APPENDIX H

Asset Management Plan

Revision History			
Revision	**Date**	**Approval**	**Reason**
0	09/30/05		Original
1	11/05/11		•
2	04/04/14		•
	07/11/19	J. Fenton	• Reviewed – no changes
3	07/08/20	C. Falzone	• Updated Asset Management Plan
4	09/20/21	T. Edwards	• Updated Asset Management Plan
5	09/19/22	T. Edwards	• Updated Asset Management Plan to 2021
6	09/21/23	T. Edwards	• Updated Asset Management Plan to 2022
7	09/19/24	T. Edwards	• Updated Asset Management Plan to 2023
8	09/15/25	T. Edwards	• Updated Asset Management Plan to 2024
9	09/14/2026	A. Siew	• Updated Asset Management Plan to 2025
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Asset Management Plan

2025







OCSAN
ORANGE COUNTY SANITATION DISTRICT

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Acronyms and Abbreviations ..... **v**

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Acronyms and Abbreviations

Ø	Diameter
®	Registered Trademark
ADWF	Average Dry Weather Flow
AM	Asset Management
AMP	Asset Management Plan
AS	Activated Sludge
AS1	Activated Sludge 1
AS2	Activated Sludge 2
BI	Business Intelligence
Board	Orange County Sanitation District Board of Directors
CCTV	Closed-Circuit Television
CEMS	Continuous Emissions Monitoring System
CenGen	Central Generation Facility
Chem.	Chemical Injection System
CIP	Capital Improvement Program
CIPP	Cured-in-Place Pipe
CM	Corrective Maintenance
CWPS	City Water Pump Station
DAFT	Dissolved Air Flotation Thickener
DC	Distribution Center
DIP	Ductile Iron Pipe
EAM	Enterprise Asset Management
EBDB	East Basin Distribution Box
EJB	Effluent Junction Box
Elec.	Electrical
EMP	Energy and Digester Gas Master Plan
EPSA	Effluent Pump Station Annex
FE	Facilities Engineering
$FeCl_3$	Ferric Chloride
FY	Fiscal Year
GIS	Geographic Information System
GWRS	Groundwater Replenishment System
H_2S	Hydrogen Sulfide
HCl	Hydrochloric Acid
HDPE	High-Density Polyethylene
HP	Horsepower
HVAC	Heating, Ventilation, and Air Conditioning
IDGP	Interplant Digester Gas Pipeline
IPE	Interplant Trunk E
JB	Junction Box
KPI	Key Performance Indicator
kV	Kilovolt(s)
LoF	Likelihood of Failure
LOX	Liquid Oxygen
LPDG	Low-Pressure Digester Gas
M&D	Metering and Diversion
MCC	Motor Control Center
MGD	Million Gallons per Day
mi	Mile
ML	Mixed Liquor
MP	Maintenance Project
MSP	Main Sewage Pump
N/A	Not Applicable
NaOH	Sodium Hydroxide
NASSCO	National Association of Sewer Service Companies
No.	Number
NPDES	National Pollutant Discharge Elimination System
NSC	North Scrubber Complex
NTP	Notice to Proceed
O&M	Operations and Maintenance
OC San	Orange County Sanitation District
OCWD	Orange County Water District
OEM	Original Equipment Manufacturer
OOBS	Ocean Outfall Booster Station
OSHA	Occupational Safety and Health Administration
OXI	Oxidizer
P1	Plant No. 1
P2	Plant No. 2
PB	Power Building
PdM	Predictive Maintenance
PE	Primary Effluent
PEDB	Primary Effluent Distribution Box
PEDB-1	Primary Effluent Distribution Box 1
PEDB-2	Primary Effluent Distribution Box 2
PEJB	Primary Effluent Junction Box
PEJB-1	Primary Effluent Junction Box 1
PEJB-2	Primary Effluent Junction Box 2
PEPS	Primary Effluent Pump Station
Phys.	Physical Injection System
PISB	Primary Influent Splitter Box
PLC	Programmable Logic Controller
PM	Preventive Maintenance
PRN	Project Request Number
PS	Pump Station
PSB	Primary Sedimentation Basin
PVC	Polyvinyl Chloride
PWWF	Peak Wet Weather Flow
RAS	Return-Activated Sludge
RCM	Reliability-Centered Maintenance
RIO	Remote Input/Output
ROCCS	Regional Odor and Corrosion Control System
RSS	Return Secondary Sludge

RUL	Remaining Useful Life
SALS	Steve Anderson Lift Station
SARI	Santa Ana River Interceptor
SBF	Sludge Blending Facility
SBS	Sodium Bisulfite System
SC	Secondary Clarifier
SCE	Southern California Edison
SCR	Selective Catalytic Reduction
SC/SR	Solids Contact/Solids Reaeration
SE	Secondary Effluent
SEJB	Secondary Effluent Junction Box
SPF	Standby Power Facility
SR	Secondary Return
SRR	Sludge Reaeration Reactor
SSC	South Scrubber Complex
SSO	Sanitary Sewer Overflow
T&D	Thickening and Dewatering
TBD	To Be Determined
TF	Trickling Filter
TFPS	Trickling Filter Pump Station
TF/SC	Trickling Filter/Solids Contact
TFSE	Trickling Filter Secondary Effluent
TFSEJB-2	Trickling Filter Secondary Effluent Junction Box 2
TWAS	Thickened Waste-Activated Sludge
UPS	Uninterruptible Power Supply
V	Volt(s)
VCP	Vitrified Clay Pipe
VDC	Volt(s) of Direct Current
VFD	Variable Frequency Drive
WAS	Waste-Activated Sludge
WSS	Waste Secondary Sludge
WSSPS	Waste Sidestream Pump Station

Executive Summary

Asset Management Plan Intent and Purpose

The Orange County Sanitation District (OC San) Asset Management Plan (AMP) is a tactical document that captures OC San's organizational structure, maintenance plans, and capital improvement plan implementation on an annual basis. This document will continue to change in content and structure to reflect OC San's efforts for continual improvement and to meet the needs of stakeholders.

Safe and reliable infrastructure and process equipment are essential to providing industry-leading wastewater collection and treatment, while achieving OC San's mission and vision statements. OC San manages asset reliability, mitigates risk, and ensures the quality of its delivered services according to the following mission statement of the Asset Management Program:

OC San will know the condition of assets we own and will have a plan to operate and maintain these assets to deliver the required level of service, at the lowest life cycle cost, with an acceptable level of risk.

Overview of OC San's Infrastructure

OC San owns and operates wastewater collection system infrastructure, as well as two resource recovery and wastewater treatment facilities located in Fountain Valley and Huntington Beach. Its collection system infrastructure includes over 380 miles of regional sewer pipelines and 15 pump stations throughout the OC San service area (Figure ES-1). Wastewater is conveyed to Reclamation Plant Number (No.) 1 in Fountain Valley and Reclamation Plant No. 2 in Huntington Beach. These facilities treat an average daily wastewater flow of 184 million gallons per day, serving approximately 2.6 million people in central and northwest Orange County, California.

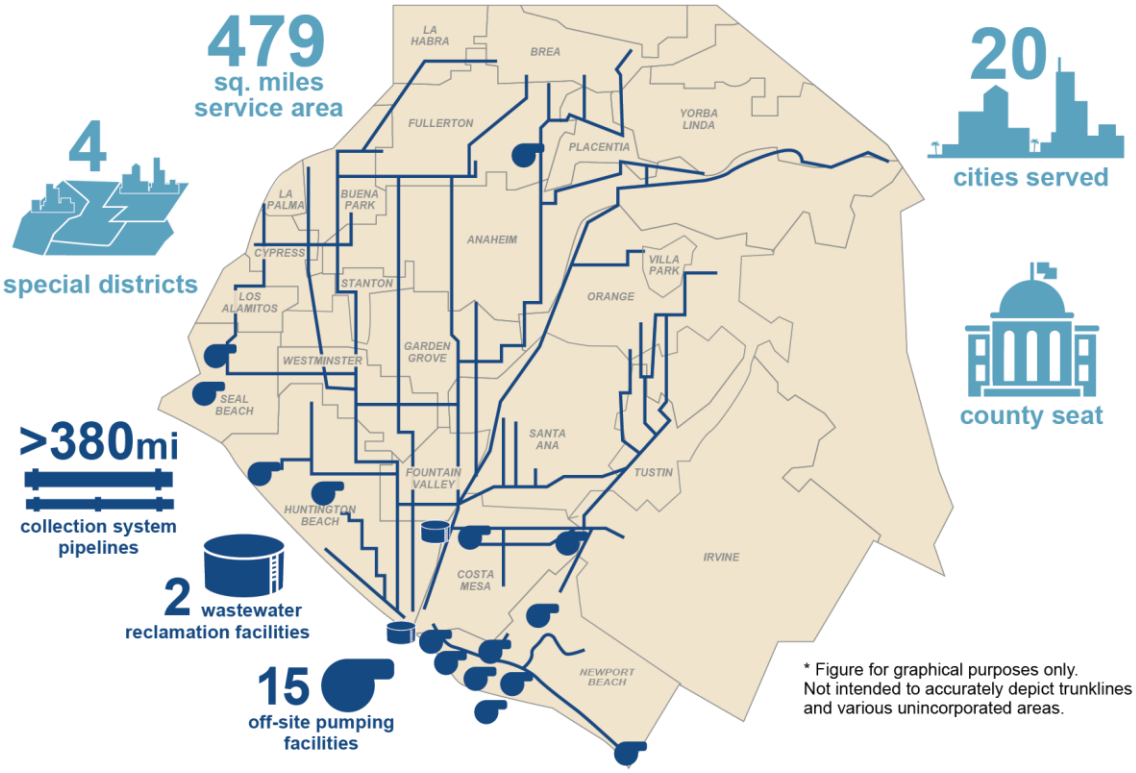


Figure ES-1. OC San's Service Area

State of OC San's Infrastructure

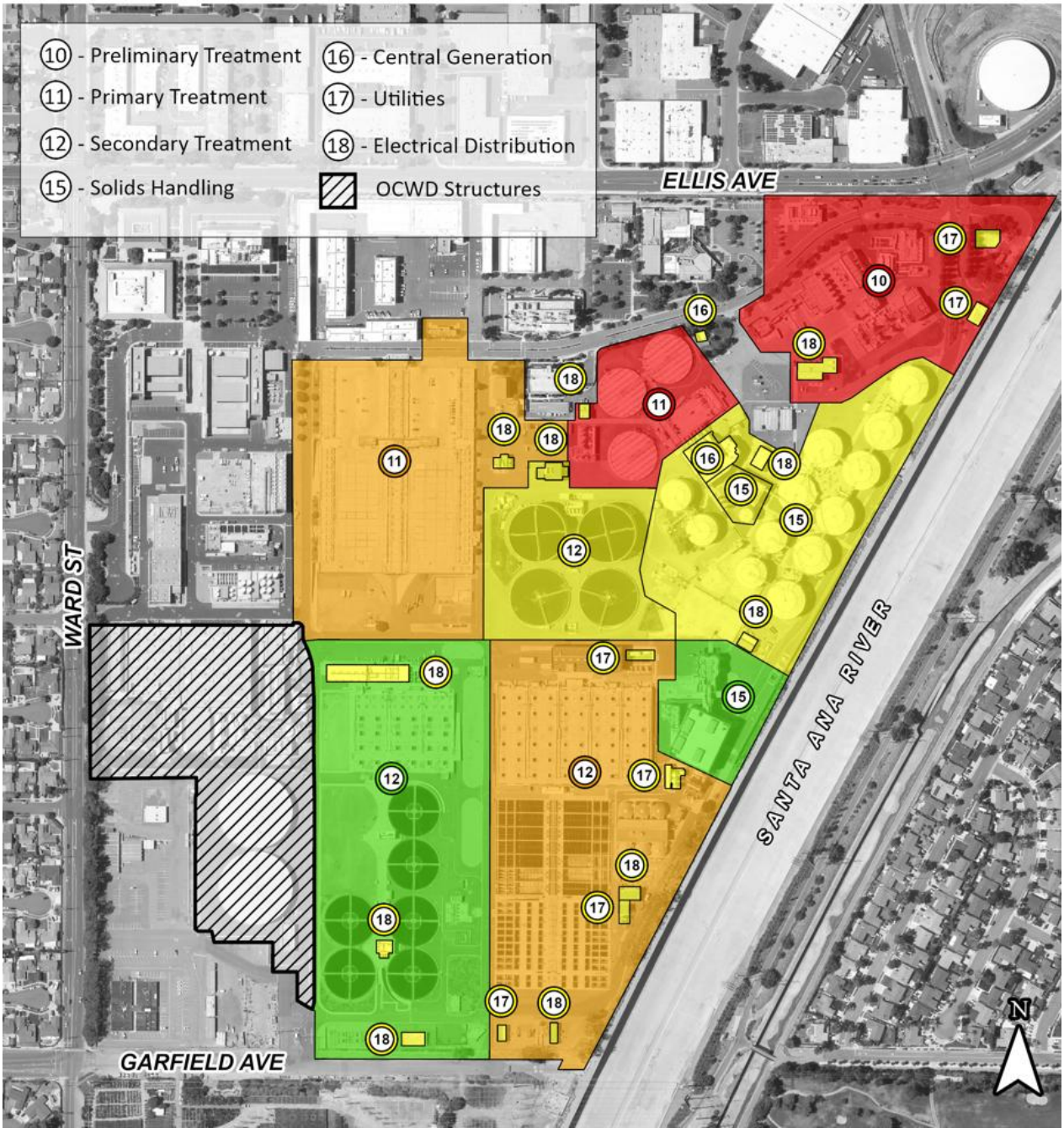
The following Area Asset Management (AM) Summary tables and condition score maps provide a high-level overview of OC San's facilities. These overviews are organized as follows:

- Plant No. 1 (Figure ES-2 and Table ES-1)
- Plant No. 2 (Figure ES-3 and Table ES-2)
- Collection System – Pump Stations and Force Mains (Figure ES-4 and Table ES-3)
- Collection System – Pipelines and Manholes (Figure ES-5 and Table ES-4)

The summaries generally include the following fields:

- **Area No.:** Number that corresponds to the plant asset area. Plant No. 1 asset areas are numbers 10 to 19, and Plant No. 2 asset areas are numbers 20 to 29.
- **Area Name:** Name of asset area.
- **Average Remaining Useful Life (RUL) Score:** Estimated average RUL score for each discipline (civil, structural, mechanical, electrical, and instrumentation) or area based on an average of the RUL scores provided in the detailed Area AM Summaries.
- **Percentage of RUL Scores with 4s or 5s:** Percentage of major assets with a RUL of 10 years or less.

AREA ASSET MANAGEMENT SUMMARY – PLANT NO. 1 OVERVIEW



Note: Areas 14 and 19 are excluded from the map. The colored process areas reflect the average RUL score as shown on the respective table.
OCWD = Orange County Water District

Figure ES-2. Plant No. 1 Process Area – Remaining Useful Life Score Map

Table ES-1. Plant No. 1 Remaining Useful Life

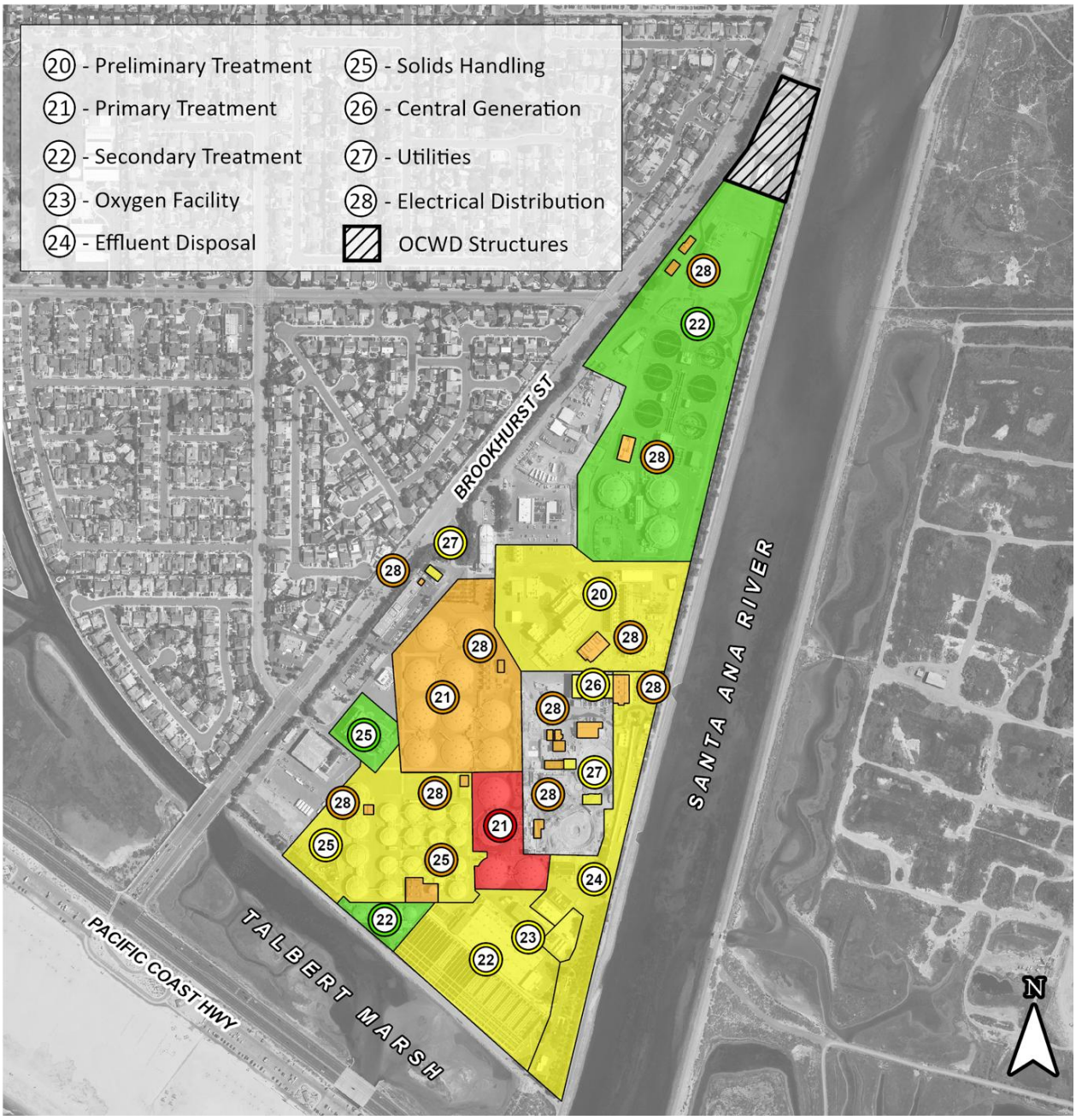
Area No.	Area Name	Average Remaining Useful Life Score						Percentage of RUL Scores with 4s or 5s
		Civil	Structural	Mechanical	Electrical	Instrumentation	All Assets	
10	Preliminary Treatment	3	3	4	5	5	5	67%
11	Primary Treatment - Basins (1–5)	5	4	5	5	4	5	79%
11	Primary Treatment - Basins (6–31)	4	3	4	4	4	4	42%
12	Secondary Treatment - Activated Sludge 1 (AS1)	3	4	5	5	5	4	73%
12	Secondary Treatment - Activated Sludge 2 (AS2)	1	1	2	3	3	2	3%
12	Secondary Treatment - Trickling Filter	1	1	3	3	4	3	26%
14	Interplant[a]	2	2	2		1	2	15%
15	Solids Handling - Digesters	2	2	3	3	3	3	16%
15	Solids Handling – Thickening & Dewatering (T&D) Facilities	1	1	2	3	3	2	12%
15	Solids Handling - Gas Handling[a]		3	3	3	4	3	44%
16	Central Generation (CenGen)[a]		1	3	4	4	3	37%
17	Utilities	3	1	4	4	3	3	23%
18	Electrical Distribution[a]				3		3	47%
19	Occupied Buildings	*Refer to Area 19 Asset Management Summary*						
	Plant No. 1 Total							**38%**

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

[a] White box with diagonal line indicates there are no assets assigned to this discipline within this process area.

