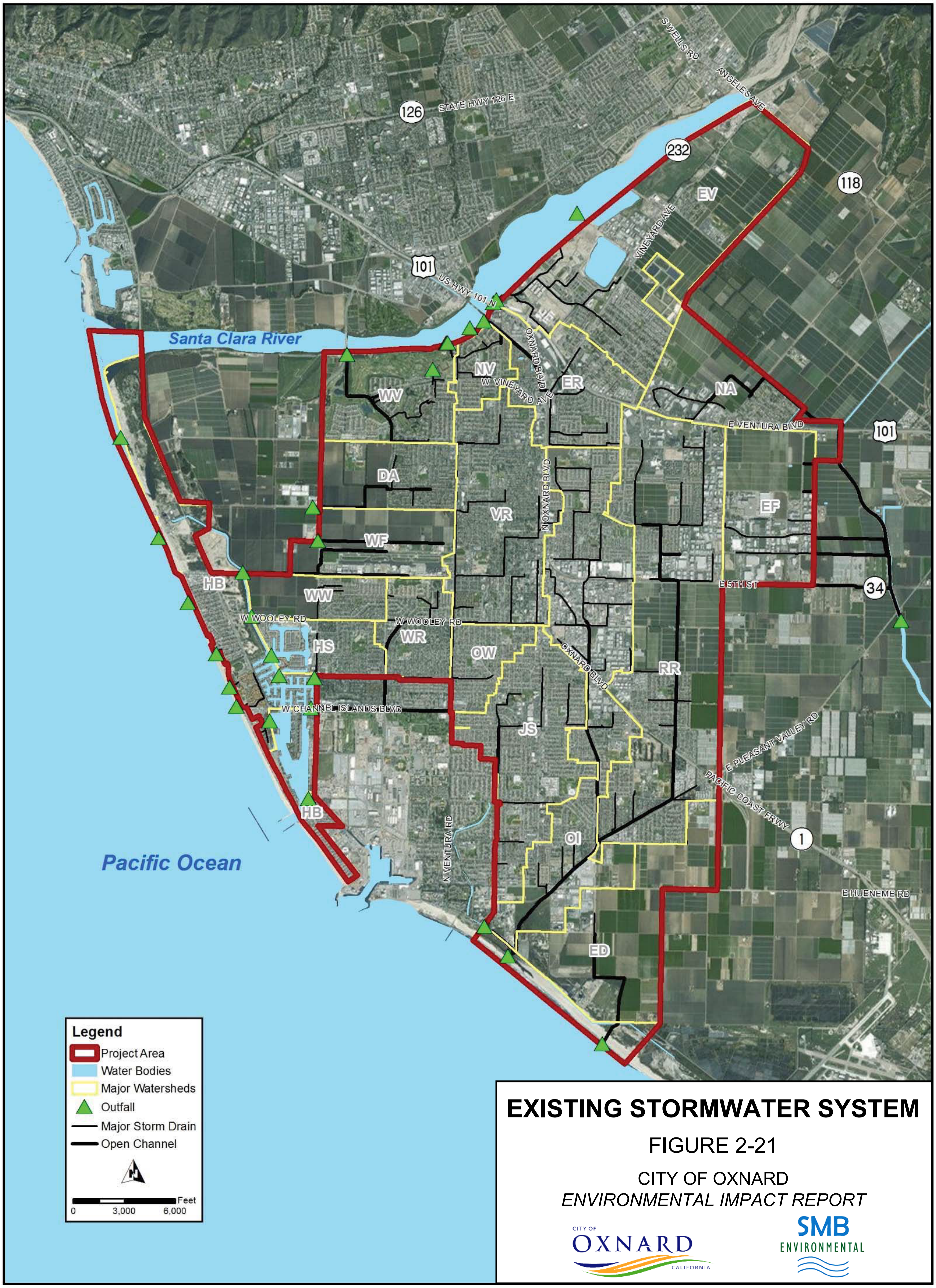
2.4.1 DESCRIPTION OF EXISTING STORMWATER FACILITIES

This section provides a description of the City's existing stormwater facilities.

2.4.1.1 Stormwater Collection System

The City's existing storm drainage system collects and conveys stormwater runoff from developed and undeveloped areas throughout the City. The system includes circular pipelines from 4- to 96-inches in diameter, rectangular pipes up to 264- by 96-inches wide, open channels, 5 stormwater pump stations and associated force mains, and various valves and diversion structures throughout the system. The majority (approximately 63 percent) of the pipes were built using reinforced concrete pipes (RCP).

Figure 2-21 shows the existing storm drainage system, including storm drain diameters, detention/retention ponds, pump stations, canals, and outfall locations. In total, the City owns approximately 162 miles of storm drains and open channels, and VCWPD has jurisdiction over 28 miles of open channels.



EXISTING STORMWATER SYSTEM

FIGURE 2-21

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The VCWPD, previously called the Ventura County Flood Control District (VCFCD), was formed in 1944 to perform drainage services not readily performed by local agencies. The City resides in the VCWPD Flood Zone 2 and City drainage facilities discharge into the VCWPD channels whenever possible. Major drainage channels within Oxnard include Doris Avenue Drain, Fifth Street Drain, Wooley Road Drain, Oxnard West Drain, Ormond Lagoon Waterway, Rice Road Drain, Tsomas Creek, El Rio Drain, Camarillo Drain, and Nyeland Drain.

2.4.1.2 Condition Assessment

Between September 12, 2014, and September 18, 2014, a condition assessment was conducted of select storm drain facilities throughout the City. Assets for inspection were chosen based on age, slope, and proximity to areas prone to flooding. Groupings of old assets with small slopes located near flood-prone areas were assessed first.

This evaluation involved visually inspecting the topsides of 304 manholes, catch basins, pipes, channels, flood zones, and outfalls, as well as select areas that have flooded in the past. In total, 29 sites were assessed, representing 2 percent of the entire stormwater collection system.

Although the majority of the assets were in excellent condition, the assessment found that approximately 12 percent are in need of immediate attention or attention within the next five years. Furthermore, although the majority of assets showed negligible amounts of sediment, sediment build-up is a concern in approximately 12 percent of the stormwater collection system assets. These assets had moderate to significant sediment buildup and should be cleaned within five years. Figure 2-22 illustrates the locations of assets in poor condition. Priority 4 assets in orange are in poor condition, and priority 5 assets in red require immediate attention.

2.4.2 FUTURE STORMWATER FACILITY NEEDS AND OPPORTUNITIES

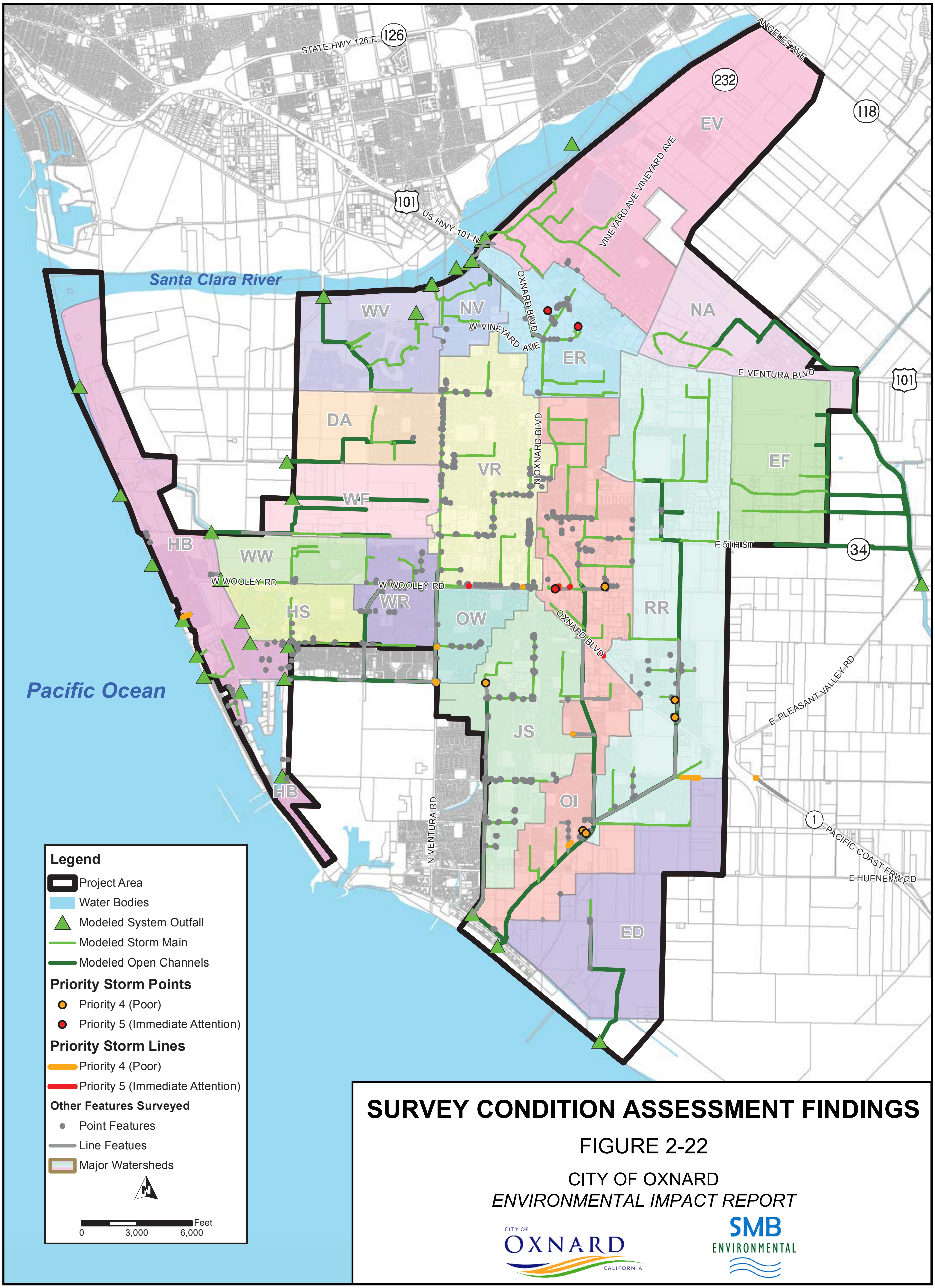
The capacity and performance of the existing stormwater system were compared with LOS criteria to locate system shortfalls. In general, the system has adequate capacity to meet current and future demand conditions. However, some capacity deficits and R&R needs exist.