AREA ASSET MANAGEMENT SUMMARY – PLANT NO. 2 OVERVIEW



Note: Area 29 is excluded from the map. The colored process areas reflect the average RUL score as shown on the respective table.
OCWD = Orange County Water District

Figure ES-3. Plant No. 2 Process Area – Remaining Useful Life Score Map

Table ES-2. Plant No. 2 Remaining Useful Life

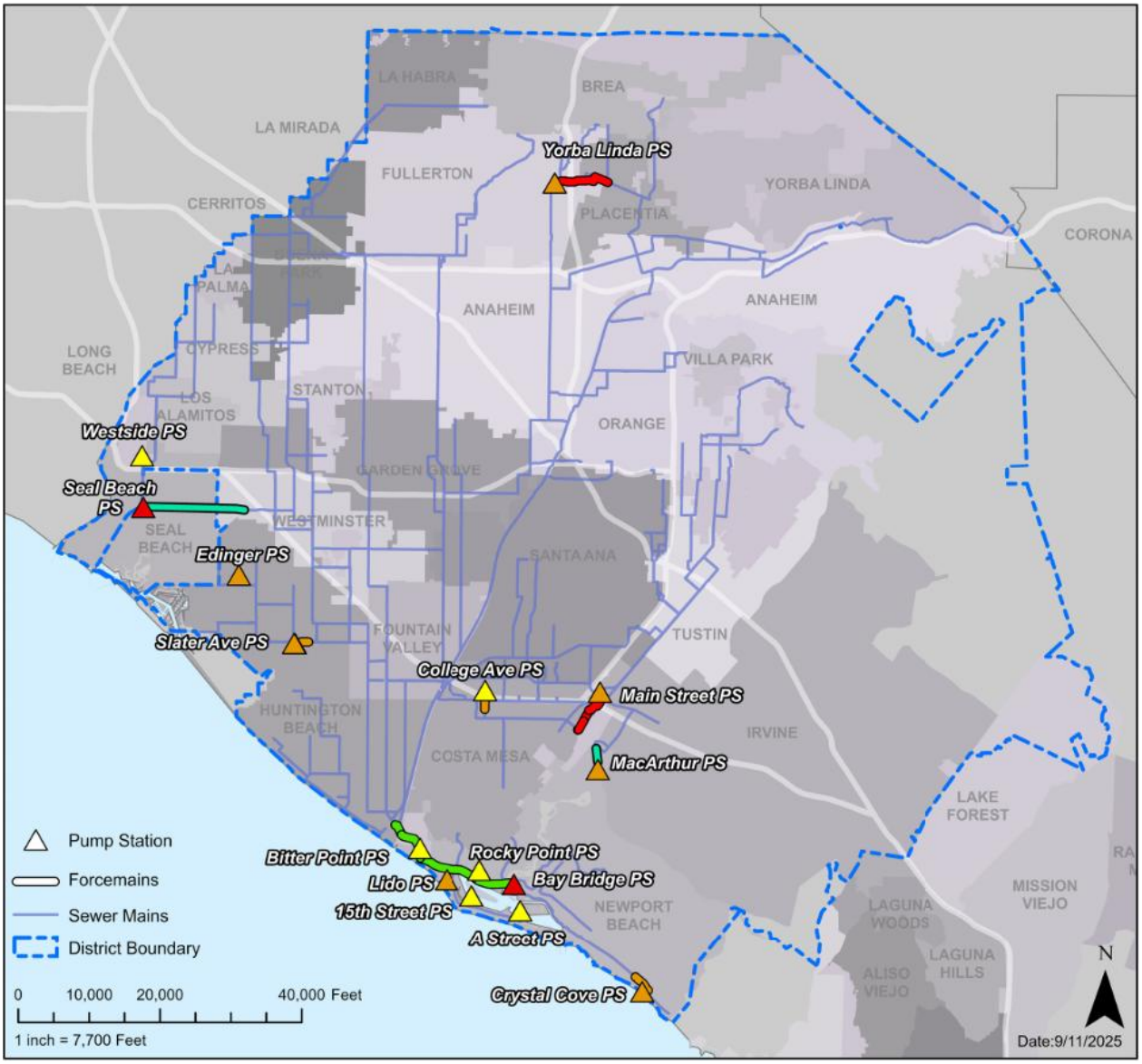
Area No.	Area Name	Average Remaining Useful Life Score						Percentage of RUL Scores with 4s or 5s
		Civil	Structural	Mechanical	Electrical	Instrumentation	All Assets	
20	Preliminary Treatment	1	1	3	4	3	3	12%
21	Primary Treatment - A Side	5	5	5	4	4	5	100%
21	Primary Treatment - B & C Side	4	3	4	3	4	4	34%
22	Secondary Treatment - Activated Sludge (AS)	3	3	3	4	3	3	28%
22	Secondary Treatment - Dissolved Air Flotation Thickener (DAFT)	4	1	3	2	3	2	17%
22	Secondary Treatment - Trickling Filter	2	1	2	2	3	2	10%
23	Oxygen Facility	3	3	3	4	4	3	100%
24	Effluent Disposal	2	2	3	4	4	3	35%
25	Solids Handling - Digesters	4	4	3	3	3	3	69%
25	Solids Handling - Facilities	2	1	2	2	3	2	5%
25	Solids Handling - Gas Handling[a]		3	4	4	4	4	50%
26	Central Generation (CenGen) [a]		1	3	4	4	3	39%
27	Utilities	3	1	3	4	3	3	20%
28	Electrical Distribution[a]				4		4	57%
29	Occupied Buildings	*Refer to Area 29 Asset Management Summary*						
	Plant No. 2 Total							**41%**

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

[a] White box with diagonal line indicates there are no assets assigned to this discipline within this process area.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM PUMP STATION AND FORCE MAIN OVERVIEW



Note: Not all pump station force mains are shown on this map. Only longer force mains are shown. Scores for force mains come from actual force main scores in Chapter 2. The colored pump stations reflect the average RUL score as shown on the respective table.

Figure ES-4. Collection System Pump Stations and Force Mains – Remaining Useful Life Score Map

Table ES-3. Collection System Pump Station and Force Main Remaining Useful Life

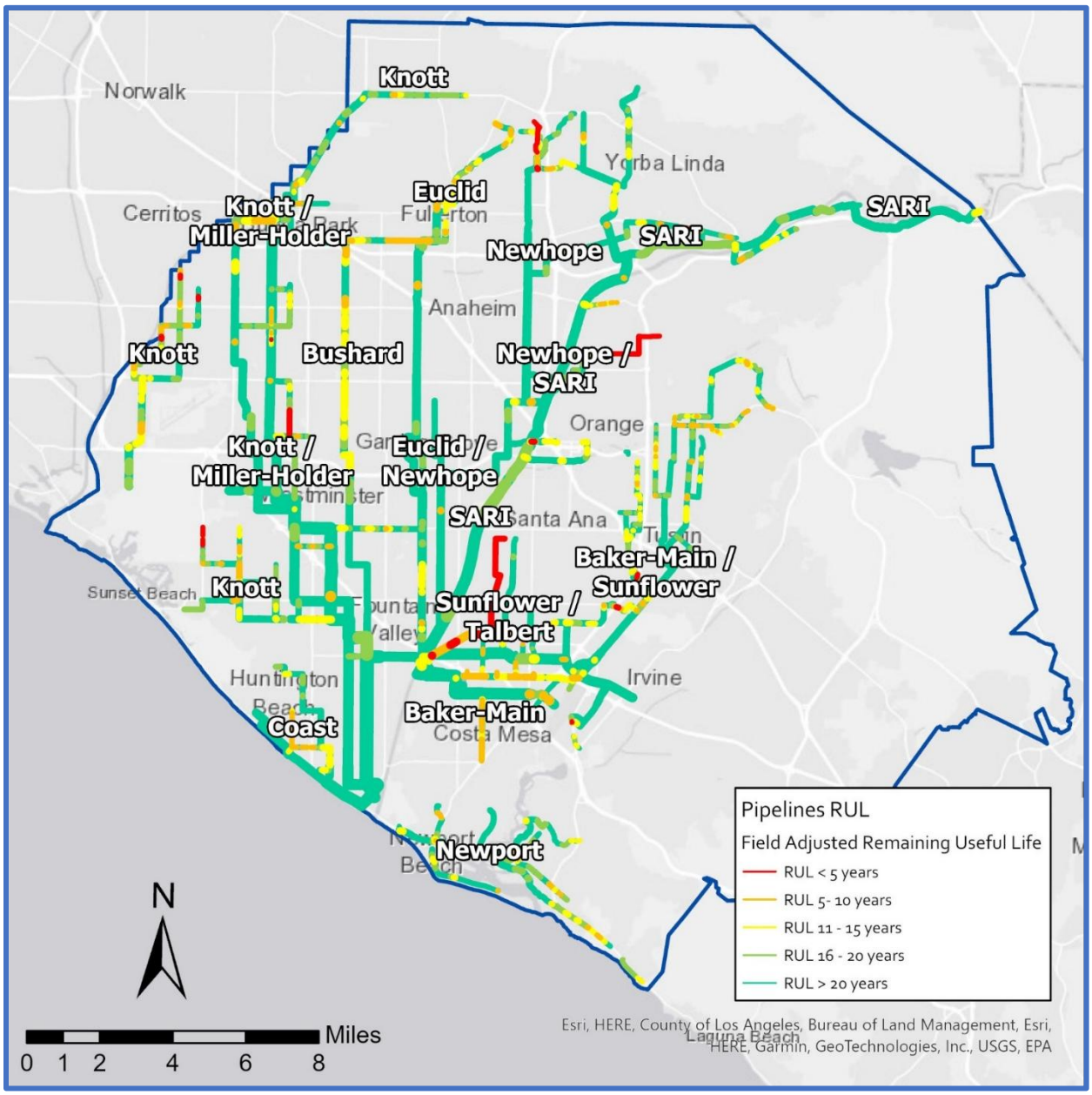
Pump Station	Average Remaining Useful Life Score						Percentage of RUL Scores with 4s or 5s
	Force Main	Structural	Mechanical	Electrical	Instrumentation	All Assets	
15th Street	3	4	4	3	3	3	27%
A Street	3	4	4	3	3	3	25%
Bay Bridge	5	4	5	4	3	5	85%
Bitter Point	2	2	3	3	4	3	23%
College	4	3	3	2	3	3	25%
Crystal Cove	4	4	4	3	3	4	42%
Edinger	5	4	3	4	5	4	64%
Lido	4	4	4	4	3	4	75%
MacArthur	1	3	4	5	4	4	73%
Main Street	5	2	4	4	4	4	46%
Rocky Point	3	3	3	3	4	3	23%
Slater	4	3	4	3	4	4	38%
Seal Beach	1	4	5	4	5	5	83%
Westside	5	3	3	3	4	3	31%
Yorba Linda[b]	5	4	4	4	4	4	82%
Newport Force Mains[a]	2					2	0%
Total							**49%**

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

[a] White box with diagonal line indicates there are no assets assigned to this discipline within this process area.
[b] The station is being decommissioned.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM PIPELINE AND MANHOLE OVERVIEW



Note: Only pipelines are shown on this map for clarity. Refer to Collection System Manhole Remaining Useful Life Score Map in Section 2.2, Area Asset Management Summaries List.

Figure ES-5. Collection System Pipelines and Manholes – Remaining Useful Life Score Map

Table ES-4. Collection System Pipeline and Manhole Remaining Useful Life

Trunklines	No. of Pipes with RUL Score of 4 or 5	Miles of Pipes with RUL Score of 4 or 5	Percentage of Pipes with RUL Score of 4 or 5 (by length)	No. of Manholes with RUL Score of 4 or 5	Percentage of Manholes with RUL Score of 4 or 5
Baker-Main	74	4.9	12%	— [a]	— [a]
Bushard	11	1.4	6%	3	1%
Coast	16	1.1	10%	3	2%
Euclid	13	0.7	2%	69	16%
Interplant[b]	0	0.0	0%	0	0%
Knott	37	2.6	4%	94	12%
Miller-Holder	22	1.6	5%	43	16%
Newhope	26	1.7	6%	82	23%
Newport	20	1.0	4%	30	8%
Santa Ana River Interceptor	66	3.0	6%	160	28%
Sunflower	15	0.5	1%	— [a]	— [a]
Talbert	77	5.9	70%	— [a]	— [a]
Total	**377**	**24.2**	**7%**	**484**	**11%**

Please see the comprehensive Acronyms and Abbreviations list for definitions.
[a] Only trunklines with greater than 50% manhole inspections completed are included in this table and in the Asset Management System Summaries.
[b] Interplant Trunk in this table refers only to Interplant Trunkline E (IPE) assets. Interplant Trunkline assets are included with Knott Trunkline in its Asset Management System Summary.

Program Monitoring and Improvements

OC San has implemented a set of key performance indicators (KPIs) that directly align with the objectives of its Asset Management Program. These measures provide a clear view of progress, benefits realized, and areas for continued improvement.

The KPIs include:

- Proactive maintenance percent
- Break-in percent
- Maintenance costs and labor hours
- Collections level of service results

Table ES-5 summarizes these KPIs for fiscal year (FY) 2024–2025.

Table ES-5. Asset Management Program KPIs for FY 2024–2025

Process Area	Average Proactive Work for Process Areas	Average of Break-in Percent	Maintenance Cost	Maintenance Labor Hours
Plant 1	33%	25%	$6,508,668	41,439
Plant 2	37%	20%	$7,642,194	41,010
Pump Stations	53%	25%	$698,245	7,248

Description	Level of Service Target	FY 2024–2025
Sanitary Sewer Overflow per 100 miles	< 2.1	0
Number of Odor Complaints	12	9
Miles of Pipeline Inspected by Closed-Circuit Television (CCTV)	70	71.1
Number of Manholes Inspected by CCTV	880	246

OC San's Asset Management Program also measures its effectiveness by the progress and results delivered. The following highlights summarize key accomplishments achieved during the last fiscal year:

- **Condition Assessment Program:** The Asset Management Team completed approximately 38 condition assessments during the last fiscal year, spending nearly $1.1 million. Annual expenditures on condition assessments have been increasing year over year, illustrating Asset Management's dedication to knowing the current condition of OC San's major assets and performing incidental repairs following inspections to increase asset life and reliability.
- **Collection System Asset Management Activities:** Proactive efforts are underway to address isolated and severe defects in the gravity collection system by grouping similar asset issues for efficient execution of solutions. Services are being procured for cleaning and sonar inspections of inverted siphons and large-diameter pipelines. OC San also continues to improve the use of the recently implemented Info360 Asset software by refining risk and decision models over time and also moving to high-definition video for all new inspections. Three pump station valve replacement projects have also been completed, with two more projects in progress. A more robust program for force main inspections has also been implemented.
- **Treatment Plant Projects:** Several key projects were completed including improvements to central generation engines, Dissolved Air Flotation Thickeners (DAFTs) A and D, various pumps, Trickling Filter Clarifier B, truck loading scales, and short-term improvements to the A-Side Primary Clarifiers and Grit Basin cables. Ongoing efforts are

addressing critical needs such as variable frequency drive replacements, clarifier rehabilitation, digester gas dryer and heat exchanger moisture separator replacements and instrumentation upgrades, pump overhauls, and additional engine overhauls at the Central Generation Facility.

- **Planning Studies:** Three major planning studies—Central Generation Digital Twin, Energy and Digester Gas Master Plan, and On-site Oxygen Generation Feasibility Study at Plant No. 2—were successfully completed to guide future reliability and sustainability initiatives.

Budgetary Considerations

The AMP focuses on documenting short- to long-term planning of maintenance and capital improvement projects to support effective budget development and sustainable operations for robust planning purposes.

The FY 2025–2026 Budget Update, the second year of the 2-year budget adopted in June 2024 and updated in June 2025, includes updates to the 20-year Capital Improvement Program (CIP) outlay. Figure ES-6 includes current and projected CIP projects. The green bars show the current proposed CIP projects while the yellow bars show the future CIP projects, which are reevaluated and adjusted annually to reflect any new information.

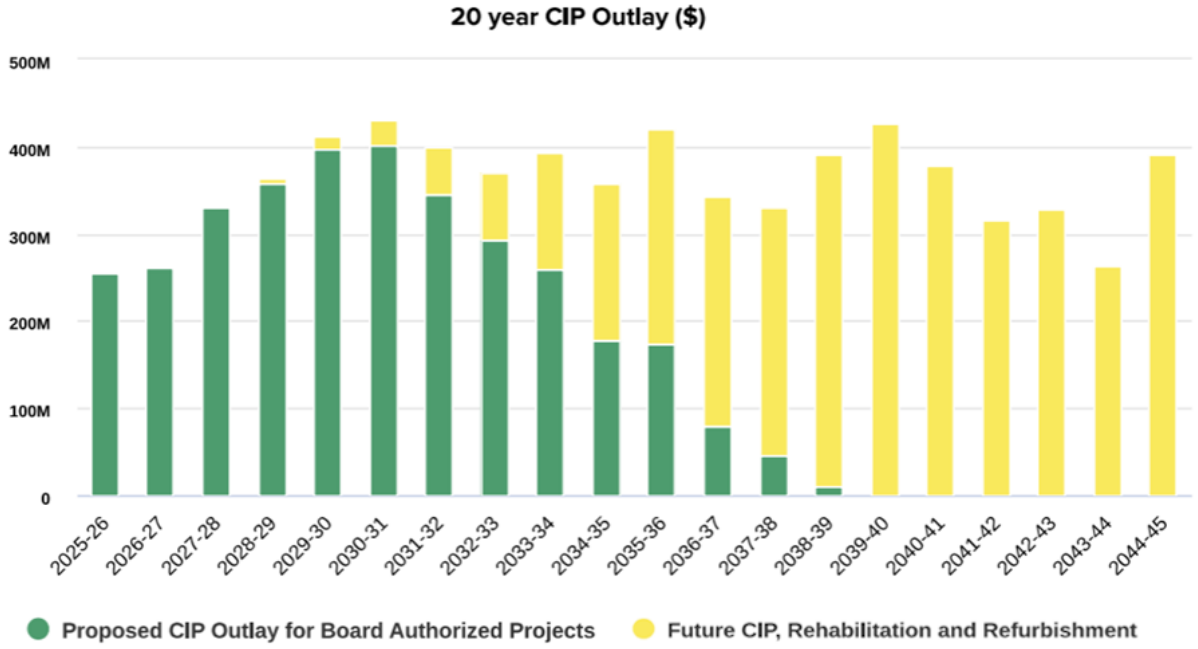


Figure ES-6. 20-Year CIP Outlay

1 Introduction

The Orange County Sanitation District (OC San) Board of Directors (Board) developed its mission and vision statements to clearly communicate OC San's purpose to its stakeholders and to articulate OC San's organizational objectives. The vision supports the mission by expressing what OC San strives to achieve now and into the future.

OUR MISSION

To protect public health and the environment by providing effective wastewater collection, treatment, and recycling.

OUR VISION

Orange County Sanitation District will be a leader in:

- Providing reliable, responsive, and affordable services in line with customer needs and expectations.
- Protecting public health and the environment utilizing all practical and effective means for wastewater, energy, and solids resource recovery.
- Continually seeking efficiencies to ensure that the public's money is well spent.
- Communicating our mission and strategies with those we serve and all other stakeholders.
- Partnering with others to benefit our customers, this region, and our industry.
- Creating the best possible workforce in terms of safety, productivity, customer service, and training.

Through improved and robust asset management practices, OC San is better able to coordinate and plan actions to ensure that all facilities and infrastructure are safe and reliable, and meet the rigorous level of service embodied by its mission statement.

In November 2019, OC San's strategic planning process resulted in the creation of an asset management policy and asset management initiatives. Collectively, the policy and initiatives guide OC San's asset management strategy.

Asset Management Policy

OC San's asset management policy states:

> *OC San will assess and manage the collection system and treatment plant systems and assets to improve resilience and reliability while lowering life cycle costs. This will be accomplished through adaptive operation, coordinated maintenance and condition assessment, and planned capital investment. Staff will balance maintenance, refurbishment, and replacement strategies to maximize useful life, system availability, and efficiency.*

Asset Management Initiatives

The asset management policy calls for the following initiatives:

- Create an annual Asset Management Plan (AMP) documenting the condition of the collection system and treatment plants, and upcoming maintenance and Capital Improvement Program (CIP) projects.
- Coordinate the efforts of Operations, Collections, Mechanical Maintenance, Electrical Maintenance, Instrument Maintenance, and Engineering through process teams to ensure that OC San's resources are focused on the high-priority work functions.

- Maintain a 20-year forecast of all CIP projects needed to maintain or upgrade OC San's assets on a prioritized risk basis to establish rate structures.

The AMP is a living document that describes evolving operational strategies, maintenance, refurbishment plans and adaptations, and CIP implementation; it is revised annually through the budgeting process. The information included in the AMP encompasses the breadth of information needed to successfully align the capital and operational planning activities necessary to meet the Asset Management Program objectives. The key objectives that are built into the Asset Management Program include the following:

- Take a proactive approach to repair, rehabilitate, and replace assets.
- Ensure assets are reliable and operating when needed.
- Minimize unplanned outages and equipment downtime.
- Manage risks associated with asset or service impairment through asset performance optimization.
- Develop cost-effective management strategies for the long term.
- Strive to implement world-class asset management strategies through continual improvement in OC San's asset management practices.

The AMP is a key component of OC San's overall planning activities. It aligns with OC San's Strategic Plan and the Facilities Master Plan (inclusive of the projects identified therein), while identifying potential and new opportunities that may require funding in the budget development process. Table 1-1 describes the relationship of the AMP with the other planning activities.



Table 1-1. Linkage between Asset Management Plan and Other Planning Activities

Planning Activity	Description	Planning Horizon	Update Cycle
Strategic Plan	Defines the strategic initiatives to be pursued by OC San and provides a basis for long-term financial, capital, and operating planning. The AMP aligns with Strategic Plan goals and objectives.	5- to 10-year	Biennial
Facilities Master Plan	Identifies long-term capital improvement plans to address treatment and collection system infrastructure improvement needs. Projects identified in the Facilities Master Plan are incorporated into the AMP and refined as appropriate.	20-year	Varies
Asset Management Plan	Documents the overall condition of treatment and collection system major assets and plans to address key condition and performance issues to ensure assets meet OC San's levels of service.	1-year 5-year 10-year and greater	Annual
Budget Book	Lays out the framework of OC San's activities and serves as a source of information for its Board of Directors, rate payers, and employees. It includes operational, capital, and debt service expenditures necessary to support its mission and to execute the Strategic Plan adopted by its Board of Directors. The AMP identifies new operational, maintenance, and capital improvement activities for consideration during the budget development process.	2-year	Annual

1.1 Overview of OC San's Infrastructure

OC San is responsible for providing wastewater collection, treatment, and recycling services to over 2.6 million people in central and northwest Orange County, California. OC San's two resource recovery and wastewater treatment facilities treated an average daily wastewater flow of 184 million gallons per day (MGD) from residential, commercial, and industrial sources in fiscal year (FY) 2024–2025.





In addition to its plant facilities, OC San owns and operates wastewater collection system infrastructure. The OC San collection system infrastructure includes over 380 miles of regional trunk sewer pipelines and 15 pump stations throughout its service area (Figure 1-1). Wastewater is conveyed via the collection system to Reclamation Plant Number (No.) 1 in Fountain Valley, and Reclamation Plant No. 2 in Huntington Beach, where resource recovery and wastewater treatment take place.

OC San's reclamation plants operate under a regulatory permit from the California Regional Water Quality Control Board and the U.S. Environmental Protection Agency. This authority is established through the National Pollutant Discharge Elimination System (NPDES), which permits the discharge of treated wastewater through an ocean outfall system to the Pacific Ocean. While some treated water is released 5 miles offshore through a deep-water ocean outfall system, most is recovered and delivered to the Orange County Water District (OCWD). OCWD further treats OC San's effluent using the Groundwater Replenishment System (GWRS), which improves the effluent water quality to drinking water standards for groundwater recharge and irrigation purposes. The following sections briefly describe the key systems under OC San's management.

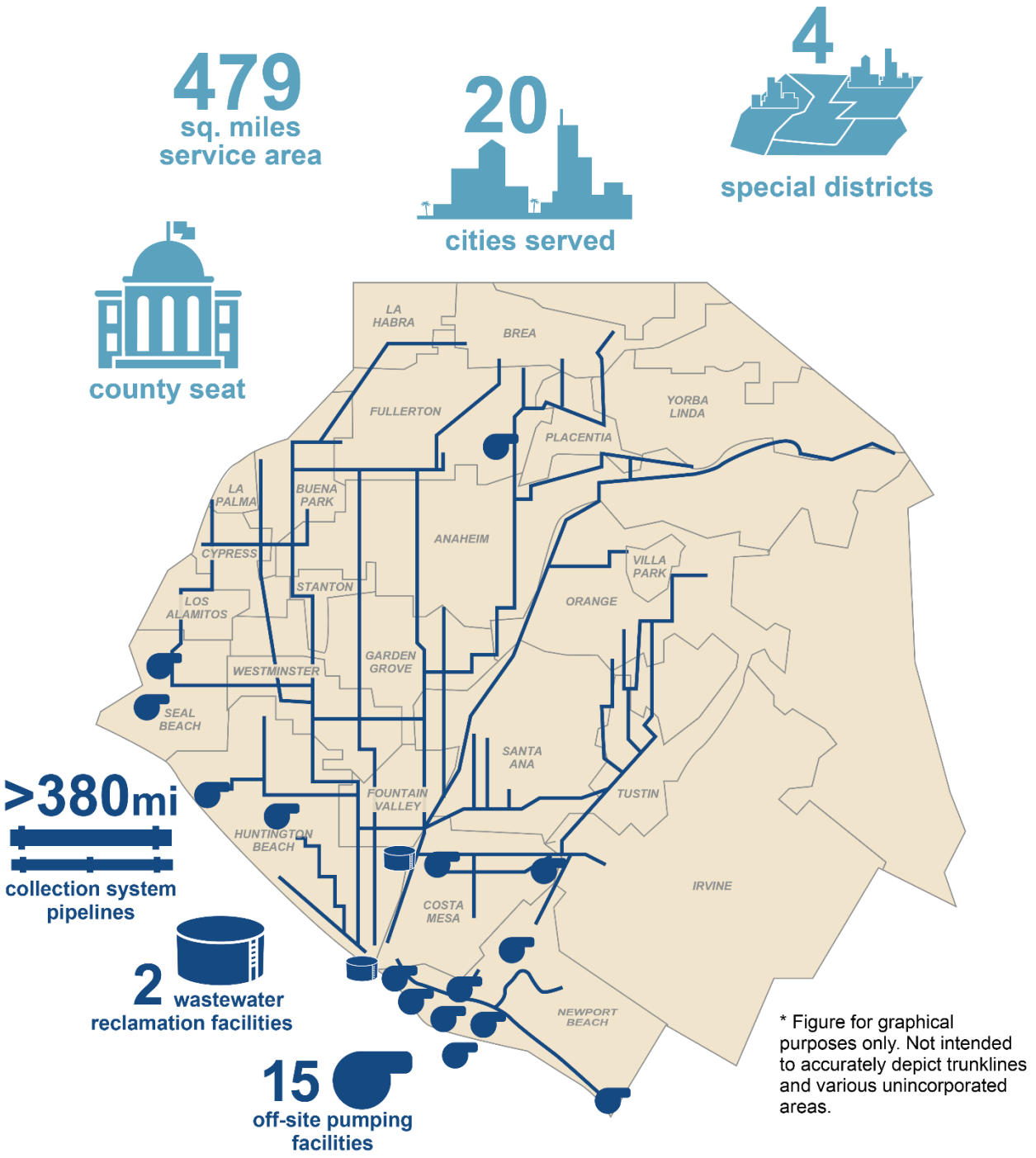
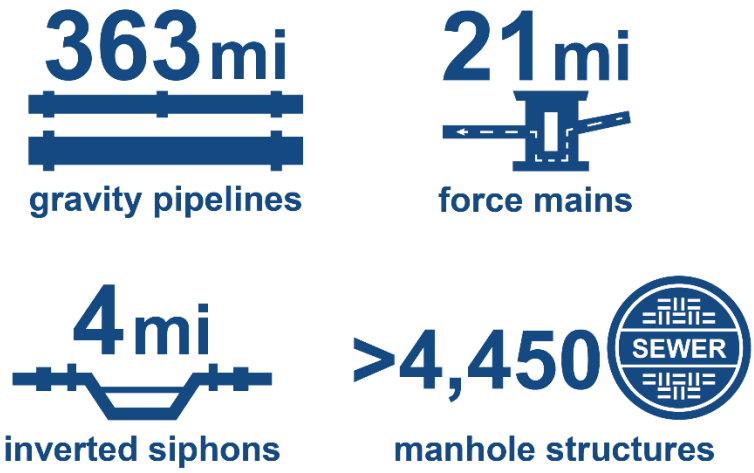


Figure 1-1. OC San's Service Area

1.1.1 Collection System

OC San's collection system serves as a regional conveyance system, collecting and conveying wastewater flows from 20 cities, 4 special districts, and various unincorporated areas, and accommodates dry weather urban runoff. OC San's more than 380 miles of collection system pipelines and 15 pump stations are spread throughout northwest Orange County and include 363 miles of gravity pipelines, 21 miles of force mains, 4 miles of inverted siphons, and more than 4,450 manhole structures.



OC San has worked with member city and agency staff to understand future development plans and flow estimates and has collected historical inflow and infiltration rates during wet weather events to ensure adequate flow-carrying capability exists in each trunk sewer system. OC San also factors in the effects of drought and lower domestic water usage rates to make sure the sewers operate properly at low-flow rates. Table 1-2 summarizes the design capacities of the pump stations; these design capacities reflect the maximum capacity of each station when all duty pumps are on and standby pumps are off.

Table 1-2. Pump Station Design Capacity

Pump Station	Location	Design Capacity (MGD)
Bitter Point	Newport Beach	39.4
Rocky Point	Newport Beach	6.5
Bay Bridge	Newport Beach	18.2
Crystal Cove	Newport Beach	0.8
Lido	Newport Beach	5.5
15th Street	Newport Beach	2.6
A Street	Newport Beach	1.4
MacArthur	Newport Beach	3.6
Main Street	Irvine	60
Seal Beach	Seal Beach	31.7
Slater	Huntington Beach	28.8
Westside	Los Alamitos	21.6
Edinger	Huntington Beach	2.5
College Avenue	Costa Mesa	8
Yorba Linda	Fullerton	11.5

1.1.2 Reclamation Plant System

OC San owns and operates two wastewater treatment plants that serve two primary functions: treatment and reclamation.

Reclamation Plant No. 1 (Plant No. 1) is located in the City of Fountain Valley, approximately 4 miles inland of the Pacific Ocean and adjacent to the Santa Ana River. Influent wastewater entering Plant No. 1 passes through a flow metering and diversion (M&D) structure, mechanical bar screens, grit chambers, and primary basins, before going to one of two air-activated sludge (AS) processes, or trickling filters (TFs), and secondary clarifiers. Thereafter, secondary effluent is diverted to OCWD's facilities for tertiary treatment before reuse. For a summary of Plant No. 1 design capacity, refer to Table 1-3. For a map of the facilities and more detailed understanding of how Plant No. 1 treatment processes work together, refer to Appendices A and B, respectively.

Solids treatment at Plant No. 1 includes co-thickening of primary and secondary sludge, followed by an anaerobic digestion process and centrifuge dewatering of digested sludge to produce Class B biosolids. Digester gas produced at Plant No. 1 is collected, cleaned, compressed, and transferred via a closed piping system to the Central Power Generation Facility as a renewable fuel for energy generation, and is interconnected to the Plant No. 2 facility. In addition, Plant No. 1 includes facilities for odor control and chemical addition to support the aforementioned processes.

Reclamation Plant No. 2 (Plant No. 2) is located in the City of Huntington Beach, adjacent to the Santa Ana River and east of Pacific Coast Highway. Raw sewage flow entering Plant No. 2 passes through a flow-metering structure, mechanical bar screens, and grit removal chambers. Flow then passes through primary basins before being split between the High-Purity Oxygen-AS or the Trickling Filter/Solids Contact (TF/SC) secondary treatment process.

With the construction of the GWRS final expansion and associated projects completed in 2023, Plant No. 2 is able to operate in a separated stream mode, splitting non-reclaimable and reclaimable streams. Additionally, both Plant No. 2 reclaimable secondary effluent and Plant No. 1 secondary effluent are diverting most of their treated water to OCWD for advanced treatment and groundwater injection. For a summary of Plant No. 2 design capacity, refer to Table 1-4. For a map of the facilities and more detailed understanding of how Plant No. 2 treatment processes work together, refer to Appendices C and D, respectively.

Solids treatment at Plant No. 2 includes dissolved air flotation thickening of secondary sludge, anaerobic sludge digestion of primary and thickened secondary sludge, and centrifuge dewatering of digested sludge to produce Class B biosolids. Plant No. 2 also has facilities for odor control and chemical addition. Digester gas produced at Plant No. 2 is collected, compressed, cleaned, and distributed to the Central Power Generation System as a renewable fuel for energy generation. Compressed digester gas can be shared between the plants through the interplant digester gas line.

Table 1-3. Plant No. 1 Dry/Wet Weather Design Capacity

Treatment Processes	ADWF Capacity (MGD)	PWWF Capacity (MGD)	Notes
Headworks	220	320	After MSP replacement by P1-105, with four duty pumps in service and one standby
Primary	153	352	With one circular and two rectangular primary clarifiers out of service
Secondary	182	345	With all basins, TFs, and clarifiers in service

Please see the comprehensive Acronyms and Abbreviations list for definitions.

Table 1-4. Plant No. 2 Dry/Wet Weather Design Capacity

Treatment Processes	ADWF Capacity (MGD)	PWWF Capacity (MGD)	Notes
Headworks	144	322	Three large and two small duty pumps in service, and one large pump and one small pump on standby
Primary	156	312	With one primary clarifier out of service
Secondary	150	317	With all basins, TFs, and clarifiers in service

Please see the comprehensive Acronyms and Abbreviations list for definitions.

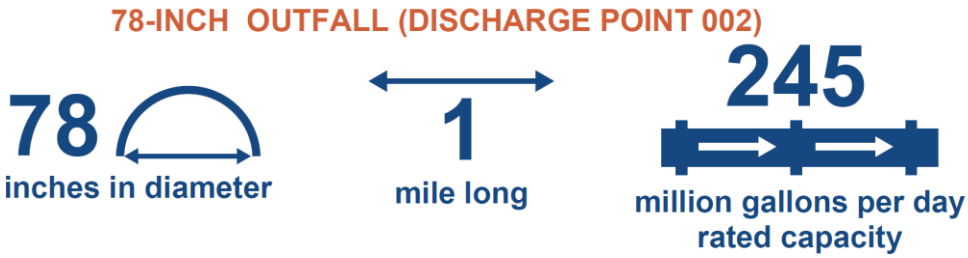
1.1.3 Outfall System

The ocean outfall system includes three discharge structures: 120-inch Outfall (Discharge Point 001), 78-inch Outfall (Discharge Point 002), and the Santa Ana River Emergency Overflow Weirs (Discharge Point 003).

120-inch Outfall (Discharge Point 001) serves as the primary ocean outfall, discharging treated wastewater approximately 5 miles offshore at a depth of approximately 200 feet. It began service in 1971. Based on the findings of a comprehensive assessment study completed in 2022, a rehabilitation project is in progress to ensure the outfall's reliability for many years to come.



78-inch Outfall (Discharge Point 002) serves as an emergency outfall and primary backup to the 120-inch Outfall, discharging treated wastewater more than a mile offshore at a depth of approximately 65 feet. It was originally constructed in 1954 and was later modified in 1965. OC San's NPDES permit specifies that this outfall can be used only in the case of an emergency or during planned maintenance activities.



Santa Ana River Emergency Overflow Weirs (Discharge Point 003) is a system with two overflow weirs at Plant No. 2 that discharge directly to the Santa Ana River. These weirs are for extreme emergency use only and serve as a secondary backup to the primary outfall facilities, ensuring the safety and welfare of the community at large.

1.2 Asset Management Organization

Asset management is an essential part of OC San's mission to deliver safe, economical, and reliable wastewater treatment services. Every part of the OC San organization is involved in some aspect of managing assets and ensuring that assets are designed, constructed, operated, and maintained to reliably deliver the required level of service to its customers. Through a collaborative effort, each OC San group plays an important role in ensuring that the individual asset management initiatives and projects are properly executed (Figure 1-2).



Figure 1-2. Groups with Roles in Asset Management

- **Operations** operates and monitors assets and infrastructure that convey, treat, process, and recover resources.
- **Maintenance** performs proactive, corrective, and restorative activities in a planned setting to maintain asset reliability and capacity, collectively referred to as reliability-centered maintenance (RCM). The goals of RCM involve implementing well-coordinated maintenance strategies to ensure OC San's assets will operate at the required level of service.
- **Planning** provides engineering support for short- and long-term management of assets, while working toward asset management objectives. The Asset Management Group works in the Planning Division of Engineering, interfacing with Operations, Maintenance, and the other Engineering divisions on a regular basis.

- The **Project Management Office** manages the design and construction of new facilities and the rehabilitation of older facilities. The Small Projects Delivery Team within the Project Management Office is responsible for the execution of facility maintenance, repair, and replacement projects.
- **Design** ensures projects and assets are designed in accordance with engineering standards and codes and meet stakeholder needs.
- **Construction Management** ensures assets are constructed in accordance with contract documents.
- **Information Technology** supports and maintains the digital platforms and systems that support asset management functions, ensuring data integrity, system integration, and consistent, reliable information across the organization.

To fulfill OC San's commitment to ratepayers to provide safe and reliable services, the Asset Management Program is structured to align the Engineering Department and Operations and Maintenance (O&M) Departments. OC San's Asset Management Group, within Engineering's Planning Division, consists of nine Asset Engineers assigned to the various process areas in the treatment plants and collection system, plus an engineer specializing in corrosion control who leads condition assessments and coating projects. Staff are responsible for understanding the key issues or concerns related to the condition and performance of OC San's assets and for developing and coordinating plans or strategies to ensure that the assets operate properly and reliably.

The Asset Engineers, each assigned to their respective process or collection system area(s), work closely with associated O&M team members to stay current with the operation, condition, process, and/or maintenance-related issues within their assigned areas. The Operations Team focuses on the optimal utilization of assets to extend equipment life and minimize energy and chemical use, while meeting all regulatory and level-of-service requirements. The Maintenance Team is committed to ensuring installed assets are in a ready state for Operations that optimizes planned maintenance and minimizes costs and downtime.

Collectively, the area Asset Engineer and O&M work together to reach the goal of providing the required level of service at the lowest life cycle cost with an acceptable level of risk. This strategy involves a significant investment in internal coordination but ensures that OC San is properly assessing risks, solving problems, and processing deficiencies in a timely manner.

1.2.1 Major Assets

A "major asset" is defined as any asset that is specifically tracked, monitored, or recorded for the purposes of fulfilling the policies and initiatives of the AM Program. A major asset can be composed of other assets. For example, a clarifier can be called a major asset, yet it is composed of other assets such as pumps, drive mechanisms, motors, etc. Similarly, for buried assets, a system of pipe segments known as a trunkline can be called a major asset. The Asset Engineer uses the term "major asset" to differentiate and communicate for purposes related to the execution of the AMP, which includes developing short-, medium-, and long-term plans for each process area. "Major assets" are sometimes simply referred to as "assets" for simplicity. Here are some examples of tests that are used to differentiate between a major asset and merely an asset:

- Does it perform a substantial role in the collection, treatment, or effluent process?
- Does its direct use impact level of service and quality metrics?
- Does it require a predictive, proactive, or preventive maintenance (PM) service approach to facilitate its management?
- Does its failure cause significant disruption to the overall process or system? Is its reliability essential to the plant's operational efficiency?
- Does its malfunction negatively impact key performance metrics or targets?
- Could its failure compromise safety protocols or create safety hazards?

- Does it play a direct role in maintaining regulatory permit compliance?

There are other variations of the definition of an “asset” outside of the AMP. These variations are typically minor and unique to the identifying group based on specific goals and objectives. For example, some variations in the definition exist between those defined in the AMP and by the Maintenance and Finance Departments. The Maintenance definition of an asset serves the Maintenance Department goals and objectives by providing a means to properly track and maintain those items using the Enterprise Asset Management (EAM) system, Maximo®. Furthermore, the AMP definition of an “asset” deviates from the Financial Management Division’s definition, as it is based on accounting practices for tax purposes. In summary, the Asset Management, Maintenance, and Finance groups look at and define assets somewhat differently and it is important to identify those similarities and differences to maintain alignment among the groups to achieve OC San’s common goals and objectives.

1.2.2 Remaining Useful Life

An asset’s Remaining Useful Life (RUL) is the estimated time remaining until the asset cannot be reliably maintained and fails to provide the required level of service. Failure includes structural failure as well as operational/service failure. The Asset Management Program converts RUL into RUL scoring for each asset on a scale of 1 to 5 per Table 1-5.

Table 1-5. Remaining Useful Life Score versus Remaining Useful Life

RUL Score	5	4	3	2	1
RUL	< 5 years	5–10 years	11–15 years	16–20 years	> 20 years

Asset Engineers determine the RUL of major assets based on a variety of factors:

- Expected RUL from original installation, repair, or rehabilitation date(s) and regular maintenance activities based on historical data (when available)
- Condition assessments, including manned or remote inspections as applicable
- O&M field observations and recommendations
- Performance, maintenance, and reliability history, including condition monitoring reports from the Maintenance Reliability Group
- Regular field inspections of asset areas
- Engineering judgment

1.2.3 Asset Life Cycle Curve D-I-P-F

The ‘P-F’ curve is a concept that identifies the intervals between Potential Failure ‘P’ and Functional Failure ‘F’ and was first introduced by Stan Nowland and Howard Heap in 1978. The curve has since been extended to include Design ‘D’ and Installation ‘I’ by Doug Plucknette and is called the ‘D-I-P-F’ curve, also known as the Asset Life Cycle Curve (Figure 1-3).

At OC San, it is understood that detecting potential failure alone is not enough to consider a program a success. For each detected potential failure, it is also important to determine the root cause of the failure and know how to eliminate the cause. OC San’s goal is to ensure all asset stakeholders are working together to move to the left of the ‘P-F’ curve into the ‘I-P’ precision domain with proper installation, commissioning, precision alignment, and balancing through good work processes, procedures, and practices. Ultimately, the goal is to apply the lessons learned to future designs to improve asset reliability and resistance to failure and minimize maintenance costs.

1.2.4 Predictive Maintenance

In asset management, Predictive Maintenance (PdM) strategies are used to regularly monitor the condition of assets. OC San’s Maintenance Reliability Group implements the PdM Program,

which collects data through condition monitoring to provide real-time performance evaluation of assets. PdM is a proactive approach that minimizes unexpected breakdowns and extends the mean time between failures. It reduces not only the likelihood of failure but also overall equipment downtime and repair costs by monitoring the actual equipment health through quantifiable means and performing advanced analysis and failure detection to identify condition degradation in its early phase (Figure 1-3).

In addition, when sudden changes or variations in the process manifest, they are often found during the regular Maintenance Reliability rounds as part of the group's everyday work. The ability to monitor equipment lends itself to helping Maintenance optimize intervals between corrective repairs, minimizing the number and cost of unscheduled repairs created by machine-train failures, and improving equipment reliability.

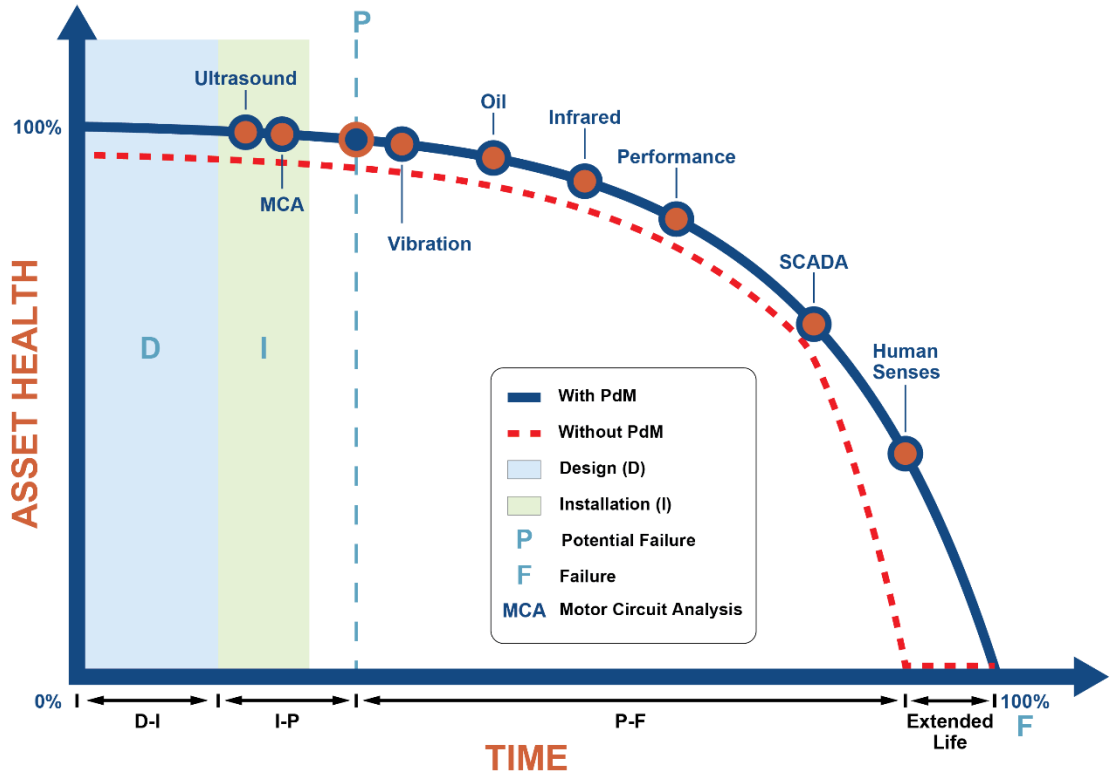


Figure 1-3. D-I-P-F Curve and PdM Summary

1.2.4.1 Mechanical Discipline

The mechanical discipline involves variance trending of the PdM test results, which includes the following:

- Vibration analysis to measure imbalance in rotating equipment
- Oil analysis to predict lubricant and equipment degradation
- Airborne ultrasound
- Structure ultrasound
- Infrared thermograph to detect hot spots
- Iris™ motion amplification camera (measures deflection and displacement)

In addition to PdM activities for mechanical equipment, OC San also uses laser alignment techniques to enhance rotating machinery accuracy to increase the machinery's operating life span.