2.4.2.1 Stormwater Collection System

Capacity

As part of the planning effort, Carollo developed a storm drainage hydrologic and hydraulic model for the City in SewerGEMS. The model was used to identify existing system deficiencies, characterize infrastructure needs for future growth, and develop capital improvements to mitigate deficiencies and meet the City's planning criteria.

To develop the model, a capacity analysis was performed on pipelines 24-inches in diameter and larger as well as other critical facilities of all sizes. The first step in the capacity analysis was to divide the 22,709 acres within the service area into 418 individual subcatchments. In addition, appropriate outlet points (i.e., drainage inlets and catch basins in City Streets or nearby manholes) were defined. The resulting subcatchments range from 1.7 acres to 374.9 acres and average approximately 54.3 acres.



SURVEY CONDITION ASSESSMENT FINDINGS

FIGURE 2-22

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Rainfall data were used to generate the basis for stormwater evaluations. As shown in Figure 2-23, a 10-year 24-hour storm (total rainfall of 4-inches) and a 100-year 24-hour storm (total rainfall of 6.4-inches) were used for the capacity assessment.

Results from the modeling effort indicate that during the 10-year, 24-hour design storm, the hydraulic grade line (HGL) in the Ventura channels is elevated, which causes significant surcharging in the City's storm pipes that drain to the channels. However, because the Ventura channels have insufficient conveyance capacity and the City's pipes are not capacity deficient, no improvements to the City's drainage pipes are proposed. Instead, the recommendation is to improve the Ventura channel conveyance to lower the HGL and allow more stormwater to drain to the canals without being held upstream in the City's system.

The modeling effort also indicated that the majority of the surcharging and flooding problems under the 10-year design storm are located in Ventura Road, Tsomas Creek, Ormond Lagoon Waterway, and north of Rice Road Avenue watersheds, which correspond to the City's downtown core. The existing storm drain system also lacks sufficient capacity to convey the 100-year design runoff while meeting the flooding criteria.

The project team evaluated the reasonableness of the model results by comparing them with the City's observations. Based on staff observations during storm events, the model results confirmed areas around the City that typically experience flooding.

In addition to the sewerGEMS model, the City recently completed a Green Alleys Plan. This plan had two goals: to identify the City's alleys that are good candidates for green alley projects and to provide a framework for the future design and implementation of these projects.