1.2.4.2 Electrical Discipline

The electrical PdM Program includes the following tests:

- Oil analysis for transformers
- Ultrasound to detect arcing
- Infrared thermography to detect hot spots
- Circuit breakers and protective relays testing
- Motor circuit analysis for large and small motors to determine motor stator health, broken rotor bars, deteriorating motor connections, and any impending failure trends
- Medium-voltage feeder cable testing to determine the health of cables and insulation

1.2.4.3 Civil Discipline

The civil aspect of PdM includes the following:

- Closed-circuit television (CCTV) assessments of buried pipe and manhole structures
- Sonar assessments of inverted siphons
- Structural sampling, testing, and analysis of concrete assets
- Water-level monitoring and debris accumulation prediction in the collection system

1.2.5 Preventive and Corrective Maintenance

Beyond the advanced PdM strategies, OC San also performs time- and cycle-based PM and corrective maintenance (CM) activities. It is these activities that, if well implemented, greatly extend the life of the assets. Recognizing the importance of these efforts, OC San has dedicated the following two groups of skilled individuals to reinforce and sustain the relevant maintenance activities:

- The PM Optimization Group is tasked with conducting in-depth assessments to optimize PM strategies for new and existing assets and to establish maintenance approaches for assets installed by projects prior to beneficial occupancy. The PM Optimization Program tracks, maintains, and manages assets throughout their life cycles, from design, construction, commissioning, beneficial occupancy, operation, and maintenance to the eventual decommissioning or replacement of those assets. This ensures that the asset life cycle is maximized with the lowest risk of process failure by achieving the intended reliability, at the lowest possible cost, and maximizing equipment availability.
- The Maintenance Planning Group drives reliability and effectiveness in the craft-based maintenance work groups they support by preparing and scheduling ready-to-execute work with appropriate resources such as tools, materials, labor, and job plans. Maintenance specialists in this group are responsible for managing blanket maintenance service contracts, planning and scheduling maintenance activities, optimizing PM activities within Maximo® (which includes fine-tuning job plans based on input received from field staff, leads, maintenance supervisors, and engineers), and coordinating complex maintenance activities involving shutdowns and outages.

OC San's PM and CM programs are staffed to address the long-term reliable performance of civil, mechanical, electrical, and instrumentation assets. PM and CM activities specific to these disciplines are an integral part of OC San's maintenance program. The following lists provide examples of tasks performed; however, they are not meant to be inclusive of all maintenance responsibilities.

1.2.5.1 Mechanical, Electrical, and Instrumentation Disciplines

PM and CM activities include:

- Valve and gate exercising program comprising more than 264 PM tasks for over 1,650 valves and gates throughout both plants and collection system

- Equipment rotation program to ensure equipment wear is predictable
- Adjusting and aligning mechanical equipment
- Rebuilding and regular testing of equipment
- Changing of lubricants and filters
- Cleaning and torque verification of electrical equipment
- Testing electrical power distribution equipment
- Testing circuit breakers and protective relays
- Calibrating sensors and meters

1.2.5.2 Civil Discipline

PM and CM activities include:

- Cleaning of civil facilities and pipelines (collection system)
- Chemical conditioning of wastewater to reduce corrosion and control odors
- Minor repairs
- Application and repair of coatings
- Maintenance and testing of cathodic protection systems

1.3 Reference

Society for Maintenance and Reliability Professionals (SMRP). 2013. *Maintenance and Reliability Best Practices.* 4th Edition.

2 State of OC San's Infrastructure

The Area AM Summaries provide a list of major assets and are intended to summarize information on those assets, including condition, average RULs, key issues under further investigation, and plans to address performance and reliability issues of these assets over the 1-, 5-, and 10-year planning horizons, as well as CIP projects planned over the next 10 to 15 years. Over the course of the year, Asset Engineers present one or more of the Area AM Summaries to the OC San Managers who make up the AM Council. All the process areas, pump stations, and collection systems are presented with feedback and questions being provided by the AM Council. The Area AM Summaries are updated as needed and incorporated into the AMP, which is published annually.

2.1 Area Asset Management Summaries

The Area AM Summaries provide a high-level overview of the assets in the areas contained in Section 2.2. The RUL scores are an average of the RUL scores for the discipline within that process area. The summaries are for the following components:

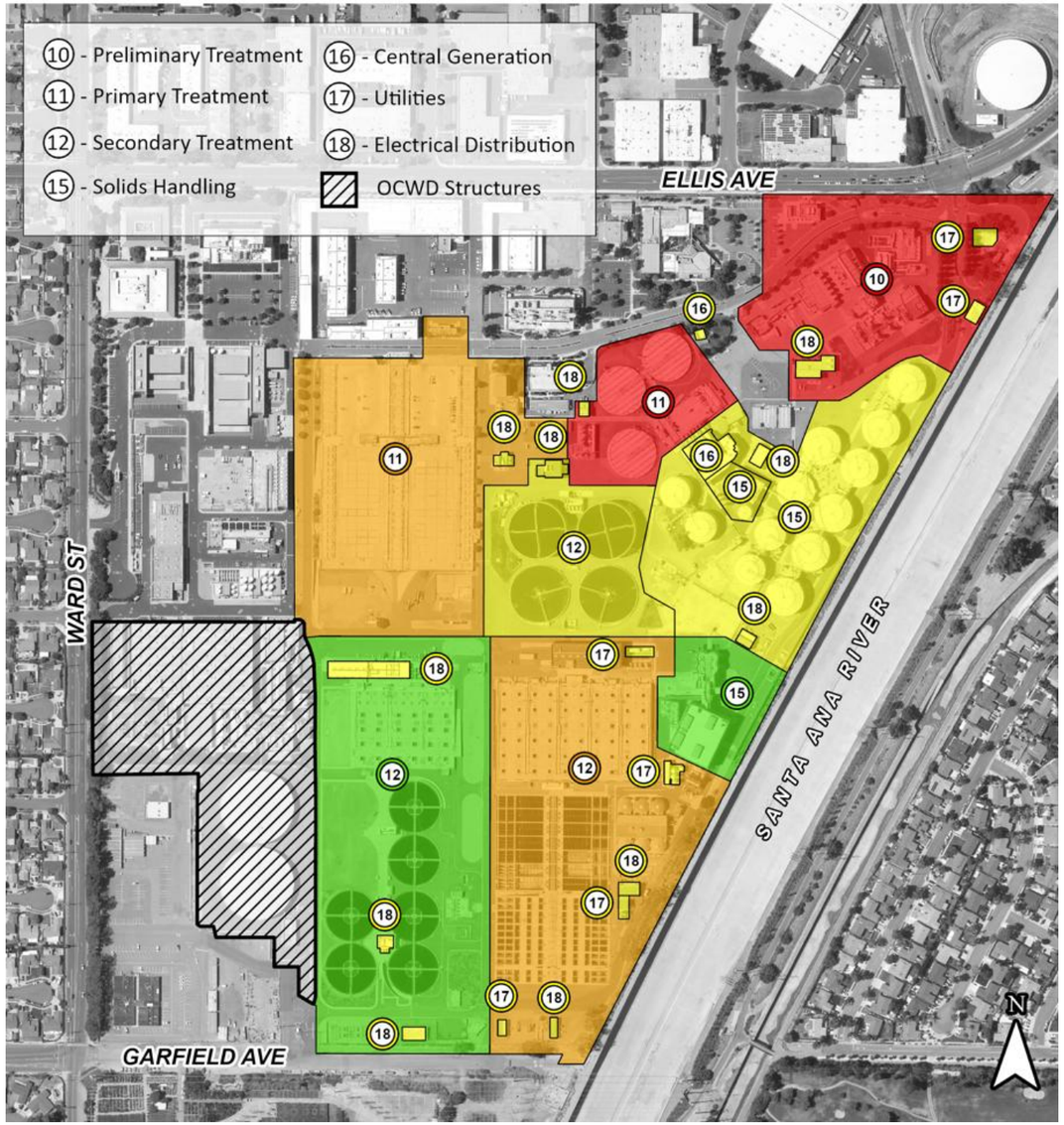
- Plant No. 1
- Plant No. 2
- Collection System – Pump Stations and Force Mains
- Collection System – Pipelines and Manholes

The Area Asset Management Summaries include area maps (Figure 2-1 through Figure 2-4) showing the general layout of the process areas or collection system, and tables (Table 2-1 through Table 2-4) with the following fields:

- **Area No.:** Number that corresponds to individual plant asset areas. Plant No. 1 asset areas are numbered 10 to 19, and Plant No. 2 asset areas are numbered 20 to 29.
- **Area Name:** Name of asset area.
- **Average RUL Score:** Estimated average RUL score for each discipline (civil, structural, mechanical, electrical, and instrumentation) or area based on an average of the RUL scores provided in the detailed Area AM Summaries.
- **Percentage of RUL Scores with 4s or 5s**: Percentage of major assets with a RUL of 10 years or less.

AREA ASSET MANAGEMENT SUMMARY – PLANT NO. 1 OVERVIEW

Figure 2-1. Plant No. 1 Process Area – Remaining Useful Life Score Map



Note: Areas 14 and 19 are excluded from the map. The colored process areas reflect the average RUL score as shown on the respective table.

Table 2-1. Plant No. 1 Remaining Useful Life

Area No.	Area Name	Average Remaining Useful Life Score						Percentage of RUL Scores with 4s or 5s
		Civil	Structural	Mechanical	Electrical	Instrumentation	All Assets	
10	Preliminary Treatment	3	3	4	5	5	5	67%
11	Primary Treatment - Basins (1–5)	5	4	5	5	4	5	79%
11	Primary Treatment - Basins (6–31)	4	3	4	4	4	4	42%
12	Secondary Treatment – Activated Sludge 1 (AS1)	3	4	5	5	5	4	73%
12	Secondary Treatment – Activated Sludge 2 (AS2)	1	1	2	3	3	2	3%
12	Secondary Treatment – Trickling Filter	1	1	3	3	4	3	26%
14	Interplant[a]	2	2	2		1	2	15%
15	Solids Handling – Digesters	2	2	3	3	3	3	16%
15	Solids Handling – Thickening & Dewatering (T&D) Facilities	1	1	2	3	3	2	12%
15	Solids Handling – Gas Handling[a]		3	3	3	4	3	44%
16	Central Generation (CenGen)[a]		1	3	4	4	3	37%
17	Utilities	3	1	4	4	3	3	23%
18	Electrical Distribution[a]				3		3	47%
19	Occupied Buildings	*Refer to Area 19 Asset Management Summary*						
	Plant No. 1 Total							**38%**

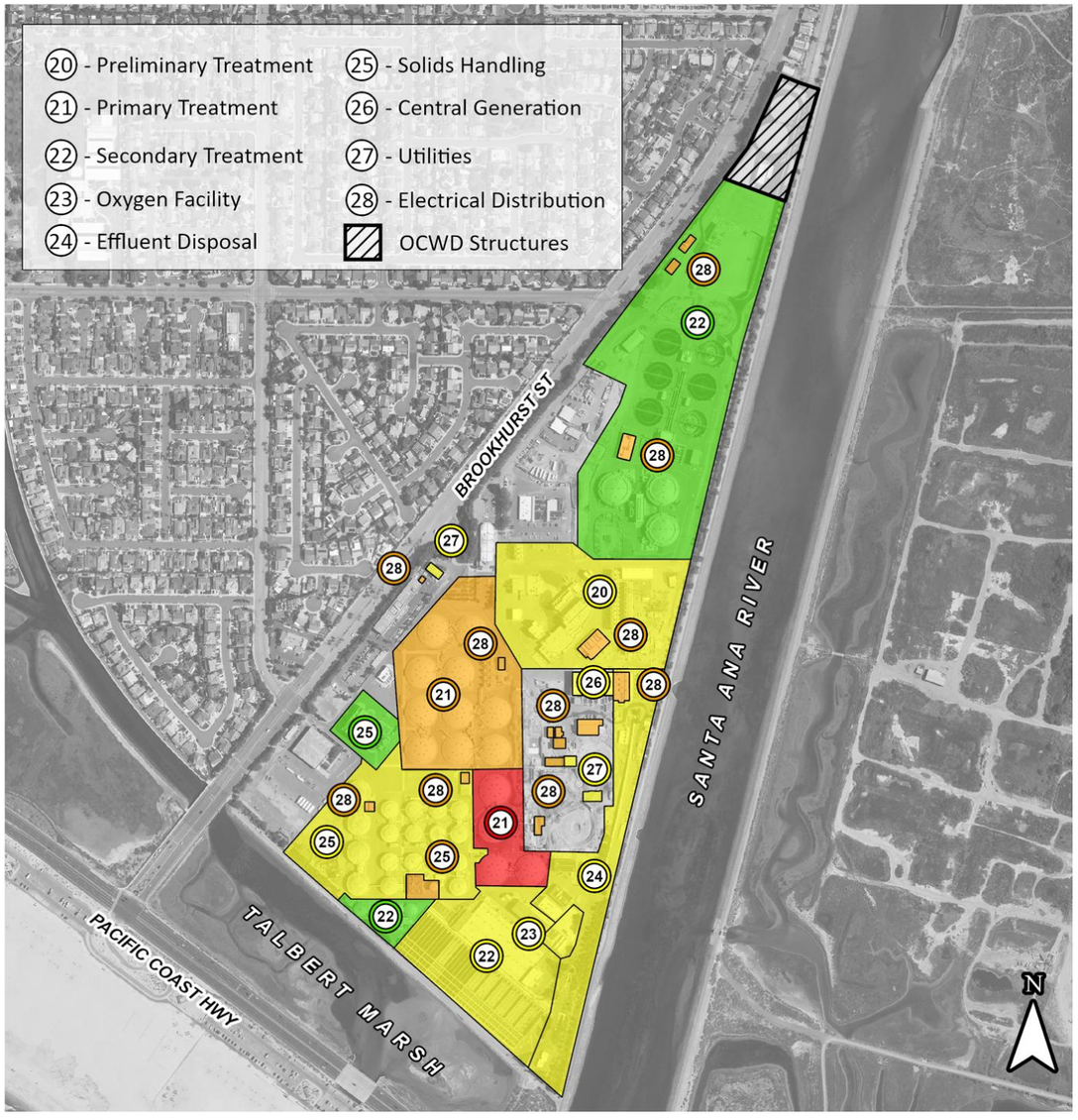
Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

[a] White box with diagonal line indicates there are no assets assigned to this discipline within this process area.

AREA ASSET MANAGEMENT SUMMARY – PLANT NO. 2 OVERVIEW

Figure 2-2. Plant No. 2 Process Area – Remaining Useful Life Score Map



Note: Area 29 is excluded from the map. The colored process areas reflect the average RUL score as shown on the respective table.

Table 2-2. Plant No. 2 Remaining Useful Life

Area No.	Area Name	Average Remaining Useful Life Score						Percentage of RUL Scores with 4s or 5s
		Civil	Structural	Mechanical	Electrical	Instrumentation	All Assets	
20	Preliminary Treatment	1	1	3	4	3	3	12%
21	Primary Treatment - A Side	5	5	5	4	4	5	100%
21	Primary Treatment - B & C Side	4	3	4	3	4	4	34%
22	Secondary Treatment - Activated Sludge	3	3	3	4	3	3	28%
22	Secondary Treatment - DAFT	4	1	3	2	3	2	17%
22	Secondary Treatment - Trickling Filter	2	1	2	2	3	2	10%
23	Oxygen Facility	3	3	3	4	4	3	100%
24	Effluent Disposal	2	2	3	4	4	3	35%
25	Solids Handling - Digesters	4	4	3	3	3	3	69%
25	Solids Handling - Facilities	2	1	2	2	3	2	5%
25	Solids Handling - Gas Handling[a]		3	4	4	4	4	50%
26	Central Generation[a]		1	3	4	4	3	39%
27	Utilities	3	1	3	4	3	3	20%
28	Electrical Distribution[a]				4		4	57%
29	Occupied Buildings	*Refer to Area 29 Asset Management Summary*						
	Plant No. 2 Total							**41%**

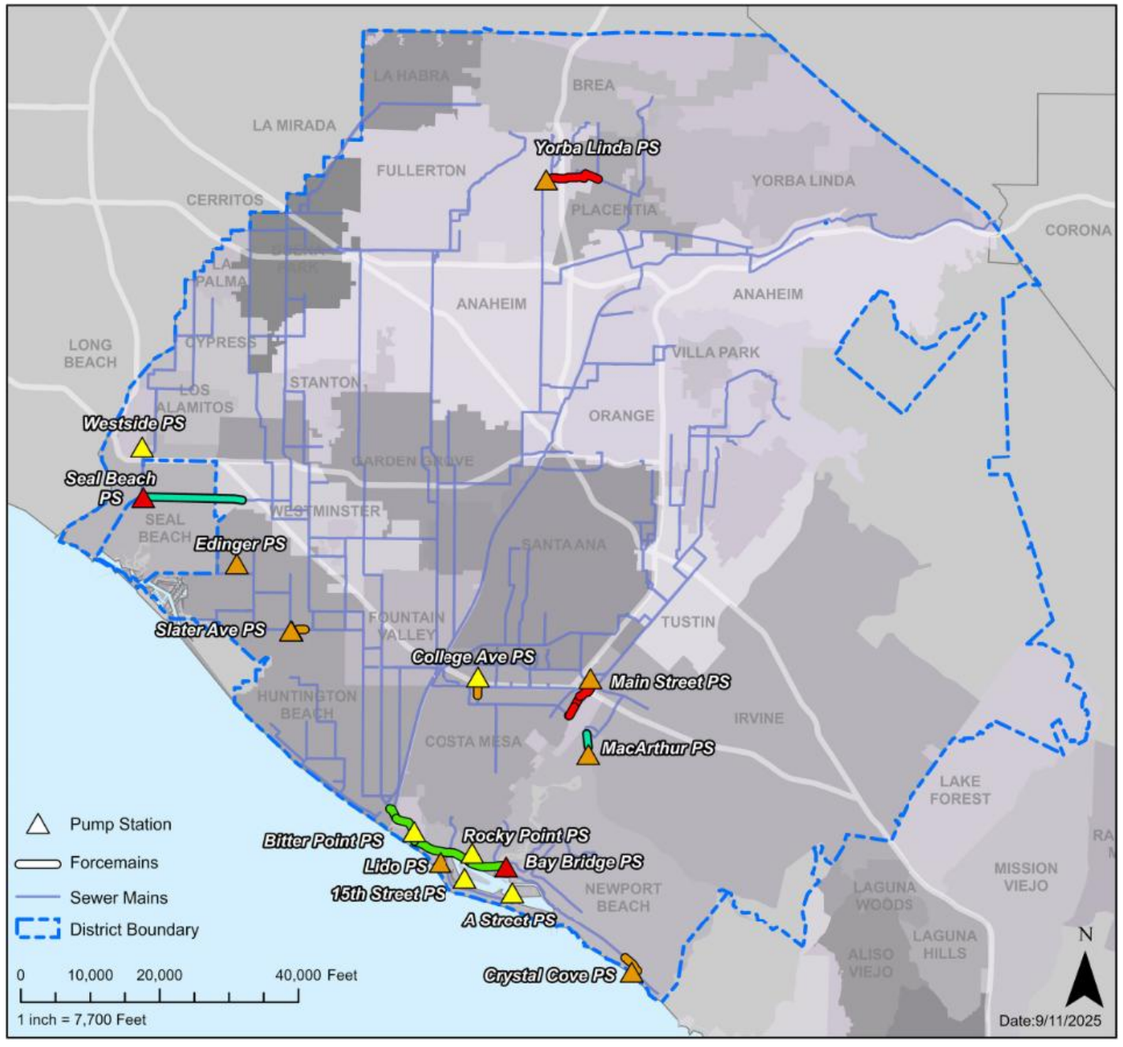
Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

[a] White box with diagonal line indicates there are no assets assigned to this discipline within this process area.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM PUMP STATION AND FORCE MAIN OVERVIEW

Figure 2-3. Collection System Pump Stations and Force Mains – Remaining Useful Life Score Map



Note: Not all pump station force mains are shown on this map. Only longer force mains are shown. The colored pump stations reflect the average RUL score as shown on the respective table.

Table 2-3. Collection System Pump Station and Force Main Remaining Useful Life

Pump Station	Average Remaining Useful Life Score						Percentage of RUL Scores with 4s or 5s
	Force Main	Structural	Mechanical	Electrical	Instrumentation	All Assets	
15th Street	3	4	4	3	3	3	27%
A Street	3	4	4	3	3	3	25%
Bay Bridge	5	4	5	4	3	5	85%
Bitter Point	2	2	3	3	4	3	23%
College	4	3	3	2	3	3	25%
Crystal Cove	4	4	4	3	3	4	42%
Edinger	5	4	3	4	5	4	64%
Lido	4	4	4	4	3	4	75%
MacArthur	1	3	4	5	4	4	73%
Main Street	5	2	4	4	4	4	46%
Rocky Point	3	3	3	3	4	3	23%
Slater	4	3	4	3	4	4	38%
Seal Beach	1	4	5	4	5	5	83%
Westside	5	3	3	3	4	3	31%
Yorba Linda	5	4	4	4	4	4	82%
Newport Force Mains[a]	2					2	0%
Total							**49%**

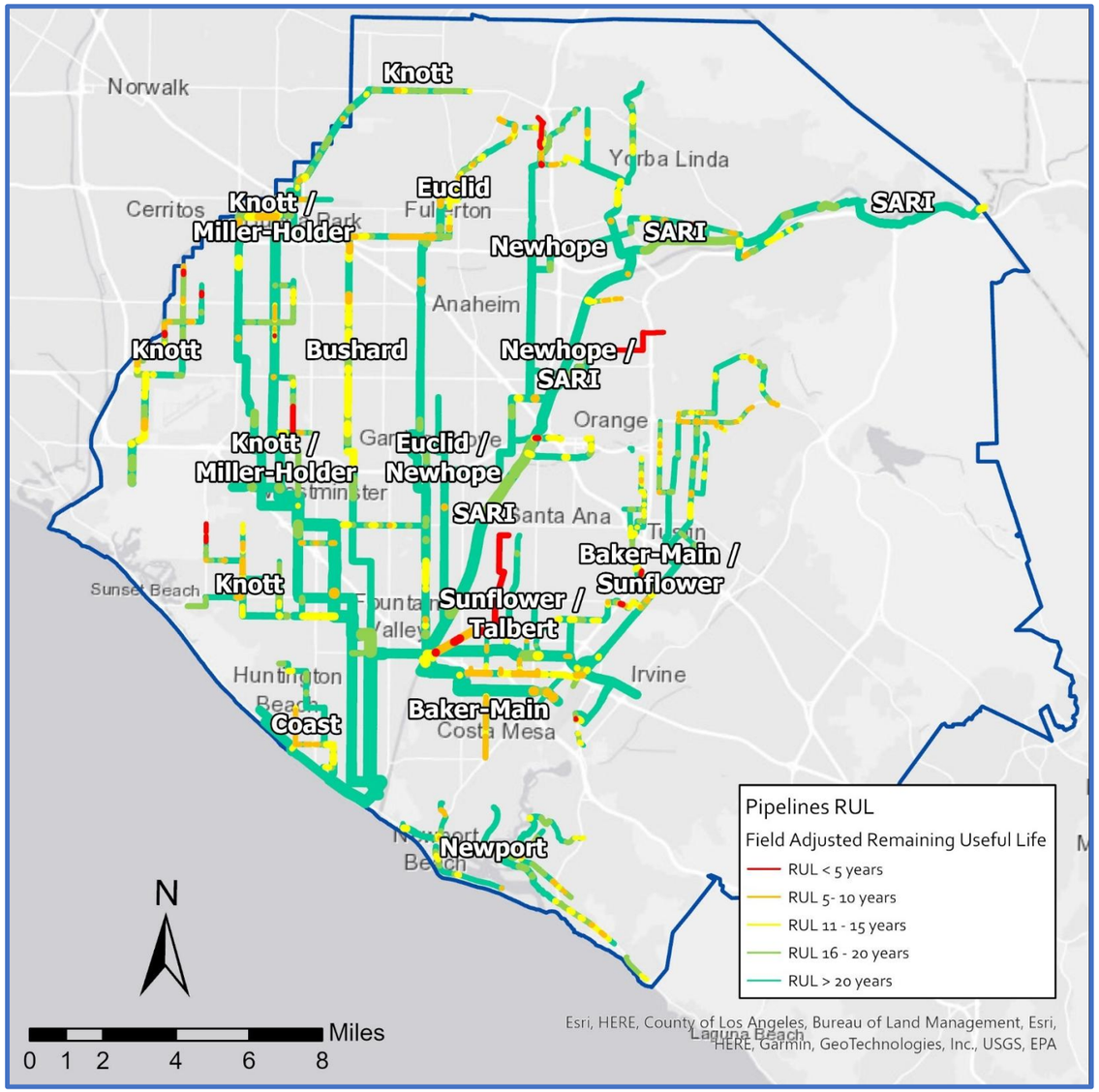
Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

[a] White box with diagonal line indicates there are no assets assigned to this discipline within this process area.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM PIPELINE AND MANHOLE OVERVIEW

Figure 2-4. Collection System Pipelines and Manholes – Remaining Useful Life Score Map



Note: Only pipelines are shown on this map for clarity. Refer to Collection System Manholes Remaining Useful Life Score Map in Section 2.2, Area Asset Management Summaries List.

Table 2-4. Collection System Pipeline and Manhole Remaining Useful Life

Trunklines	No. of Pipes with RUL Score of 4 or 5	Miles of Pipes with RUL Score of 4 or 5	Percentage of Pipes with RUL Score of 4 or 5 (by length)	No. of Manholes with RUL Score of 4 or 5	Percentage of Manholes with RUL Score of 4 or 5
Baker-Main	74	4.9	12%	—[a]	—[a]
Bushard	11	1.4	6%	3	1%
Coast	16	1.1	10%	3	2%
Euclid	13	0.7	2%	69	16%
Interplant[b]	0	0.0	0%	0	0%
Knott	37	2.6	4%	94	12%
Miller-Holder	22	1.6	5%	43	16%
Newhope	26	1.7	6%	82	23%
Newport	20	1.0	4%	30	8%
Santa Ana River Interceptor	66	3.0	6%	160	28%
Sunflower	15	0.5	1%	—[a]	—[a]
Talbert	77	5.9	70%	—[a]	—[a]
Total	**377**	**24.2**	**7%**	**484**	**11%**

Please see the comprehensive Acronyms and Abbreviations list for definitions.
[a] Only trunklines with greater than 50% manhole inspections completed are included in this table and in the Asset Management System Summaries.
[b] Interplant Trunk in this table refers only to Interplant Trunkline E (IPE) assets. Interplant Trunkline assets are included with Knott Trunkline in its Asset Management System Summary.

2.2 Area Asset Management Summaries List

The following AM Summaries document the current state of process areas in both plants and the collection system. The remainder of this section contains the AM Summaries organized as follows:

Plant No. 1 Area Asset Management Summaries

- Preliminary Treatment
- Primary Treatment
- Secondary Treatment – Activated Sludge
- Secondary Treatment – Trickling Filters
- Interplant
- Solids Handling – Digesters
- Solids Handling – Remaining Facilities
- Central (Power) Generation
- Utilities
- Electrical Distribution
- Occupied and Power Buildings

Plant No. 2 Area Asset Management Summaries

- Preliminary Treatment
- Primary Treatment
- Secondary Treatment – Activated Sludge
- Secondary Treatment – Trickling Filters/Solids Contact
- Effluent Disposal
- Solids Handling – Digesters
- Solids Handling – Remaining Facilities
- Activated Sludge and Oxygen Facility
- Central (Power) Generation
- Utilities
- Electrical Distribution
- Occupied and Power Buildings

Collection System Asset Management Summaries

- Pump Stations and Force Mains
- Pipelines and Manholes

The AM Summaries are built around a common structure. This structure provides a framework for continued use and development of the summaries. Key structure elements for AM Summaries are shown on Figure 2-5.



Figure 2-5. Area Asset Management Summary Structure

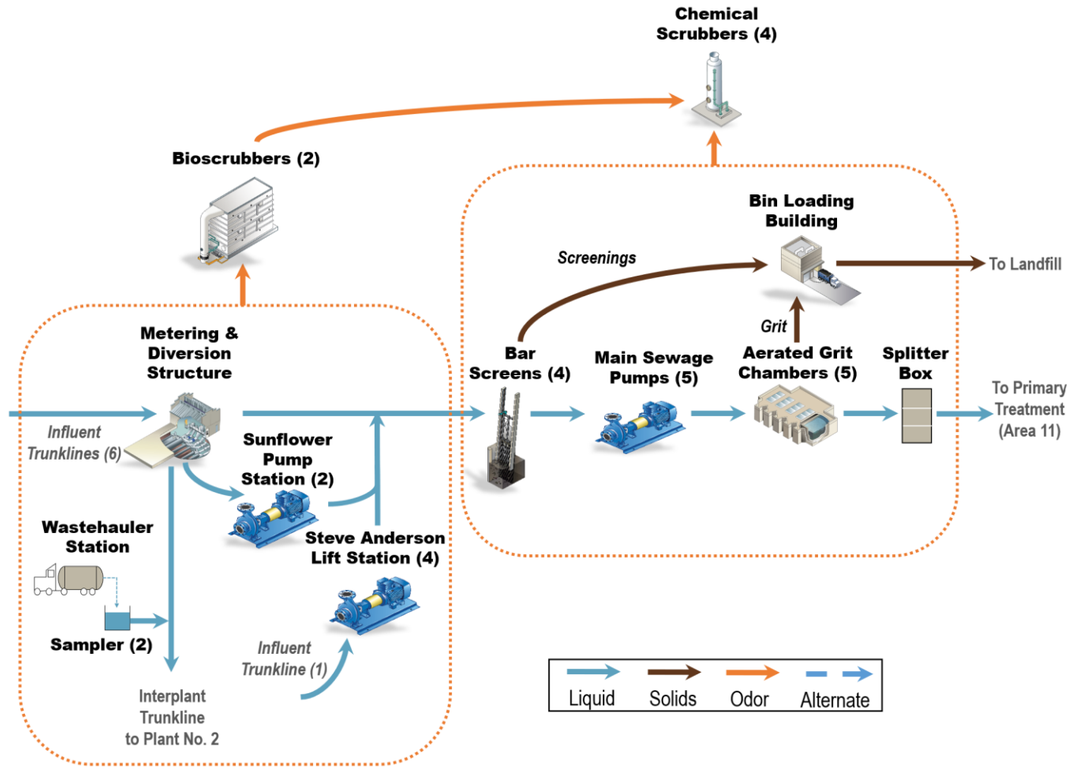
Plant No. 1 Area Asset Management Summaries

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AREA 10 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 PRELIMINARY TREATMENT

2.2.1 Plant No. 1 Preliminary Treatment

Process Schematic



Major Assets Remaining Useful Life

Asset Type	Metering & Diversion	Sunflower Pump Station	Steve Andersen Lift Station	Bar Screens	Main Sewage Pumps	Aerated Grit Chamber	Splitter Box	Bin Loading Building	Chemical Scrubbers	Bioscrubbers	Wastehauler Station
Civil											
Effluent Piping	-	-	-	-	-	-	3	-	-	-	-
Structural											
General	2	5	1	2	2	2	3	3	4	3	3
Mechanical											
Piping	5	-	1	-	1	-	-	-	-	-	3
Gates/Valves	5	5	2	5	5	5	5	-	5	3	2
Gearboxes	-	4	-	1	-	-	-	5	-	-	-
Screens	-	-	-	1	-	-	-	-	-	-	-
Pumps	-	5	2	-	5	-	-	-	5	5	-
Conveyors	-	-	-	5	-	-	-	4		-	-
Fans/Blowers	4	4	2	4	5	5	-	5	5	1	2
Electrical											
VFDs	-	-	5	-	5	-	-	-	-	4	-
MCCs	5	5	2	5	5	5	5	5	5	5	5
Instrumentation											
General	5	5	4	5	4	-	5	-	5	5	4

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

Major Assets	Quantities
Metering and Diversion	
Flowmeters	7
Gates	29
Sunflower Pump Station	
Screw Pumps	2
Motors	2
Gearboxes	2
Lube Oil Systems	2
Gates	3
Steve Anderson Lift Station	
Main Pump/Motor/VFD	4
Drain Pumps	2
Sump Pumps	4
Flowmeter	1

Major Assets	Quantities
Bar Screens	
5/8" Bar Screens	6
Gates	21
Fans	4
Main Sewage Pumps	
Pump/Motor/VFD	5
Gates	15
Aerated Grit Chambers	
Grit Chambers	5
Bulk Gates	18
Slide Gates	15
Flap Gates	5
Blowers	3

Major Assets	Quantities
Splitter Box	
Slide Gates	5
Weir Gates	15
Flowmeters	3
Bin Loading Building	
Paddle Conveyors	2
Belt Conveyor	1
Fans	3

Major Assets	Quantities
Odor Control	
Bioscrubbers	2
Chemical Scrubbers	4
Fans	6
Recirculation Pumps	12
Chemical Tanks	4
Wastehauler Station	
Flushing System/Tank	1
Barrier Arm	1
Fan	1
Automated Samplers	2

AREA 10 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 PRELIMINARY TREATMENT

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Headworks Maintainability – The P1-105 project will rehabilitate most assets throughout the preliminary treatment area; however, the construction completion date is February 2030. Some assets have very little remaining life or have failed already and will need interim solutions before they are addressed by the project, these assets include exhaust fans, the hydrogen sulfide (H_2S) monitoring system, and corroded piping and grit paddles.	Continue to actively monitor the condition of aging assets scheduled for repair under P1-105 and develop appropriate solutions as applicable.	Permanent solutions will be provided by Project P1-105.
Metering & Diversion (M&D) – The trunkline pipes inside the M&D building are at the end of their useful life and are experiencing accelerated corrosion causing failures and leaks in 2024 (Sunflower and Santa Ana River Interceptor [SARI]). O&M is also experiencing issues with the flow meters being inaccurate.	Condition assessment of each trunkline and repairs were performed between August 2024 and January 2025 to extend the useful life of the piping. Instrumentation team is assessing and replacing the troubled flow meters.	M&D structure and piping along with the flow meters will be rehabilitated/replaced by Project P1-105.
Sunflower Pump Station – This pump station is equipped with two screw pumps. Pump no. 1 and associated supporting equipment have been replaced by FE19-04, but pump no. 2 is experiencing issues with bearings, gear boxes, and grease system. These assets in the pump station are approaching the end of their useful lives. The gates are leaking, and the pump station structure also has coating failure and concrete deterioration along with rebar corrosion.	Maintenance continues to monitor, repair, and replace parts as needed to keep pump no. 2 in operation.	FR1-0026 will rehabilitate the pump station outlet channels to repair the concrete, rebar, and coating in 2026/2027. FE25-01 will replace pump no. 2 and associated supporting equipment, similar to FE19-04, with construction starting in 2027. P1-105 will replace gates and T-lock. All of these projects will provide a complete rehabilitation of Sunflower Pump Station.
Wastehauler Station – The automated sampling systems installed by FE20-01 continues to experience issues with the valves, switches, and touch screens, causing shutdowns and delays. The connection point height and angle create an upward flow direction, which is not ideal, causing waste to drain out when haulers disconnect, leading to additional odor.	The Instrumentation group has been providing support and working with the vendor to troubleshoot these issues and keep the Wastehauler Station in operation.	A planning study is recommended to review the ongoing issues at the Wastehauler Station and propose solutions to be implemented by future CIP Project X-102, Wastehauler Facility Improvements, to improve the operation and maintenance of the facility.

Current and Future Projects

Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
P1-105	Headworks Rehabilitation at Plant No. 1	Headworks															
FR1-0026	Sunflower Pump Sation Effluent Channel Repairs	Sunflower Pump Station															
FE25-01	Sunflower Pump No. 2 Replacement at Plant No. 1	Sunflower Pump Station															
FE24-11	Steve Anderson Lift Station (SALS) Variable Frequency Drive (VFD) Replacement at Plant No. 1	Steve Anderson Lift Station															
FE22-01	Platform Modifications for Process Areas at Plant No. 1 and No. 2	Steve Anderson Lift Station															
FE23-06	HVAC Replacements at Plant Nos. 1 and 2	Steve Anderson Lift Station															
PRN-01022	Replace MSP-4 with Spare	Influent Pump Station															
TBD	Wastehauler Facility Improvements Planning Study	Wastehauler Station															
X-102	Wastehauler Facility Improvements	Wastehauler Station															
X-044	Steve Anderson Lift Station Rehabilitation	Steve Anderson Lift Station															

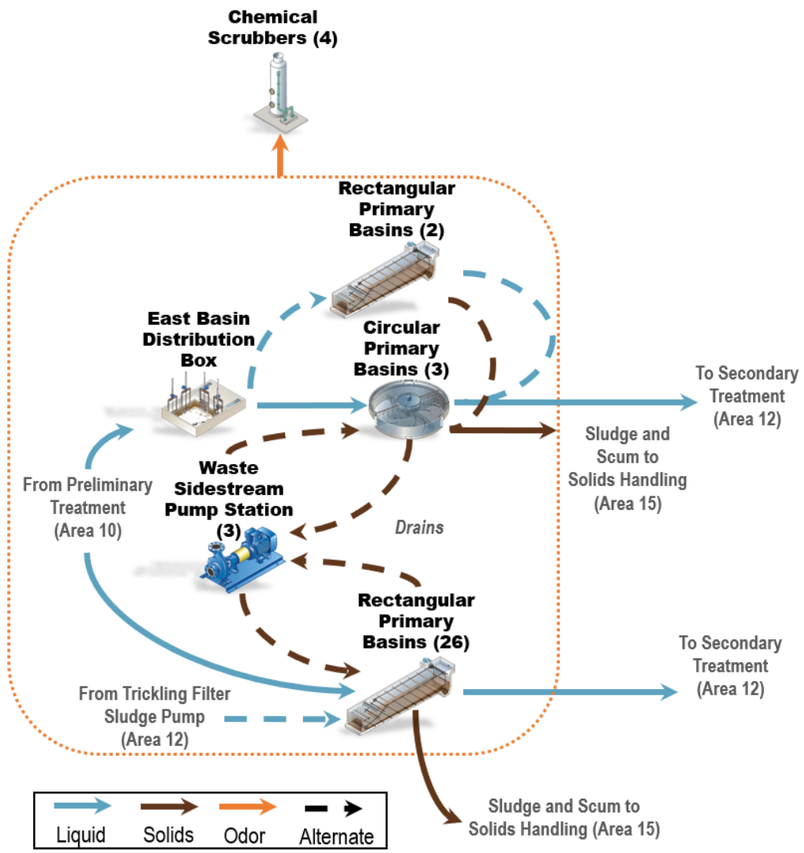
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREA 11 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 PRIMARY TREATMENT

2.2.2 Plant No. 1 Primary Treatment

Process Schematic



Note: Primary Basins No. 1 and No. 2 are not shown. The facilities are scheduled to be demolished within the next 10 years.

Major Assets Remaining Useful Life

Asset Type	EBDB	PEDB-1	PEJB	PSB 3-5	PSB 6-15	PSB 16-31	PISB	Centerfeed Channels	WSSPS-1	Phys. Chem.	Odor Control
Civil											
Effluent Piping	5	5	4	4	3	5	-	-	3	-	-
Structural											
Structures	5	4	1	5	2	2	3	3	3	3	4
Cover	-	-	-	3	2	2	2	3	-	-	-
Mechanical											
Piping	-	-	-	-	4	4	-	-	3	3	5
Gates/Valves	5	4	3	5	3	3	4	3	3	3	4
Sludge/Scum Collection System	-	-	-	5	3	3	-	-	-	-	-
Sludge Pumping System	-	-	-	5	3	3	-	-	4	-	-
Scum Pumping System	-	-	-	5	5	5	-	-	-	-	-
Recirculation/Chemical Pumping/Fans	-	-	-	-	-	-	-	-	3	4	4
Electrical											
VFDs	-	-	-	-	3	3	-	-	3	5	-
MCCs	-	-	-	5	5	2	-	-	5	5	5
Instrumentation											
General	-	3	-	4	4	4	-	-	4	3	5

Please see the comprehensive Acronyms and Abbreviations list for definitions.
Note: RUL scores do not reflect new pumps and VFDs recently installed by P1-133, currently in commissioning. RUL scores will be updated in the next revision.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

Major Assets	Quantities
Rectangular Primary Basins	
Basins	26
Thickened Sludge Pumps	8
Dilute Sludge Pumps	6
Dilute Sludge Sumps	2
Scum Pumps	12
Scum Pits	6

Note: Quantity may not reflect the most recent development. To be updated in the next revision.