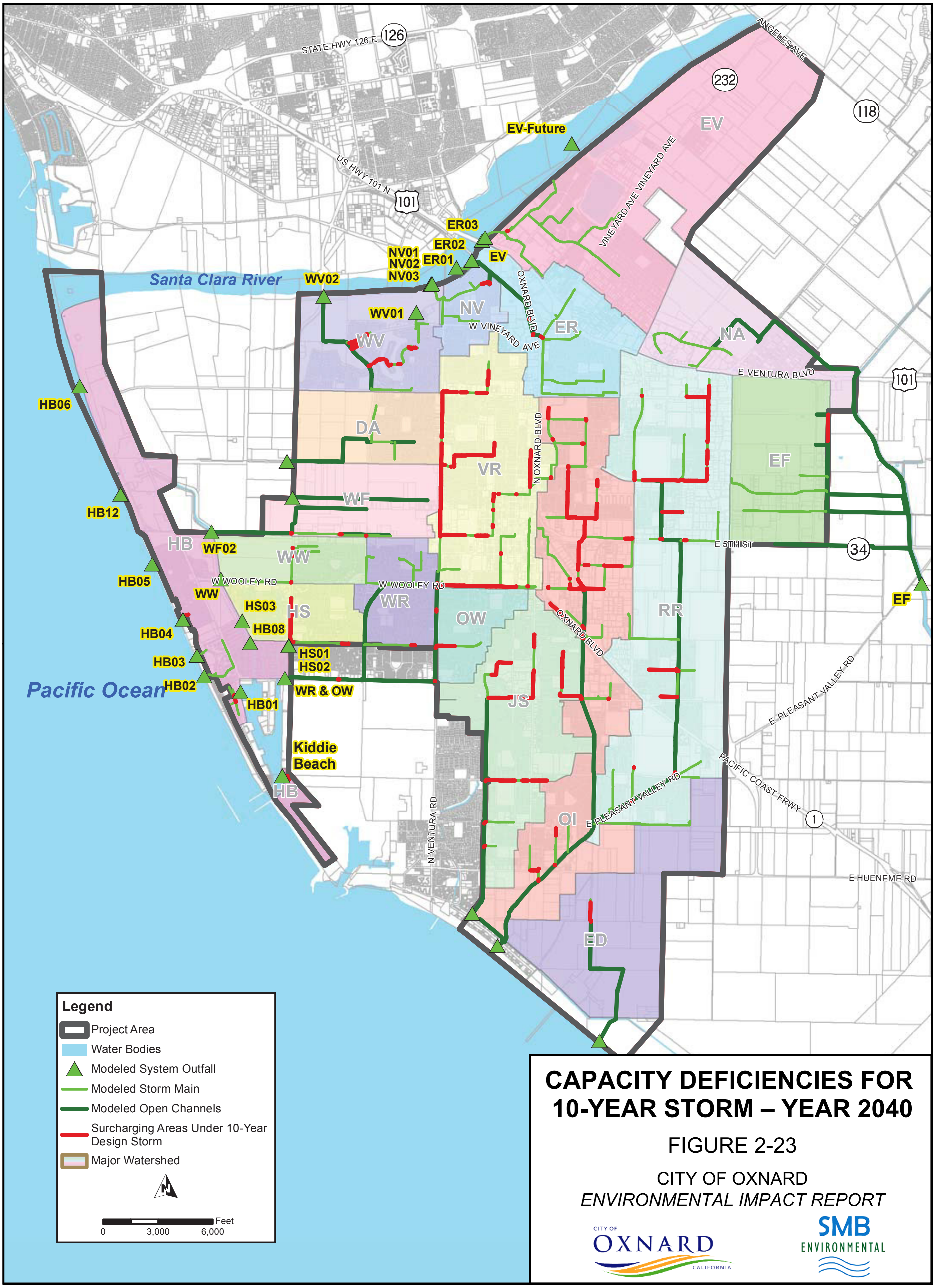
After comparing the environmental prioritization results performed in the Green Alley program, some of the high priority public alleys were noted to overlap with the observed areas of flooding. As a result, it is recommended, where appropriate, that the City incorporate bioswales, permeable paving, or rain barrels (for community gardens) to help decrease flooding in these locations. Figure 2-24 shows the areas of high priority for Green Alleys projects and the existing flooding areas.

R&R

As previously mentioned, approximately 12 percent of the assets need immediate attention or attention within the next five years. These assets are in poor or very poor condition. In addition, sediment build-up was a problem in approximately 12 percent of the assets.

2.4.2.2 New Stormwater Projects

A number of new stormwater projects were considered to achieve the goals outlined in the PWIMP. The goal of these projects is to improve stormwater quality so it can be harvested as an additional water source and meet regulatory requirements. Once an initial list of stormwater project options was identified, all options went through a fatal flaw screening to determine which were the most viable. From this screening, three new stormwater projects were selected: dry weather diversion, a citywide incentive program, and total maximum daily load (TMDL) compliance. Each project is described in the following sections.



CAPACITY DEFICIENCIES FOR 10-YEAR STORM – YEAR 2040

FIGURE 2-23

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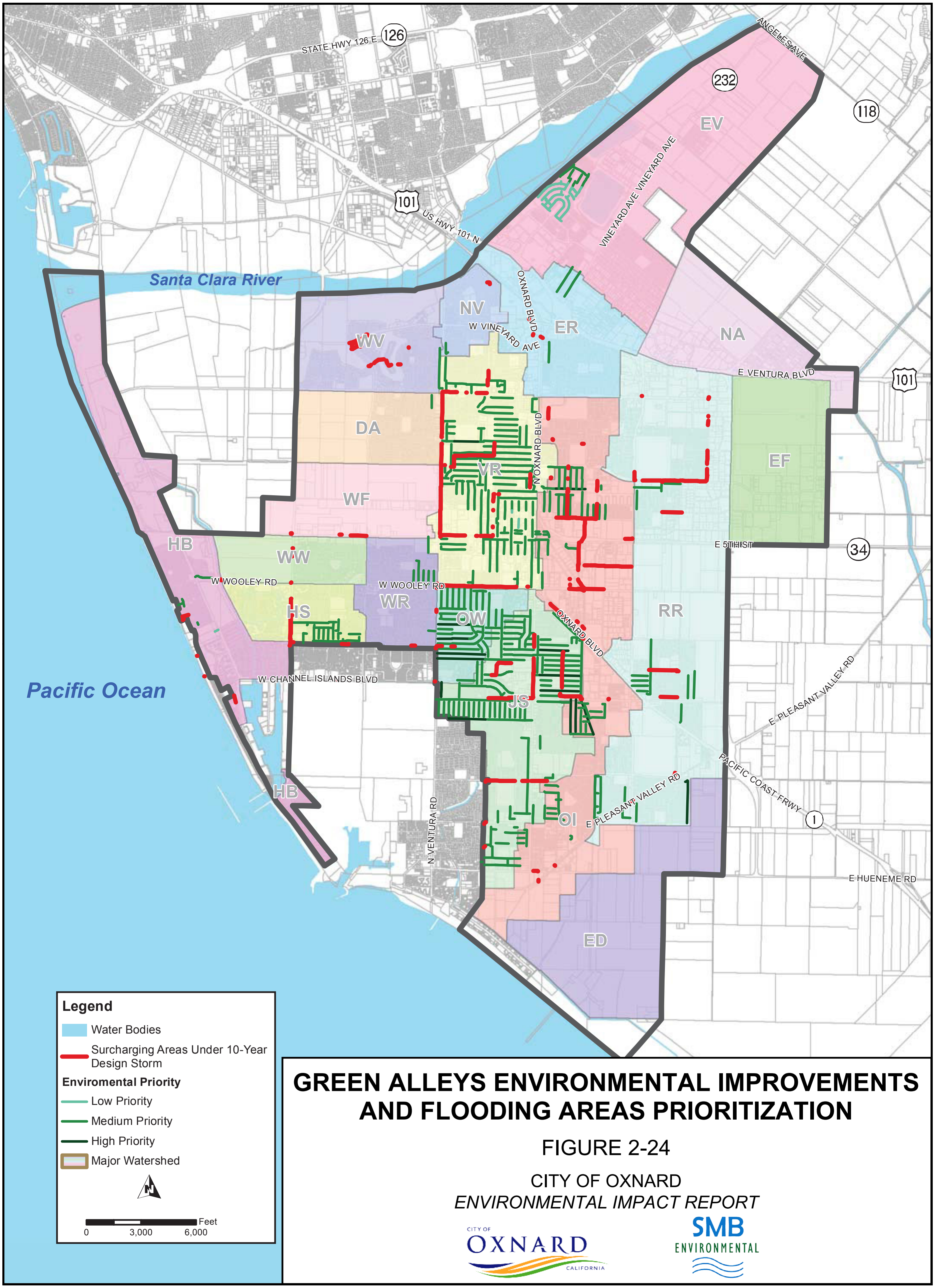

GREEN ALLEYS ENVIRONMENTAL IMPROVEMENTS AND FLOODING AREAS PRIORITIZATION

FIGURE 2-24

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Dry Weather Diversion

The first project would divert dry weather stormwater channel flows to the Oxnard Wastewater Treatment Plant (OWTP) to be treated and potentially reused at the Advanced Water Purification Facility (AWPF). Dry weather flows include flow from irrigation runoff, pool draining, washdown water, construction work, and other related activities. In Oxnard, shallow groundwater infiltration is likely another component of dry weather 'stormwater' flow.

Water could be diverted from the stormwater collection system in a number of ways. Typically, stormwater diversion structures in California are constructed to first screen water for trash and then pumping water from a stormwater pump station to a sanitary collection system. However, water can also be diverted in an open channel by installing an inflatable dam or mechanical gate. Water that builds up behind the dam or gate can then be pumped into the sanitary collection system. The diverted stormwater would be treated downstream at the OWTP and potentially the AWPF.

A dry weather diversion could be used only when the OWTP has excess capacity. In Oxnard's case, storage would not be required because dry weather flows in stormwater channels occur year-round. To prevent significant water quality degradation of OWTP influent, however, dry weather diversions should be kept small in proportion to OWTP influent.

Before this project could be implemented, the City should consider the effects removing this dry weather storm channel flow could have on downstream habitat. Additionally, water quality implications should be studied further.