Major Assets	Quantities
Circular Primary Basins	
Basins	3
Sludge Pumps	4
Scum Pumps	3
Phys. Chem.	
Polymer Tanks	4
$FeCl_3$ Tanks	1

Major Assets	Quantities
Waste Sidestream Pump Station	
Pumps	3
Primary Odor Scrubber Complex	
Chemical Scrubbers	4
HCl Tanks	1
HCl Pumps	2
NaOH Tanks	1

Major Assets	Quantities
Primary Odor Scrubber Complex	
NaOH Pumps	5
Bleach Tanks	1
Bleach Pumps	8

AREA 11 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 PRIMARY TREATMENT

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Primary Basins 6–31 Mechanical Reliability and Obsolescence – The rectangular primary basins experience relatively frequent issues with mechanical part replacement and sludge pumping systems that require maintenance. These issues require ongoing attention from Maintenance and can affect Plant No. 1's treatment capacity. The scum pumps serving these basins are also obsolete, which means parts cannot be procured quickly for repairs, causing significant interruption to operation.	The center feed channel was cleaned and inspected in 2024; repairs were made to the T-lock liner to extend the useful life of the structure. The primary basins 17–31 west side effluent channel and pipe are being inspected during the preparation of this document to ensure they remain free of obstructions, allowing for smooth and reliable operation during the upcoming wet weather season. Condition assessments and repairs of the primary basin tanks will be planned in conjunction with O&M activities in the coming years to increase reliability of the basins prior to the future rehabilitation project.	P1-133 has recently replaced five of the six launders in the Primary Influent Splitter Box (PISB), installed new variable frequency drives (VFDs) for the three dilute sludge pumps serving basins 6–15, and replaced the three dilute sludge pumps serving basins 17–31. FE23-05 will replace the obsolete scum pumps to improve scum pumping reliability and availability. These projects will increase the reliability of the rectangular primary basins for the coming decade before X-017 provides a general rehabilitation of the primary sedimentation basins.
Primary Treatment Area Programmable Logic Controller (PLC) Obsolescence – Existing PLCs are obsolete.	Maintenance has stockpiled parts and will continue to repair/replace as needed.	Obsolete PLCs will be replaced as part of future projects in this area.
Scum Management – The scum collection systems in rectangular primary basins have been experiencing operational issues such as trapped scum in various locations, overflow and failure of scum tipping troughs, and clogs in the scum pits and scum pumps.	PRN-00563 will perform a comprehensive evaluation of the scum collection system and provide recommendations. The study will take the results of previous research studies, such as RE19-01, Primary Scum Equipment Evaluation at Plant No. 1, into consideration.	X-017 will take into consideration the results of the Scum Study to improve the scum removal system during the rehabilitation.
Waste Sidestream Pump Station (WSSPS) Pump Ragging and Grit – The pump station has been experiencing increased ragging issues due to the headworks shutdown scheduled for the P1-105 construction. Grit buildup has also increased resulting in Maintenance having to schedule grit removal monthly. The pumps are also approaching the end of their useful lives.	Maintenance has increased the frequency of pump de-ragging and grit removal from the wet well as a mitigation measure. It is also recommended to install a de-ragger on one of the pumps to test compatibility with this service.	MP1-003 has replaced one of the WSSPS pumps with a chopper type pump to test the performance of the new pump type for this service to mitigate the ragging issues and improve the station's reliability. The project is currently in the commissioning phase. Upon improved performance, the other two pumps will be replaced with similar chopper pumps through a subsequent project. X-006 is the future project that will rehabilitate the pump station and increase the station's capacity.
Primary Effluent Pipe Conditions – A recent condition assessment of the West Primary Effluent Pipe revealed that most of the PVC pipe joint liners have failed and several pipe joints have also failed as groundwater was observed to be infiltrating the pipe via these joints.	Develop an expedited repair project to seal the failed joints. Plan a more detailed condition assessment to pressure test all joints in the pipe.	Plan a capital project to perform a comprehensive rehabilitation of both primary effluent east and west pipes within 5 years.

Current and Future Projects

Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
RE24-01	Hydrogen Sulfide Analyzer Evaluation at Plant No. 1	Primary Scrubbers 5–8															
PRN-00563	P1-33/37 Scum Study	Primary Basins 6–31															
FE23-05	Primary Clarifier 6–31 Scum Pump Replacement at Plant No. 1	Primary Basins 6–31															
MP1-003	WSSPS Pump Replacement at Plant No. 1	Waste Sidestream Pump Station															
PRN-01012	Primary Clarifier Effluent Gate PLC Panel Replacement at Plant 1	Primary Basins 6–31															
P1-126	Primary Clarifier Replacements and Improvements at Plant No. 1	Primary Basins 3, 4, and 5															
X-017	Plant No. 1 Primary Clarifiers 6–31 Rehabilitation	Primary Basins 6–31															
X-006	Waste Sidestream Pump Station Rehabilitation	Waste Sidestream Pump Station															

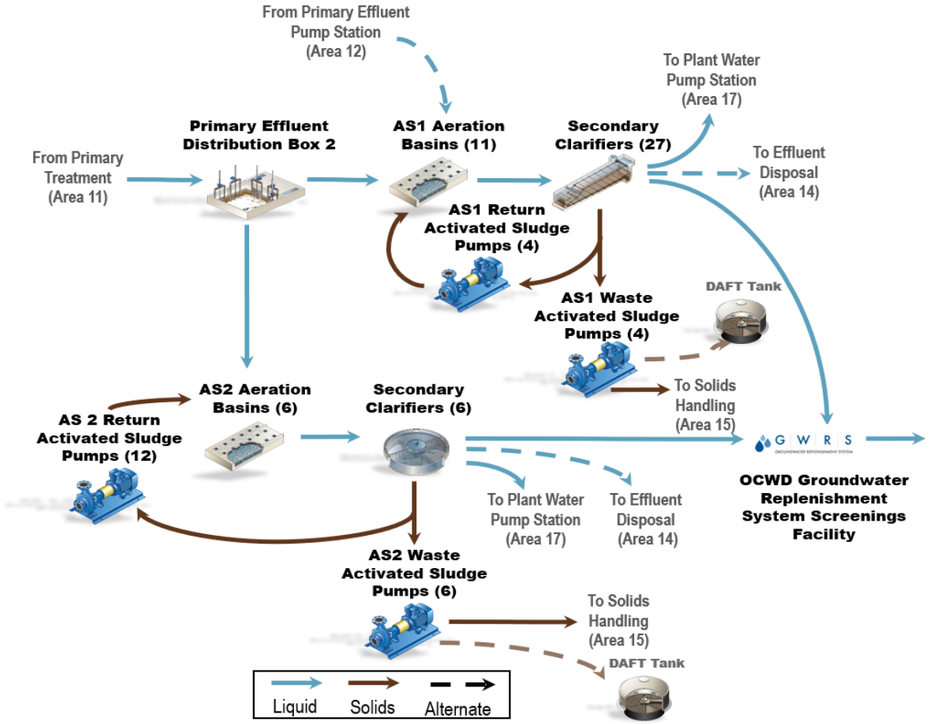
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREA 12 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 SECONDARY TREATMENT – ACTIVATED SLUDGE

2.2.3 Plant No. 1 Secondary Treatment – Activated Sludge

Process Schematic



Asset Type	PEPS	Blower Building 1	AS1 Aeration Basins	AS1 Clarifiers	AS1 RAS PS	AS1 WAS	AS2 PEPS 2	Blower Building 2	AS2 Aeration Basins	AS2 Clarifiers	AS2 RAS PS/WAS PS	WSSPS 2	PEDB-2	AS1 & AS2 Junction Boxes
Effluent Piping	4	3	3	3	4	3	1	-	-	-	-	-	1	2
Buildings	4	4	-	-	3	-	-	1	-	-	-	-	-	-
Structures	3	-	4	4	-	-	1	-	1	1	-	1	1	2
Piping	4	4	4	4	5	3	-	2	2	2	2	2	-	-
Pumps	5	-	-	-	5	5	-	-	-	-	3	3	-	-
Diffusers	-	-	4	-	-	-	-	-	4	-	-	-	-	-
Mixers	-	-	4	-	-	-	-	-	2	-	-	-	-	-
Solids Collector Mechanism	-	-	-	5	-	-	-	-	-	3	-	-	-	-
Blowers	-	4	-	-	-	-	-	2	-	-	-	-	-	-
Drain Gates & Inlet Gates	-	-	5	4	-	-	2	-	2	2	-	-	2	-
HVAC & Ventilation	4	4	-	-	-	-	-	3	-	-	-	-	-	-
Chemical/Polymer Facility	-	-	5	-	-	-	-	-	-	-	-	-	-	-
VFDs	4	-	4	4	4	4	-	-	4	4	4	4	-	-
MCCs	5	-	5	5	5	5	-	-	2	2	2	2	-	-
PLCs, Flow Meters	5	5	5	5	5	5	-	3	3	3	3	3	-	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

AREA 12 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 SECONDARY TREATMENT – ACTIVATED SLUDGE

Major Assets

Major Assets	Quantities
Primary Effluent Pump Station	
Building	1
Wet Well	1
Pumps	3
Discharge Valves	3
AS1 Aeration Basins	
Aeration Basins	10
Inlet Gates	10
AS1 Blower Building 1	
Blower Building	1
Blowers	5

Major Assets	Quantities
AS1 Secondary Clarifiers (SCs)	
Secondary Clarifiers	26
Inlet Gates	78
Sludge Collectors	52
Secondary Clarifiers	26
AS1 RAS PS/WAS PS	
RAS PS Building	1
RAS Pumps	5
WAS Pumps	4
Primary Effluent Pump Station 2 (PEPS 2)	
Structure	1
Gate	1

Major Assets	Quantities
AS2 Aeration Basins	
Aeration Basins	6
Inlet Gates	6
AS2 Blower Building 2	
Blower Building	1
Blowers	4
AS2 Secondary Clarifiers	
Secondary Clarifiers	6
Sludge Collectors	6
AS2 RAS PS/WAS PS	
RAS/WAS Pumps	12/6
Surface Wasting Pumps	6
Scum Pumps	6

Major Assets	Quantities
Waste Side Stream Pump Station 2	
Pumps	2
Structure	1
Primary Effluent Distribution Box 2	
Structure	1
Gates	11
AS1 and AS2 Junction Boxes	
Junction Box Structures	8

Major Assets	Quantities
Dissolved Air Flotation Thickeners (DAFTs)	
Concrete Tanks	6
Mechanical Sweep	6
Recycle Pumps	12
Retention Tank	6
TWAS Pumps	12
DAFTs Polymer System	
Storage Tank	2
Mix Tank	2
Polymer Transfer Pumps	2
Feed Pumps	6

Key Issues – AS1 and AS2

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Activated Sludge Plant No. 1 – AS1 is an aging facility. Condition assessments show corrosion on the reactor wall. Baffle wall supports and vertical air pipes have corrosion in some of the basins. In addition, final clarifier drives are obsolete, and two of the secondary clarifiers' chain and flights mechanisms are broken and no replacement part is available.	Maintenance is monitoring and replacing the equipment as needed. MP1-017 is in progress to rebuild Final Clarifiers 11 and 13 due to a broken chain and flight. Planning and Maintenance have started a trial project to address obsolete clarifier drives.	P1-140 will rehabilitate AS1, replacing blowers, repairing basins, and replacing mechanical equipment.
PEDB-2 – PEDB-2 has limited hydraulic capacity. Routing flows from rectangular primary clarifiers to AS1 through PEDB-2 has some limitations and risk of overflows.	Planning is coordinating with the P1-126 project team to ensure reliable hydraulic capacity is available during project construction.	P1-126 performed hydraulic modeling and included plans for bypass during peak wet weather flow.
Obsolescence at AS1 and AS2 Blower Controls – The blower control system is obsolete and requires an upgrade to operate efficiently.	PRN-01053 was approved by Clearinghouse to upgrade obsolete vane actuators.	P1-140 will replace blowers and control systems for AS1.

Current and Future Projects

Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
FE20-05	Plant Water Pipe Replacement	AS1 Aeration Basin and Clarifiers															
MP1-017	Activated Sludge Final Clarifiers 11 & 13 Rebuild at Plant No. 1	AS1, Final Clarifiers 11 and 13															
P1-140	Activated Sludge 1 Rehabilitation at Plant No. 1	AS1 Basins, Blowers, Clarifiers, and PEPS															
X-039	Plant Water Pump Station Rehabilitation	No direct impact on the Activated Sludge Facility															
X-018	Activated Sludge 2 Rehabilitation at Plant No. 1	AS2 Aeration Basin, Clarifiers, and Blowers															

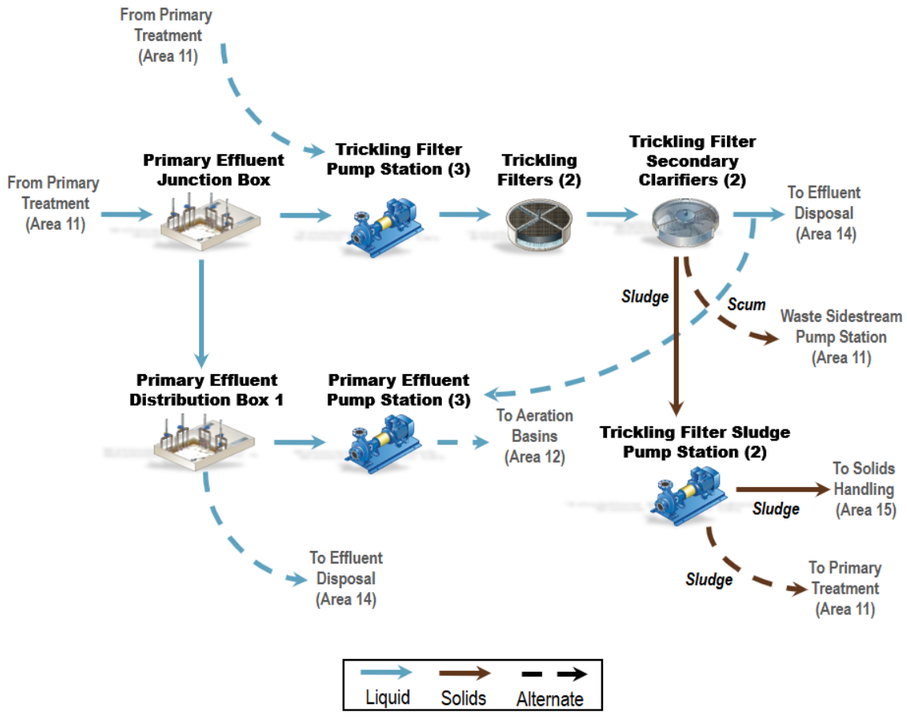
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREA 12 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 SECONDARY TREATMENT – TRICKLING FILTERS

2.2.4 Plant No. 1 Secondary Treatment – Trickling Filters

Process Schematic



Major Assets

Major Assets	Quantities
Trickling Filter Pump Station	
Structure	1
Trickling Filter Pumps	3
Trickling Filters	
Trickling Filter Basins	2
Rotary Distributor	2
Recirculation Fans	8
Secondary Clarifiers	
Circular Clarifiers	2
Sludge Collector	2
Sludge Pump	2
Junction Boxes	
Structure	6

Major Assets Remaining Useful Life

Asset Type	Trickling Filter Pump Station	Trickling Filters	Secondary Clarifiers	Trickling Filter Sludge Pump Station	Junction Boxes
Civil					
Effluent Piping	1	1	1	-	1
Structural					
Buildings	-	1	1	-	-
Structures	1	2	1	1	1
Mechanical					
Pumps	3	-	3	1	-
Distributor Drive	-	4	-	-	-
Ventilation Fans	3	3	-	3	-
Trickling Filter Media	-	5	-	-	-
Clarifier Moving Mechanism	-	-	3	-	-
Valves, Gates	3	-	3	3	3
Electrical					
VFDs	5	5	-	-	-
MCCs, Switchgear	1	2	2	2	-
Instrumentation					
General	4	4	4	4	4

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

AREA 12 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 SECONDARY TREATMENT – TRICKLING FILTERS

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Trickling Filter PLC Obsolescence – Existing PLCs are obsolete.	Maintenance has stockpiled parts and will continue to repair/replace as needed.	Obsolete PLCs will be replaced as part of future projects in this area.
Trickling Filters Snail Control – Permanent caustic dosing is needed at the Trickling Filter Pump Station for snail control. Currently, temporary totes are used to dose caustic into the wet well.	Continue to dose caustic using temporary totes for snail control.	P1-126 will add pumps to the caustic tank in the primary scrubber area to provide a permanent solution for trickling filter snail control.
Trickling Filter Pump Station Reliability – The presence of snail shells can cause damage to the trickling filter pump impellers affecting the reliability of the pump station.	Perform condition assessment and repair as needed.	N/A
Trickling Filter Media – Trickling filters at Plant No. 1 have been in operation for over 17 years. The filter media is nearing the end of its useful life, and the trickling filter lining and coatings systems need repairs.	N/A	Project P1-142 will replace the trickling filter media and repair coating defects and failures.
Trickling Filter Odor Control – An increase in odor complaints may be due to the trickling filter operation. Operations has reduced flow to the trickling filters to control odors.	A planning study (PS24-04) is being conducted to determine the best solution/approach to minimizing odor at the trickling filters, which may include covering the trickling filters and adding odor control.	Solutions from the planning study (PS24-04) will be implemented via future project X-015.

Current and Future Projects

Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
P1-126	Primary Sedimentation Basins Numbers 3–5 Replacement at Plant No. 1	Trickling Filters Pump Station															
P1-142	Trickling Filter Rehabilitation at Plant No. 1	Trickling Filters															
TBD	Plant No. 1 Trickling Filter #2 Rotary Distributor Drive and Motor Replacement	Trickling Filters															
TBD	Plant No. 1 Trickling Filter Rotary Distributor VFD Replacement	Trickling Filters															
TBD	Trickling Filter Clarifier #1 Drain Valve Replacement at Plant No. 1	Trickling Filters Secondary Clarifier 1															
FR1-0011	Plant No. 1 Trickling Filter Pumps VFD replacement (three pumps)	Trickling Filters Pump Station															
PS24-04	Trickling Filter Odor Control Planning Study at Plant No. 1	Trickling Filters															
X-015	Trickling Filters Facilities Rehabilitation at Plant No. 1	Trickling Filters	Project starts in 2040														

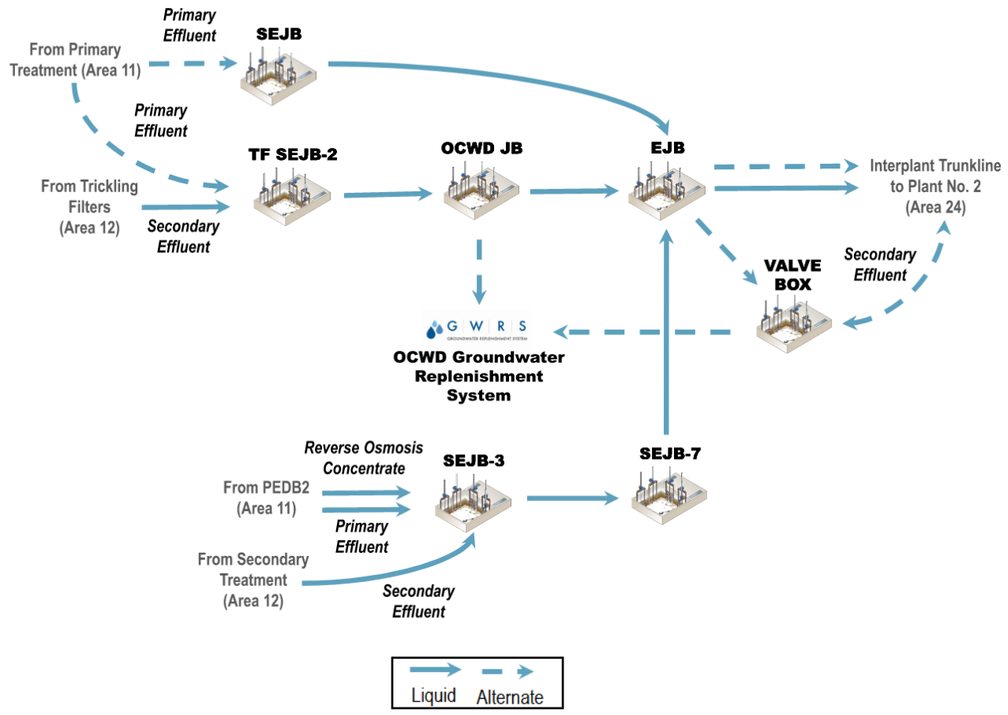
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREA 14 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 INTERPLANT

2.2.5 Plant No. 1 Interplant

Process Schematic



Major Assets Remaining Useful Life

Asset Type	Plant No. 1 Facility									Santa Ana Corridor						
	EJB	TFSEJB-2	SEJB	SEJB-3	SEJB-7	PEJB-1	66" PE/SE	84" PE/SE	108" PE/SE	66" PE/SE	84" PE/SE	120" PE/SE	Digester Gas Line	Ellis Corridor	Brookhurst Corridor	Bushard Corridor
Civil																
Pipeline	-	-	-	-	-	-	4	3	1	4	2	1	3	1	1	-
Structural																
Structure	1	1	3	1	1	4	-	-	-	-	-	-	-	-	-	-
Mechanical																
Sluice Gates	2	-	-	3	1	5	-	-	-	-	-	-	-	-	-	-
Butterfly Valves	2	3	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Ball Valves	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Instrumentation																
Fiber Optic	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	1

Please see the comprehensive Acronyms and Abbreviations list for definitions.

For spatial representation of asset remaining useful life, please see remaining useful life maps at the end of this area summary.

RUL < 5 years | RUL 5–10 years | RUL 11–15 years | RUL 16–20 years | RUL > 20 years

Major Assets

Major Assets	Quantities
Plant No. 1 Facility	
Large Diameter Piping	1.1 miles
Junction Boxes	6
Gates	17
Butterfly Valves	9

Major Assets	Quantities
Santa Ana Corridor	
Large Diameter Piping	10.6 miles
Digester Gas Piping	3.9 miles
Fiber Optic Communication	3.2 miles
Ball Valves	2

Major Assets	Quantities
Ellis Corridor	
Large Diameter Piping	1.2 miles
Fiber Optic Communication	0.8 miles
Brookhurst Corridor	
Large Diameter Piping	3.8 miles
Bushard Corridor	
Fiber Optic Communication	4.1 miles

AREA 14 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 INTERPLANT

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Vandalism – Repeated vandalism of electrical controls at EJB is due to the damaged security fence, which allows access to the site. Exposed conduit outside of the fence line was cut and wire stolen. Project MP1-008 was completed in 2025 and installed new lighting to improve nighttime visibility and deterrence. Damage and copper wire theft were found at several cathodic protection test stations for the 66-inch, 84-inch, Interplant Digester Gas Pipeline (IDGP), and fiber optic cable facilities along the Santa Ana River Trail. The damaged cathodic protection test stations were repaired in 2025 including installing flat bars and special locking bolts for adding security. The fiber optic handholes were also repaired and full functionality restored.	N/A	Project SC23-02 will address security issues at EJB by replacing existing fencing with a higher-security fencing system and enclosing exposed conduit with new fencing.
Interplant Digester Gas Pipeline Deficiencies – Surface corrosion of varying severity has occurred in all blow off vaults. Other deficiencies include water intrusion in Vaults 1–4, Vault 4 outside existing utility easement, access difficulties to Vaults 8 and 9, structural damage to Vault 10, lack of dedicated blowdown valves, and lack of pressure relief between the Department of Transportation valves.	N/A	Project FRJ-0003 will repair, replace (or relocate), and abandon blow off vaults. The project also includes installing blowdown valve manifolds and pressure relief for the IDGP.
Santa Ana Corridor Soil Erosion – Soil loss has been occurring in the unprotected slopes along the interplant utility corridor paralleling the Santa Ana River for many years. Soil erosion is directly affecting blow off Vault 5 on the IDGP. There are significant reaches of pipeline that appear to lack adequate cover for pipeline protection.	OC San has approved a new planning study, PRN-00935, to perform a slope erosion analysis with various field investigations; review slope stabilization alternatives; and identify, compare, and rank conceptual design alternatives. This effort includes developing a new plan and profile for the pipeline to pinpoint areas of inadequate cover and provide the basis of design to resolve the issue(s).	Based on the recommendations of PRN-00935, a proposed improvement project will be developed to construct permanent improvements. The future improvement project must at least be started prior to OC San's next audit with the California Public Utilities Commission in 2032.
PEJB-1 Condition – The sluice gates in PEJB-1 are in very poor condition and no longer properly seal. The PEJB-1 structure is also in poor condition.	N/A	Rehabilitation of the PEJB-1 structure and replacement of existing sluice gates with new ones are included in the scope of Project P1-126.
66-inch Interplant Pipeline Condition – The 66-inch pipelines between PEJB-1 and EJB are in poor condition per the 2021 condition assessment. Conditions have not changed significantly since 2009. The 66-inch pipelines between EJB and Ocean Outfall Booster Station (OOBS) that were not sliplined are also in poor condition.	Perform a new condition assessment of the 66-inch Interplant Pipeline between PEJB-1 and EJB in 2026.	Project X-125 will rehabilitate the 66-inch pipelines between PEJB-1 and EJB, and portions of the 66-inch pipeline not sliplined between EJB and OOBS.