City-wide Incentive Program

The second project is a citywide incentive program that would involve capturing stormwater to offset potable water use. A program like this would encourage new developers to invest in rainwater harvesting and onsite reuse. It would also give interested residents the opportunity to retrofit their homes with rain barrels or rain cisterns. These measures would lower the risk of flooding and would encourage residents and developers to take a proactive stance on stormwater.

The City could encourage such rainwater collection in several ways. It could provide discounted rain barrels and cisterns for purchase or offer a discount on water utilities bills. Such incentives could be provided for both existing landowners and developers. The cost for such an incentive program would depend entirely on its size and the amount the City is willing to offset.

Since the City is located on a shallow perched aquifer, the PWIMP recommends focusing any incentive program on onsite capture and use instead of infiltration. This focus will decrease customers' potable water use for landscape irrigation the most.

TMDL Compliance

The final project involves meeting a TMDL for indicator bacteria. The Los Angeles Regional Water Quality Control Board (LARWQCB) adopted a TMDL for indicator bacteria in the Santa Clara River Estuary. This TMDL requires participating agencies like the City to prepare an implementation plan outlining proposed activities to achieve a reduction in bacteria load.

In March 2015, a draft implementation plan was developed that located potential infiltration basins and subsurface infiltration basins for both dry and wet weather stormwater throughout the watershed. South

Bank Park in Oxnard was one of the locations identified. This location, shown in Figure 2-25, is the proposed site for a subsurface infiltration basin.

This infiltration basin would be sized to treat the 85th percentile volume from the local drainage area and would require approximately 85,000 square feet. It would be approximately 2-feet deep and infiltrate at a rate of 0.5-inches per hour.

2.4.3 PROPOSED STORMWATER PROJECTS

Detailed below is a summary of the proposed stormwater projects.

2.4.3.1 Stormwater Collection System

Stormwater collection system improvements were focused on capacity and R&R needs and based on the capacity assessment and condition assessment, respectively. Through these assessments, 13 main capacity projects were identified. These projects are summarized in Table 2-16.

In addition, a total of 21 assets with a Level 4 rating were identified, as was an asset with a Level 5 rating that requires R&R. An overall schedule for these R&R needs can be found in Figure 2-26.

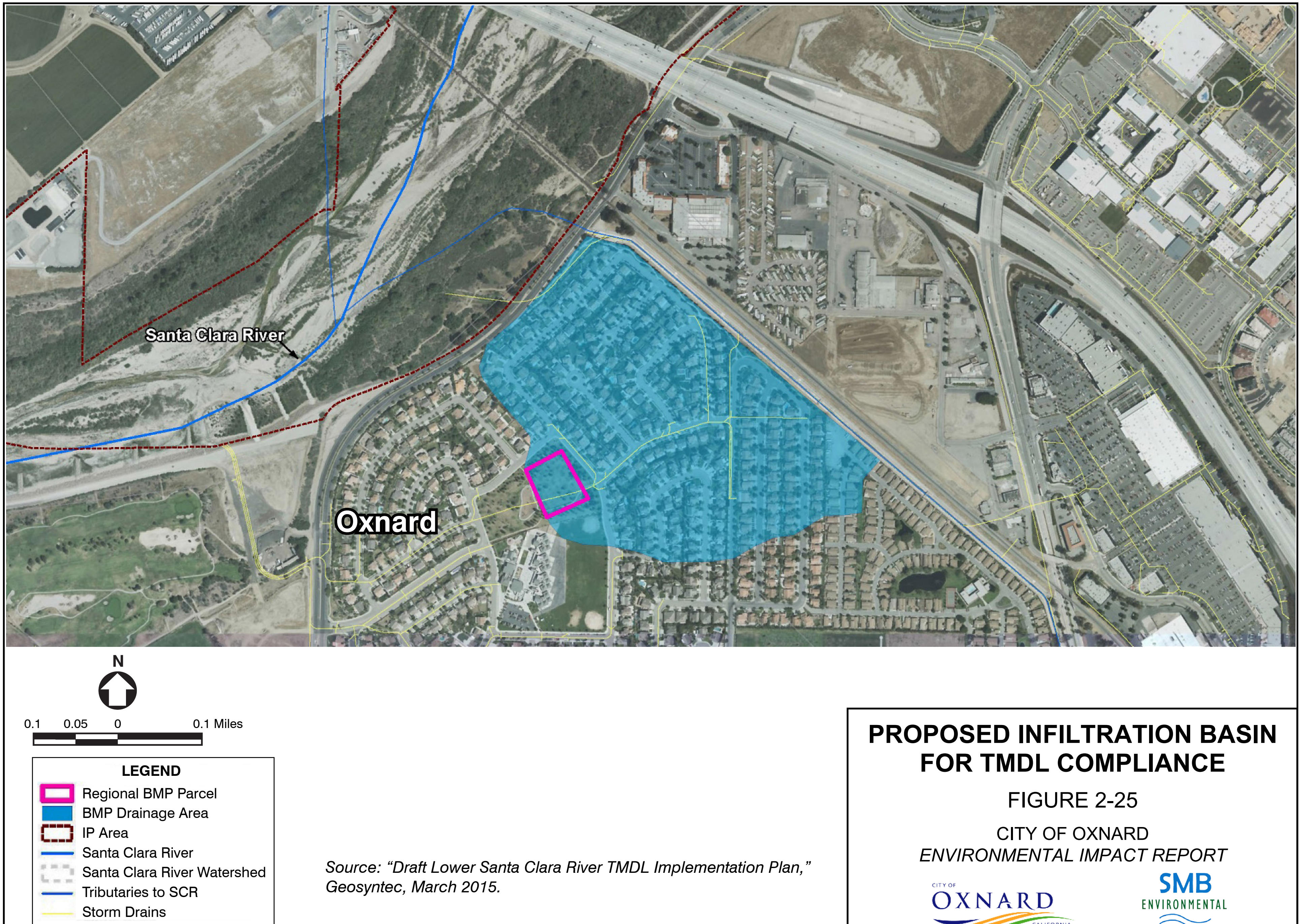
2.4.3.2 New Stormwater Projects

As outlined above, three new stormwater projects have been proposed for the PWIMP. The infiltration basin, recommended for TMDL compliance, should be implemented, since it is required to meet the Santa Clara River's indicator bacteria TMDL. The remaining two projects, a dry weather diversion and an incentive program, should be considered for future implementation. For more information about these projects, refer to Table 2-17. For an overall schedule, refer to Figure 2-26.

Table 2-16
Recommended Collection System Projects
Public Works Integrated Master Plan
City of Oxnard

Project Name	Driver	Phase
Drainage Basin WV (444 ft)	Capacity	2
Drainage Basin WV (748 ft)	Capacity	4
Drainage Basin OI (607 ft)	Capacity	2
Drainage Basin RR (2,436 ft)	Capacity	3
Drainage Basin OI (2,388 ft)	Capacity	4
Drainage Basin VR (5,872 ft)	Capacity	1
Drainage Basin JS (1,421 ft)	Capacity	1
Drainage Basin JS (1,292 ft)	Capacity	2
Drainage Basin JS (426 ft)	Capacity	2
Drainage Basin JS (457 ft)	Capacity	2
Drainage Basin JS (655 ft)	Capacity	2
Drainage Basin JS (701 ft)	Capacity	2
Drainage Basin HS (1,552 ft)	Capacity	2
22 assets	R&R	1

General Note: For the pipeline replacement projects, see the hydraulic models developed as part of the PWIMP to identify the exact pipeline locations.



Source: "Draft Lower Santa Clara River TMDL Implementation Plan," Geosyntec, March 2015.

PROPOSED INFILTRATION BASIN FOR TMDL COMPLIANCE

FIGURE 2-25

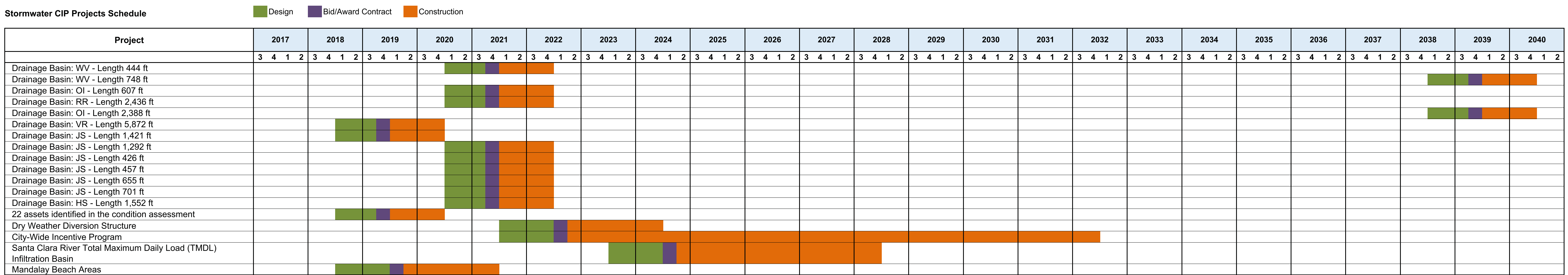
CITY OF OXNARD
ENVIRONMENTAL IMPACT REPORT

CITY OF OXNARD CALIFORNIA

SMB ENVIRONMENTAL

ox0917rf27-9587-CEQA(EIR-Fig2-25).ai

Stormwater CIP Projects Schedule



Notes:

(1) Project start year moved two years later compared to 2015 CIP.