Current and Future Projects

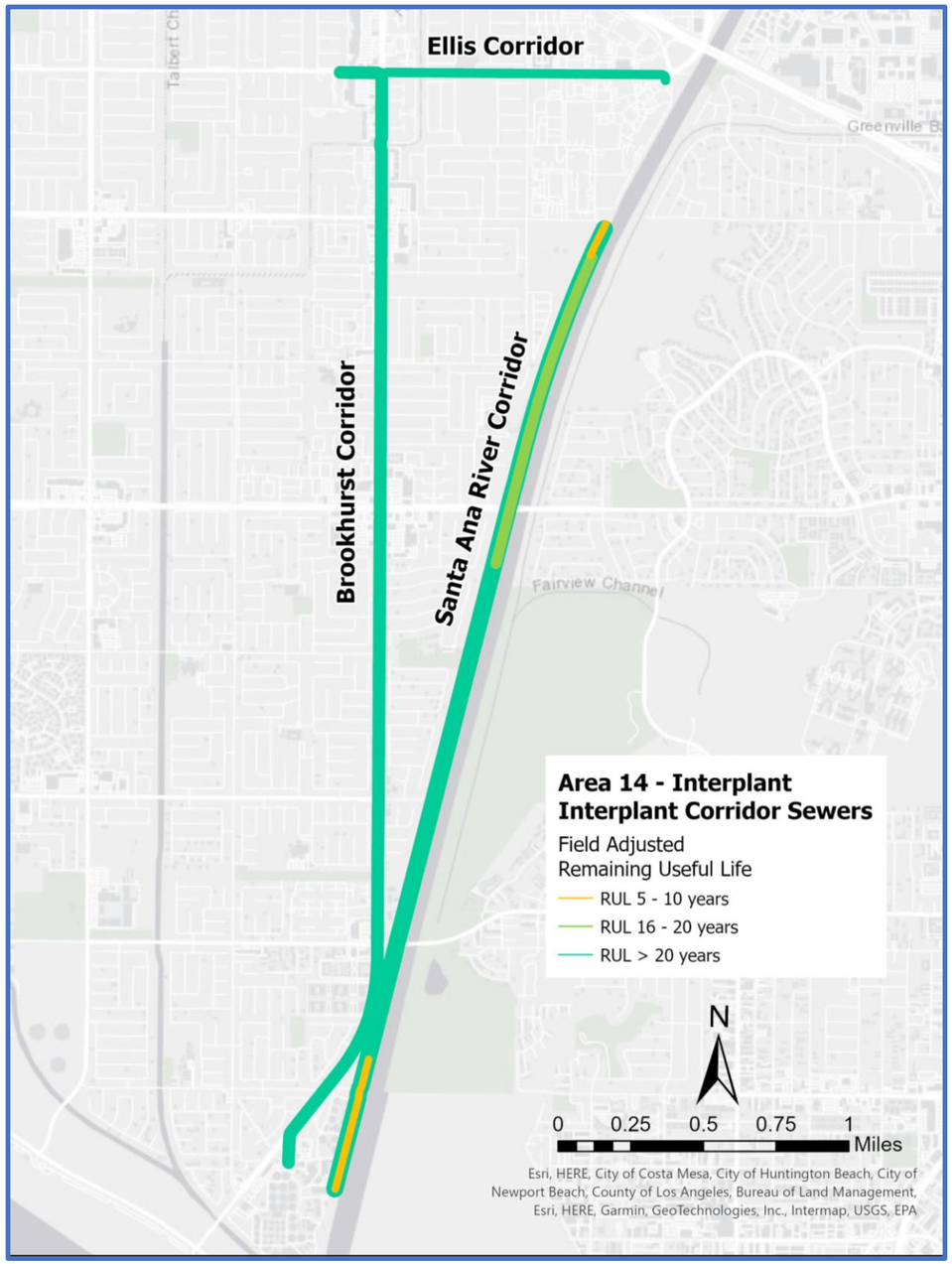
Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
SC23-02	Effluent Junction Box Security Fence Replacement at Plant No. 1	EJB															
FRJ-0003	Interplant Gas Line Blow Off Repairs	Digester Gas Piping															
PRN-00935	Interplant Digester Gas Pipeline Slope Stabilization Study	Digester Gas Piping															
P1-126	Primary Sedimentation Basins No. 3-5 Replacement at Plant No. 1	PEJB-1															
X-125	66-Inch Interplant Pipeline Rehabilitation at Plant No. 1	66" PE/SE															

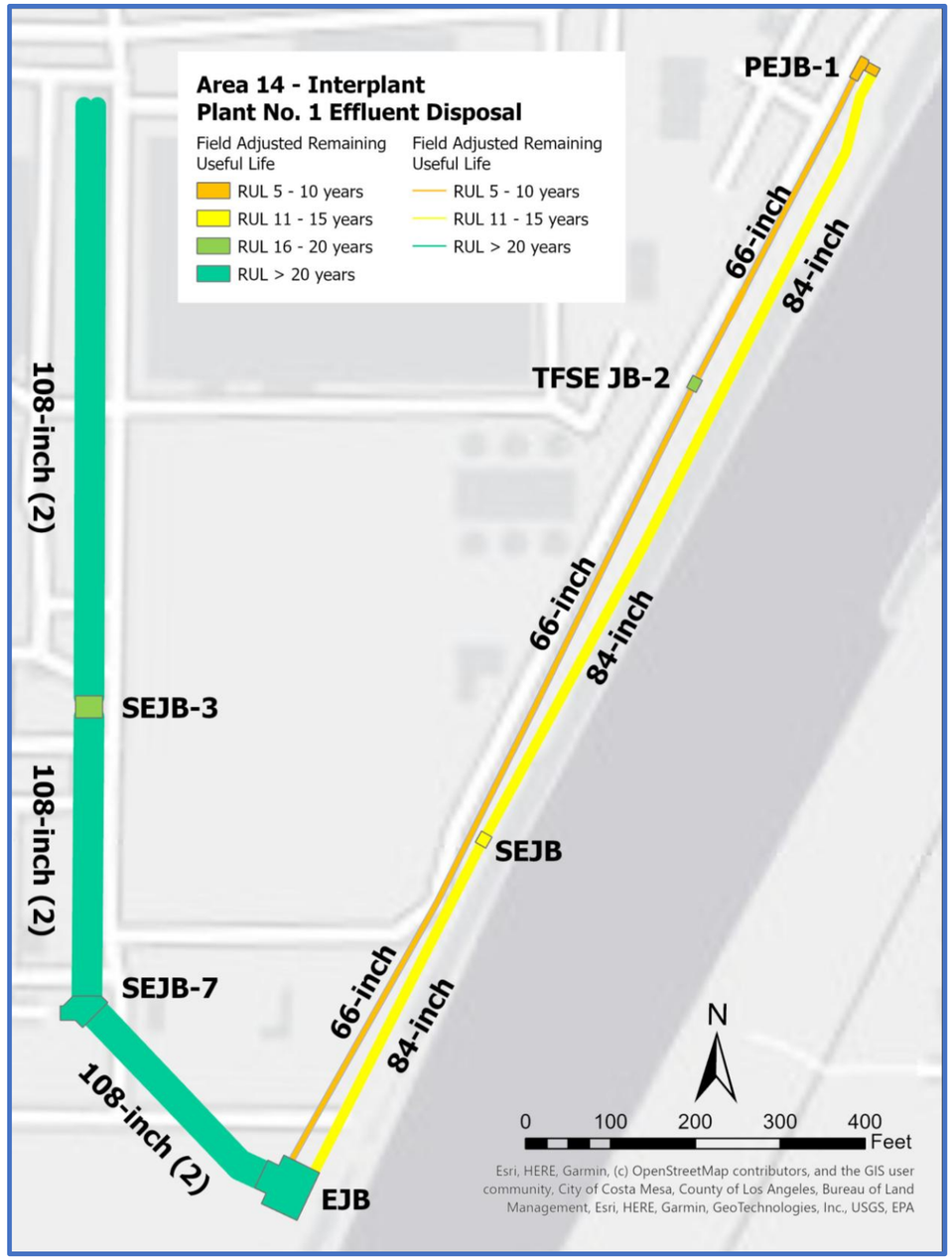
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREA 14 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 INTERPLANT

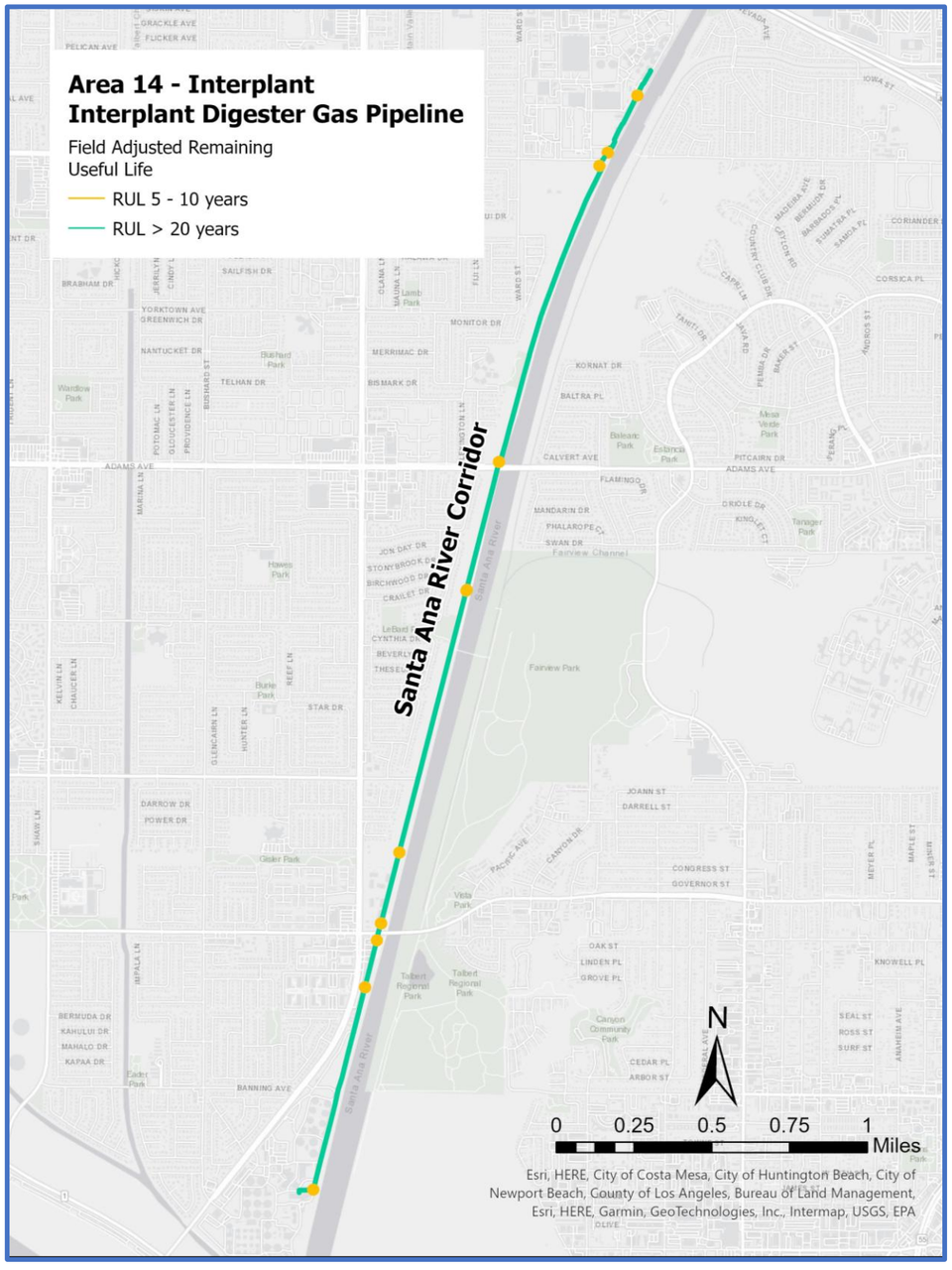
Remaining Useful Life Maps





AREA 14 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 INTERPLANT

Remaining Useful Life Maps

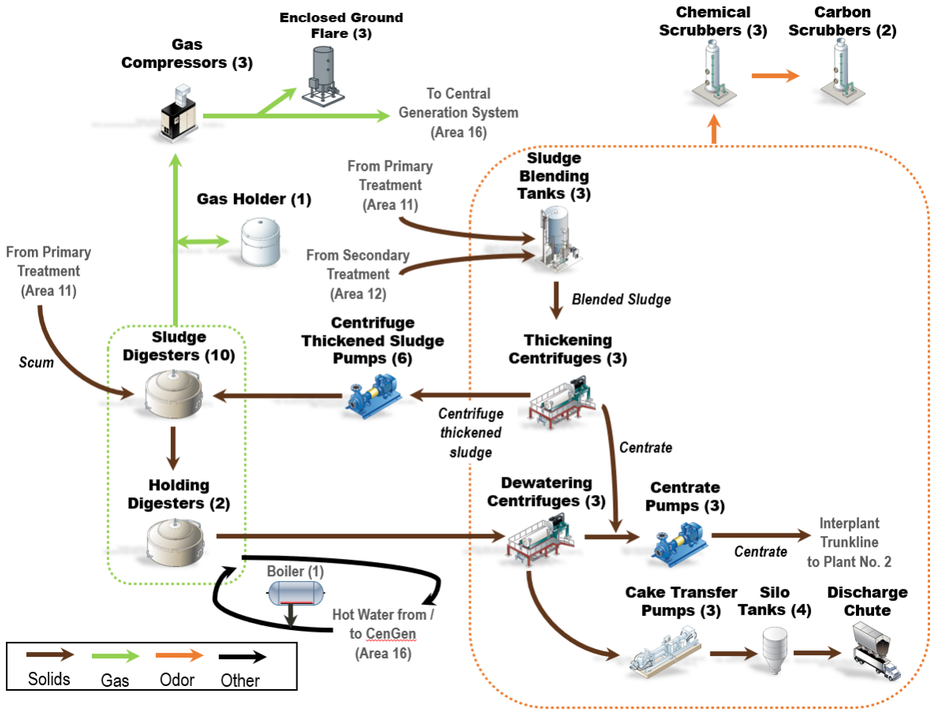




AREA 15 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 SOLIDS HANDLING – DIGESTERS

2.2.6 Plant No. 1 Solids Handling – Digesters

Process Schematic



Note: Process Schematic shows entire Area 15 Solids Handling Facility.

Major Assets Remaining Useful Life

Asset Type	Digester 5 (Holder)	Digester 6 (Holder)	Digester 7	Digester 8	Digester 9	Digester 10	Digester 11	Digester 12	Digester 13	Digester 14	Digester 15	Digester 16	Ferric System
Civil													
Effluent Piping	2	2	2	2	2	2	2	2	2	2	2	2	-
Structural													
Digester	3	3	3	3	3	3	2	2	2	2	1	1	-
Mechanical													
Piping	2	2	2	2	2	2	2	2	2	2	2	2	2
Chemical Pumps	-	-	-	-	-	-	-	-	-	-	-	-	2
Ferric Control System	-	-	-	-	-	-	-	-	-	-	-	-	2
Sludge Mixing Pumps	3	3	3	3	3	3	3	3	3	3	3	3	-
Sludge Recirculation & Heating System	-	-	3	3	3	3	3	3	3	3	3	3	-
Hot Water System	-	-	3	3	3	3	3	3	3	3	3	3	-
Sludge Transfer Pumps	4		4		4		4		4		4		-
Electrical													
VFDs	4	4	4	4	4	4	4	4	4	4	4	4	-
MCCs	2	2	2	2	2	2	2	2	2	2	2	2	-
Instrumentation													
PLCs and Flow Meters	3	3	3	3	3	3	3	3	3	3	3	3	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

Major Assets

Major Assets	Quantities
Anaerobic Digesters	
Digesters (7–16)	10
Holding Digesters (5 & 6)	2
Sludge Mixing Pumps	22
Grinders	10+3
Sludge Recirculation Pumps	10
Hot Water Circulation Pumps	10

Major Assets	Quantities
Anaerobic Digesters (Continued)	
Heat Exchangers	10
Bottom Sludge Pumps	5
Digesters Transfer Pumps	3
Ferric System	
Storage Tanks	2
Feed Pumps	2

AREA 15 ASSET MANAGEMENT SUMMARY PLANT NO. 1 SOLIDS HANDLING – DIGESTERS

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Structures – Project PS15-06 Seismic Evaluation of Structures at Plant No. 1 and Plant No. 2 has identified lateral spread as the main seismic risk for the digesters and structures close to the Santa Ana River.	N/A	Project X-109 will address lateral spread seismic risk.
Digester Leaks – There are minor leaks at digester wall penetrations.	Repairs were made under the Condition Assessment Program. The digester condition assessment will evaluate pipe penetrations and include repairs as needed.	Project X-120 will perform comprehensive rehabilitation or replacement of the digesters.
Digester Mixing – With thicker sludge being sent to the digesters, the two existing high-rate pumps are needed to mix the sludge. Any failure of the mixing pumps, even with short duration repairs, will affect the digester mixing efficiency.	A trial study is in progress to install one chopper pump at Digester 16 to improve digester mixing (FE24-01).	Based on the results of FE24-01, Planning will determine whether a planning study (PRN-00962) is needed to evaluate the mixing system, considering co-thickened sludge density and pump repair history.

Current and Future Projects

Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
FE24-01	Chopper Pump Trial for Digester Mixing at Plant No. 1	Digester 16 Mixing System															
PRN-00962	Digester Mixing Capacity Reliability Study	All Digesters and Holders															
X-109	Lateral Spreading Mitigation at Plant No. 1	All Digesters and Holders															
X-120	Digester Rehabilitation/Replacement at Plant No. 1	All Digesters and Holders															

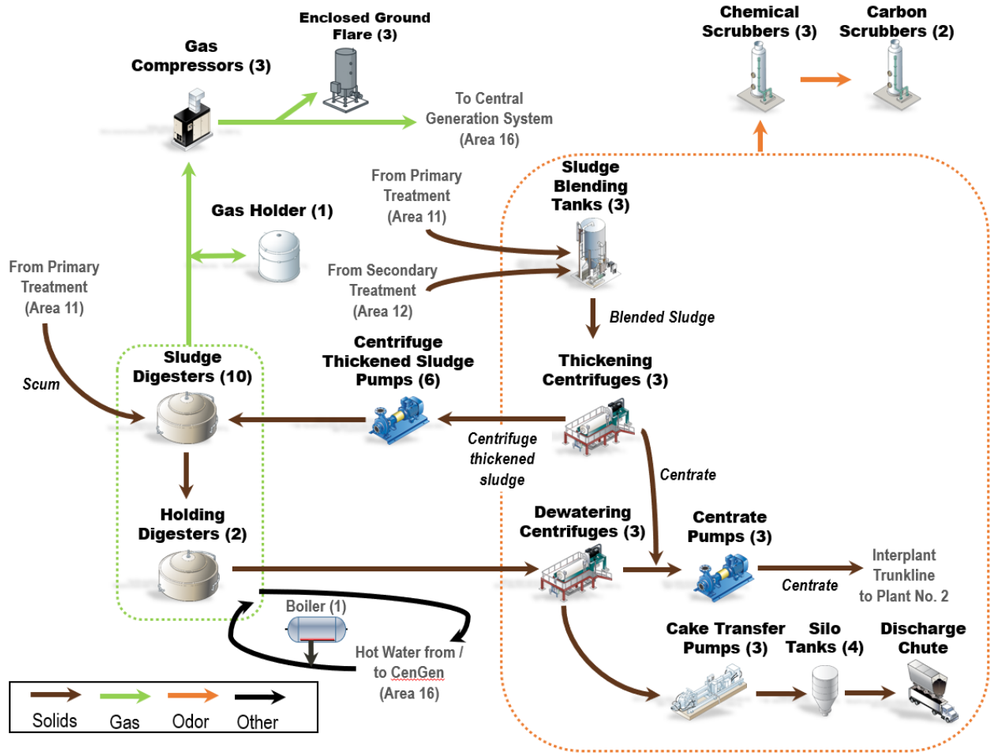
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: CIP – Planning; CIP – Design; CIP – Construction; Maintenance Project

AREA 15 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 SOLIDS HANDLING – REMAINING FACILITIES

2.2.7 Plant No. 1 Solids Handling – Remaining Facilities

Process Schematic



Note: Process Schematic shows entire Area 15 Solids Handling Facility.