(2) Project start year adjusted with City input and do not correspond to Dec. 2015 publication start year.

RECOMMENDED STORMWATER PROJECTS SCHEDULE

FIGURE 2-26

CITY OF OXNARD
ENVIRONMENTAL IMPACT REPORT

ox0917rf28-9587-CEQA(EIR-Fig2-26).ai

Table 2-17 Recommended New Stormwater Projects Public Works Integrated Master Plan City of Oxnard			
Project Name	**Driver**	**Start Year**	**Phase Ranking**
Dry Weather Diversion Structure	Resource Sustainability	2021	2
City-Wide Incentive Program	Resource Sustainability	2021	2
TMDL Infiltration Basin	Resource Sustainability	2023	2

2.5 Construction Considerations

Construction of the PWIMP is expected to spring of 2019 and will likely continue into for 15-20 years through 2040. Construction work will typically be done within normal working hours, weekdays between the hours of 7 a.m. and 8 p.m., and possibly on Saturdays between the hours of 10 a.m. and 6 p.m. The PWIMP would be constructed primarily within existing easements, roadways, and rights-of-ways. Any damages occurring during construction will be returned to the pre-construction condition or better. The following describes typical construction methods to be used for PWIMP project/facility components:

- Construction of stationary facilities (e.g., AWPF expansion, desalter expansion, pump stations, reservoirs, and wells) would include site preparation, equipment delivery, and building construction. Some excavation and grading would be required for locations with uneven gradient. Ground clearing and excavation of the sites would be performed using heavy construction equipment such as bulldozers, backhoes, cranes, and graders. Upon completion of excavation, construction activities would also include pouring concrete footings for tanks, laying pipeline and making connections, installing support equipment such as control panels, and fencing the perimeter of the site.
- Proposed new and rehabilitated/replaced pipelines and conveyance facilities would be installed using both conventional open-trench and horizontal directional drilling construction techniques, with most of the construction using the former method. Pipe sections would be placed in a trench of varying depth depending on pipe size and topography, and covered using conventional equipment such as backhoes and compactors. For portions of the alignment where it is not feasible to perform open-cut trenching (such as State highway crossings, stream and drainage crossings, and high utility congestion areas), tunneling technology methods such as boring and jacking, micro-tunneling or horizontal directional drilling may be used.
- All construction activities would be restricted to the ROW approved by the applicable landowner or agency. All roadways disturbed during pipeline/conveyance facility installation would be restored. Generally, trench spoils would be temporarily stockpiled within the construction easement, then backfilled into the trench after pipeline/conveyance facility installation.

2.6 Potential Responsible Agencies, Permits and Approvals

The Proposed Project, with its myriad distinct components and range of alternatives, is a complex project. Numerous federal, state, and local regulations and permit requirements would apply to the construction and operation of the Proposed Project. Table 2-18 lists the major federal, state, and local permits, approvals, and consultations identified likely to be required for the construction and operation of the Proposed Project. Table 2-18 is not intended to be exclusive and/or an exhaustive list. Other permits and approvals may be required. If so, the lead agency(s) would be bound by law to comply with such requirements.

Table 2-18
Potential Regulatory Requirements, Permits, and Authorizations for Project Facilities
Public Works Implementation Plan
City of Oxnard

Agency	Permit or Approval	Activity Requiring Permit or Approval/Comment
Federal		
Bureau of Reclamation	Discretionary Funding Approval	Required if federal funding is used for construction of any PWIMP Program element
State		
California Coastal Commission	Coastal Development Permit	Required because portions of the projects would be located within the coastal zone
	Federal Consistency Review	Required if federal funding is used for construction of project facilities
California Department of Health Services	Domestic Water Permit Amendment	Required to add operation of new water supply facilities to the City of Oxnard's current Domestic Water Permit
	Title 22 Engineering Report Approval	Required for approval to operate the water recycling element of the PWIMP
California Department of Transportation, District 7	Encroachment Permit	Required for use of Caltrans road right-of-ways
California Division of Occupational Safety and Health	Construction Permit	Required for construction of facilities
	Trenching and Excavation Permit	Required for the construction of conveyance pipelines
	Tunneling Permit	Required for portions of the water supply and/or recycled water delivery system that are tunneled beneath roadways or drainage crossings
California Regional Water Quality Control Board, Los Angeles Region (4)	National Pollutant Discharge Elimination System (NPDES) Permit	Required for discharges to surface or groundwater
	Waste Discharge Requirements (WDR)	Required for desalination and brine discharge
	Construction General Permit 99-08- DWQ	Required for projects that disturb more than 5 acres (including trenching and staging areas)