Major Assets Remaining Useful Life

Asset Type	Sludge Blending Facility (SBF)	Thickening System	Dewatering System	Centrate System	Dewatering Odor Control	Truck Loading	Boiler System	Gas Handling	Gas Holder	Gas Flares
Civil										
Effluent Piping	1	1	1	1	-	1	-	-	-	-
Structural										
Structures	1	-			-	-	-	-	3	3
Buildings	-	1			-	1	-	4	-	-
Mechanical										
Piping and Valve	-	1	1	1	1	2	1	4	3	3
Pumps and Grinders	2	2	2	2	3	2	-	-	-	-
Boiler and Heat Exchangers	-	-	-	-	-	-	2	-	-	-
Centrifuges	-	2	2	-	-	-	-	-	-	-
Chemical/Polymer System	-	1	1	-	2	-	-	-	-	-
Gas Cleaning Vessel	-	-	-	-	2	-	-	3	-	-
Gas Compressors	-	-	-	-	-	-	-	4	-	-
Gas Dryers	-	-	-	-	-	-	-	5	-	-
Silo Cake Conveyors	-	-	-	-	-	2	-	-	-	-
Silo Sliding Frames	-	-	-	-	-	2	-	-	-	-
Electrical										
VFDs	4	4	4	4	4	4	-	-	-	-
MCCs	1	1	1	1	1	1	1	5	-	-
Instrumentation										
PLCs and Flow Meters	3	3	3	3	3	3	5	4	-	3

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

Major Assets

Major Assets	Quantities
Thickening System	
Sludge Blending Tanks	3
Thickening Grinders	3
Centrifuge Feed Pumps	3
Thickening Centrifuges	3
Thickened Sludge Wet Wells	3
Thickened Sludge Pumps	6

Major Assets	Quantities
Thickening System (Continued)	
Centrate Wet Well	1
Centrate Pumps	3
Chemical Equipment	
Thickening Polymer Feed Pumps	3
Dewatering Polymer Feed Pumps	3

Major Assets	Quantities
Chemical Equipment (Continued)	
Polymer Mixing/Aging Tank	6
Polymer Make-Down Unit	4
Dewatering System	
Dewatering Grinders	2
Centrifuge Feed Pumps	3
Dewatering Centrifuges	3
Cake Transfer Pumps	3

Major Assets	Quantities
Dewatering Odor Control	
Three-Stage Packed Tower Scrubbers	3
Carbon Media	2
Truck Loading	
Cake Storage Silos	4
Cake Silo Transfer Pumps	4
Standby Truck Loading Bay	1

Major Assets	Quantities
Gas Handling	
Low Pressure Gas Holder	1
Gas Compressors	3
Gas Dryers	2
Gas Flares	3
Gas Cleaning Vessels	2
Boiler	1

AREA 15 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 SOLIDS HANDLING – REMAINING FACILITIES

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Thickening and Dewatering Maintainability of the Equipment – Access to equipment to perform maintenance is difficult due to congestion.	Currently, a small project is being scoped to add lifting supports for equipment in the basement.	Project FE21-04 will install a handrail for safety improvements. Project FE22-01 will install equipment access and a platform.
Odor Control System – The booster fan inside the T&D Building frequently fails.	A small study will investigate the issue and recommend a solution.	Pending the outcome of the study.
Gas Handling System Reliability – The aging facility requires replacement or rehabilitation to meet current and future process needs and regulatory requirements. The gas compressor system is aging and needs reliability improvements such as regular equipment overhauls.	Continue to actively monitor the condition of aging assets and perform preventive maintenance until replacement and/or overhaul.	Project J-124, Digester Gas Facilities Rehabilitation, will replace existing flares and compressor inlet moisture separator systems; install new closed-loop cooling water systems; rehabilitate the building; perform various electrical, instrumentation, and control upgrades to improve reliability; and add a new control room. Gas compressor overhauls will be performed by Maintenance. The remaining instrumentation upgrades will be completed under Project FE24-02.
Gas Dryer System Not Operational – The refrigerated gas dryer is out of service. Currently, gas goes through the chilled water gas heat exchangers and condensate drops out without a backup spare. These heat exchangers are also aging and need replacement.	Continue to actively monitor the chilled water heat exchanger conditions until replacement.	The refrigerated gas dryer system will be replaced by Project FE23-01. The chilled water heat exchanger and separator replacements and gas dryer system instrumentation upgrades will be addressed under Project FE24-02.
Plant Water – Corrosion from plant water on equipment is causing premature wear on pumps and piping failures.	N/A	A project will be created to incorporate recommendations by PS20-09. The goal of the study was to improve the water quality and reduce corrosivity of the plant water. Project J-124 will replace the plant water piping on the gas compressor skids.
Supplemental Heat Boiler – Controls are obsolete.	The controls are obsolete, and Maintenance will continue to repair or replace major components as necessary to ensure proper operation.	Obsolete PLCs will be replaced as part of future projects in this area.

Current and Future Projects

Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
J-124	Digester Gas Facilities Rehabilitation	Electrical and Instrumentations, Building, Compressor Cooling System, Inlet Separators, and Flares															
N/A	Digester Gas Compressor Overhauls at Plant No. 1 and No. 2 (Maintenance Service Contract)	Gas Compressors															
FE22-01	Platform Modifications for Process Areas at Plant No. 1 and No. 2	Truck Loading Slide Frame															
FR1-0018	Dewatering Centrifuge Diverter Gate Improvements at Plant No. 1	Dewatering Diverter Gate															
FE23-01	Digester Gas Compressor Dryer Replacements at Plant No. 1 and No. 2	Refrigerated Gas Dryers															
PRN-00686	Scrubber Acid System Installation	Sulfuric Acid Tank															
FR1-0024	Centrifuge Motor Disconnect	Centrifuge Motors															
FE24-02	Gas Compressor Chilled Water Exchangers and Condensate Separator Replacements and Instrumentation Upgrades	Chilled Water Gas Heat Exchangers and Condensate Separator, Gas Dryers Instrumentation, and Gas Header Instrumentation															
X-119	Thickening, Dewatering and Truck Loadout Rehabilitation at Plant No. 1	Solids Storage, T&D, and Solids Scrubbers															
TBD	Low-Pressure Digester Gas (LPDG) Drip Trap Improvements at Plant No. 1	LPDG Drip Traps															

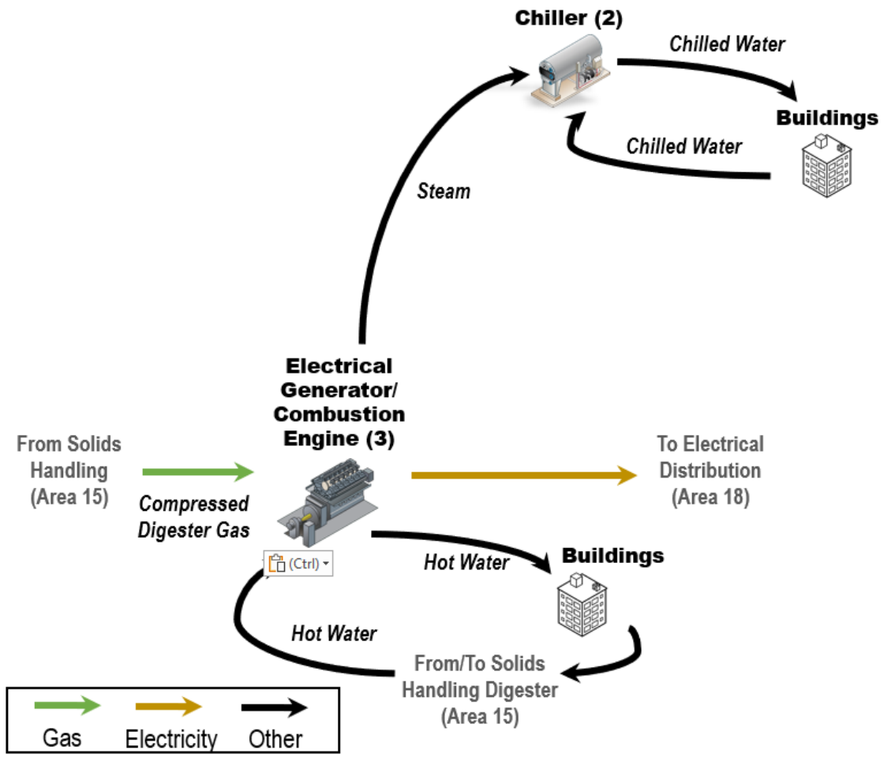
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREA 16 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 CENTRAL GENERATION

2.2.8 Plant No. 1 Central Generation

Process Schematic



Major Assets

Major Assets	Quantities
Engine Generator	
Gas Engine (12 Cylinders)	3
Electrical Generator	3
Engine Lube Oil System	3
Cooling System	
Absorption Chiller	2
Boiler Feed Water System	
Deaerator System	1
Heat Exchanger Systems	
Jacket Water System	3
Auxiliary Waste Heat System	3
Headquarters Hot Water System	3
Waste Heat System	2
Headquarters Hot Water System	3

Major Assets	Quantities
Engine Emission Control	
OXI Catalyst	3
SCR Catalyst	3
Urea Injection System	3
Heat Recovery System	
Heat Recovery Boiler	3
Building	
Elevator	1
Piping	Various
HVAC	
Air Handling Units	5
Air Compressors	
Engine Starting Air	2
Instrument Air	2

Major Assets Remaining Useful Life

Asset Type	Engine Generator #1	Engine Generator #2	Engine Generator #3	Chilled Water/ Absorption Chillers	Hot Water/ Supplemental Heat	Boiler Feed Water/ Steam	Waste Heat	Plant Water Piping	Oil Storage/ Handling	Instrument Air	Start Air	Building HVAC	Urea Storage/ Handling
Structural													
Buildings[a]	1												
Structures	-	-	-	-	-	-	-	-	-	-	-	-	-
Mechanical													
Combustion Engine	3	5	3	-	-	-	-	-	-	-	-	-	-
Lube Oil System	3	3	3	-	-	-	-	-	-	-	-	-	-
Engine Jacket Water	3	3	3	-	-	-	-	-	-	-	-	-	-
Auxiliary Waster Heat	3	3	3	-	-	-	-	-	-	-	-	-	-
Headquarter Hot Water	2	2	2	-	-	-	-	-	-	-	-	-	-
Heat Recovery Boiler	3	3	3	-	-	-	-	-	-	-	-	-	-
OXI/ SCR/ Urea Injection	3	3	3	-	-	-	-	-	-	-	-	-	-
Piping/ Ducting	-	-	-	4	3	3	3	5	3	3	3	3	3
Heat Exchanger	-	-	-	3	3	-	3	-	-	-	-	-	-
Pump	-	-	-	3	3	4	3	-	3	-	-	-	3
Vessel/ Tank	-	-	-	-	-	4	-	-	3	3	3	-	3
Absorption Chiller	-	-	-	5	-	-	-	-	-	-	-	-	-
Centrifuge	-	-	-	-	-	-	-	-	3	-	-	-	-
Compressor	-	-	-	-	-	-	-	-	-	4	4	-	-
Dryer	-	-	-	-	-	-	-	-	-	4	3	-	-
Fan/ Air Handling Unit	-	-	-	-	-	-	-	-	-	-	-	4	-
Electrical[b]													
Generator	3	5	3	-	-	-	-	-	-	-	-	-	-
VFDs	-	-	-	-	-	-	-	-	-	-	-	-	-
MCCs	4	4	4	4	-	4	-	-	-	2	2	4	4
Instrumentation													
General / PLCs/ CEMS	5	5	5	5	4	4	4	4	3	5	4	4	3

Please see the comprehensive Acronyms and Abbreviations list for definitions.
[a] Building is common for all assets.
[b] Refer to Area 18 (Section 2.2.10) for switchgears, batteries, and other electrical assets.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

AREA 16 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 CENTRAL GENERATION

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Gas Engine Generator Set Reliability – Aging components and systems required to operate the Central Generation (CenGen) engines are creating reliability issues and need to be addressed.	Continue to perform engine/generator PMs and monitor engine/generator performance.	Project J-135B completed overhauling engine/generator set #1 and #3. Project J-135C will overhaul engine/generator set #2 after J-135B is completed in 2026. Project J-140 will upgrade engine/generator protection system and diagnostics.
Switchgear Reliability – The switchgears and electrical equipment at the CenGen and Service Center are aging and need to be replaced for reliability purposes.	Continue to perform switchgear and major electrical equipment PMs, provide as-need CMs, and monitor equipment performance.	Project J-142 will replace aging and obsolete 12-kilovolt (kV) switchgears.
Plant Water Piping Corrosion – The plant water (that is, cooling water) piping has corroded and needs to be replaced.	Continue to monitor existing piping and provide as-needed CMs until replacement.	Project FE19-02 is replacing all plant cooling water piping in the basement of CenGen.
Backup Battery System Reliability – The batteries used to provide backup power for switching of the switch gear during a loss of power event have reached the end of their useful lives.	N/A.	Project FR1-0005 is replacing the lead acid batteries and their respective battery chargers with a suitable backup battery system.
Engine Programmable Logic Controller (PLC) Obsolescence – The existing master and engine PLCs and Remote Input/Output (RIO) cards are obsolete.	Continue to perform PLC PMs, provide as-needed CMs, and monitor equipment performance until replacement.	Project J-140 will replace obsolete PLCs and RIO cards with new Modicon M580 PLCs and new RIO cards.
Engine Protection System Obsolescence and Limited Engine Diagnostics – The existing engine vibration monitoring systems are aging, obsolete, and lack diagnostic capability.	Continue to actively monitor obsolete system until replacement.	Project J-140 will upgrade the Engine Condition Monitoring System and include diagnostic capabilities.
Engine Cylinder Pressure Monitoring and Balancing – There is no online engine cylinder pressure monitoring to assist with engine load balancing and troubleshooting.	N/A.	Project J-140 will add pressure sensors to monitor individual cylinder's pressure.
Exhaust Heat Recovery Boilers Reliability – The boilers need to be inspected both internally and externally.	N/A.	The boilers will be cleaned and inspected through Maintenance Service Contract CS-2025-650BD. As-needed repairs will be performed through Maintenance or a separate contract based on inspection results to improve boiler performance and reliability.
Engine Ignition Control System Obsolescence – The existing engine ignition controls are aging and obsolete.	Continue to actively monitor the obsolete assets and perform as-needed CMs until replacement.	MPJ-002 (PRN-00965) is pilot testing a new engine ignition system on Plant 2 Engine 2 to test compatibility and performance prior to installing new ignition control systems onto each engine generator set.
Absorption Chiller Obsolescence – The chillers are obsolete and need to be replaced.	Continue to actively monitor the obsolete assets and perform as-needed CMs until replacement.	Perform a planning study (PRN-01034) to determine the best solution and approach to replace the obsolete chillers. Replace obsolete chillers with new chillers designed for revised chilled water balance or with alternative technologies based on planning study recommendations.
Deaerator Reliability – The deaerator system is aging and needs to be replaced to improve reliability.	Continue to perform PMs, provide as-needed CMs, and monitor equipment performance until replacement.	Plan a project to replace the deaerator system.
Heating, Ventilation, and Air Conditioning (HVAC) Reliability – The five air handling units in the CenGen building are aging and need to be replaced to improve reliability.	Continue to perform PMs, provide as-needed CMs, and monitor equipment performance until replacement.	Plan a project to replace the air handling units.
Continuous Emissions Monitoring System (CEMS) Analyzer Obsolescence – The analyzers are obsolete and need to be replaced.	Continue to actively monitor the obsolete assets and perform as-needed CMs until replacement.	Plan a project to replace the obsolete analyzers.

AREA 16 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 CENTRAL GENERATION

Current and Future Projects

Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
J-142	Power Distribution Systems and Power Building C Replacements at Plant No. 1 and No. 2	CenGen Electrical System															
FE19-02	CenGen Plant Water Pipe Replacement at Plant No. 1	Plant Water Piping															
FE18-06	CenGen Instrument Air Compressor Replacement at Plant No. 1	Instrument Air Compressors															
J-135C	Engine and Generator Overhauls at Plant Nos. 1 and 2, Phase 2	Engine Generator Set #2															
J-140	CenGen Engine Monitoring System Improvements at Plant No. 1 and No. 2	Engine Generator, Heat Recovery System, Waste Heat, Steam, Chilled Water, Hot Water, Instrument Air															
FR1-0005	CenGen and 12kV Service Center Switchgear Battery System Upgrades	Battery Backup															
J-138	CenGen Facilities and OOBS Seismic Upgrades	CenGen Building															
MPJ-001	CenGen Exhaust Heat Recovery Boiler Cleaning/Assessment (Maintenance Service)	Heat Recovery System															
MPJ-002 (PRN-00965)	CenGen Engine Ignition Control System Obsolescence Replacement	Engine Generator															
PRN-01034	CenGen Chilled & Hot Water Loops Improvements Study at Plant No. 1	Chilled and Hot Water Loops															
FR1-0021	CenGen Basement Access Hatch Fall Restraint at Plant No. 1 and No. 2	CenGen Building															
TBD	CenGen Underground Storage Tank Assessment at Plant No. 1 and No. 2	CenGen Oil Storage/ Handling															
TBD	CenGen Deaerator System Replacement at Plant No. 1	Deaerator System															
TBD	CenGen Starting Air Compressor Overhauls (Maintenance Service)	Starting Air Compressors															
AI-753	CenGen Building HVAC Replacement at Plant No. 1	HVAC															
TBD	CenGen Absorption Chiller Replacement Plant No. 1	Absorption Chillers															
AI-797	CenGen CEMS Analyzer Replacement Plant No. 1 and No. 2	CEMS															
TBD	Energy and Digester Gas Master Plan - Revisit	CenGen															

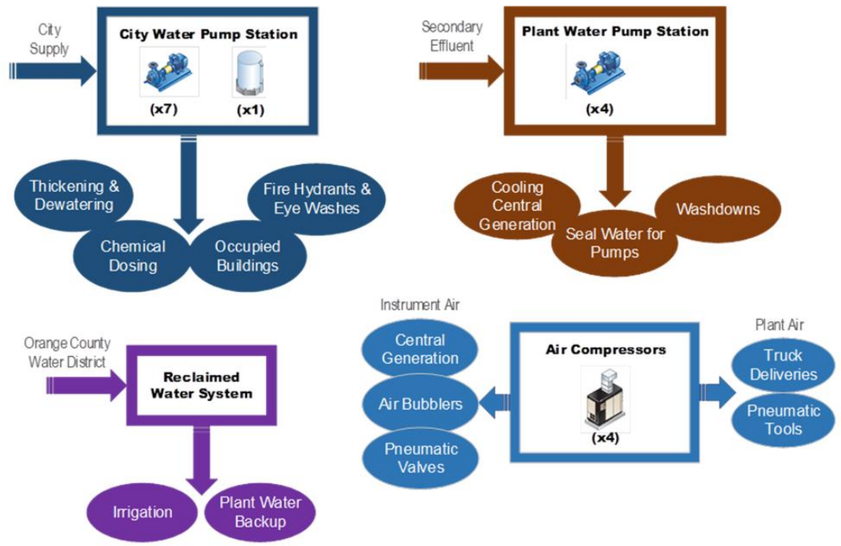
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREA 17 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 UTILITIES

2.2.9 Plant No. 1 Utilities

Process Schematic



Major Assets

Major Assets	Quantities
City Water	
Pumps	7
Tanks	3
Piping	10.6 miles
Plant Water	
Pumps	4
Strainers	3
Piping	12.5 miles
Reclaimed Water	
Piping	5.4 miles
Plant Air	
Compressors	4
Plant Air Piping	4 miles
Instrument Air Piping	3.5 miles

Major Assets Remaining Useful Life

Asset Type	City Water System	Plant Water System	Reclaimed Water Piping	Plant Air Systems
Civil				
Piping	3	3	2	3
Structural				
Pump Station	1	1	-	-
Tanks	2	-	-	-
Mechanical				
Pumps	3	4	-	-
Strainers	-	3	-	-
Compressors	-	-	-	3
Ventilation System	4	4	-	-
Electrical				
MCCs	4	4	-	-
VFDs	4	4	-	-
Instrumentation				
PLCs, Flowmeters	3	3	-	3

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

AREA 17 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 UTILITIES

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Plant/Instrument Air Line Issues – Excessive condensate and oversized piping are causing a large pressure drop, reducing compressor redundancy.	Continue to actively monitor existing piping and replace as needed.	Future small projects will be created to address oversized piping and several dead ends within the system. PRN-00995, Plant Air Piping Study, will provide recommendations. Project P1-105 will provide new compressors with filtration and condensate removal.
City Water Redundancy and Aging Pump Station – There is no redundancy in the system should the pump station fail. The pump station is getting old, requiring increased maintenance, and will not be reliable long term.	N/A	PS23-05, Utility Water Planning Study, will provide options for potable water if no City water is available for long periods and provide recommendations for rehabilitation or replacement of the pump station.
Plant Water Piping Reliability – There are piping failures throughout the system due to the corrosive nature of plant water. Current ductile iron pipes (DIPs) are corroding prematurely. Aging pipes are also a contributing factor. Pump station reliability needs evaluation.	Continue to actively monitor existing piping and replace as needed.	Project FE19-02 will address corroded plant water piping at CenGen, and FE20-05 will address recent plant water pipe failures at the secondary clarifiers. PS23-05 will provide recommendations for rehabilitation or replacement of the pump station.
Air Compressor Capacity – Plant and instrument air supply issues exist due to the lack of air compressors. Current air compressors are not adequate to meet the current plant needs.	Continue to monitor existing compressors and provide as-needed CMs until replacement.	Project P1-105 will add two new 100-horsepower (HP) compressors at headworks (one duty and one standby). FE18-06 will replace the existing 10 HP air compressors at CenGen.

Current and Future Projects

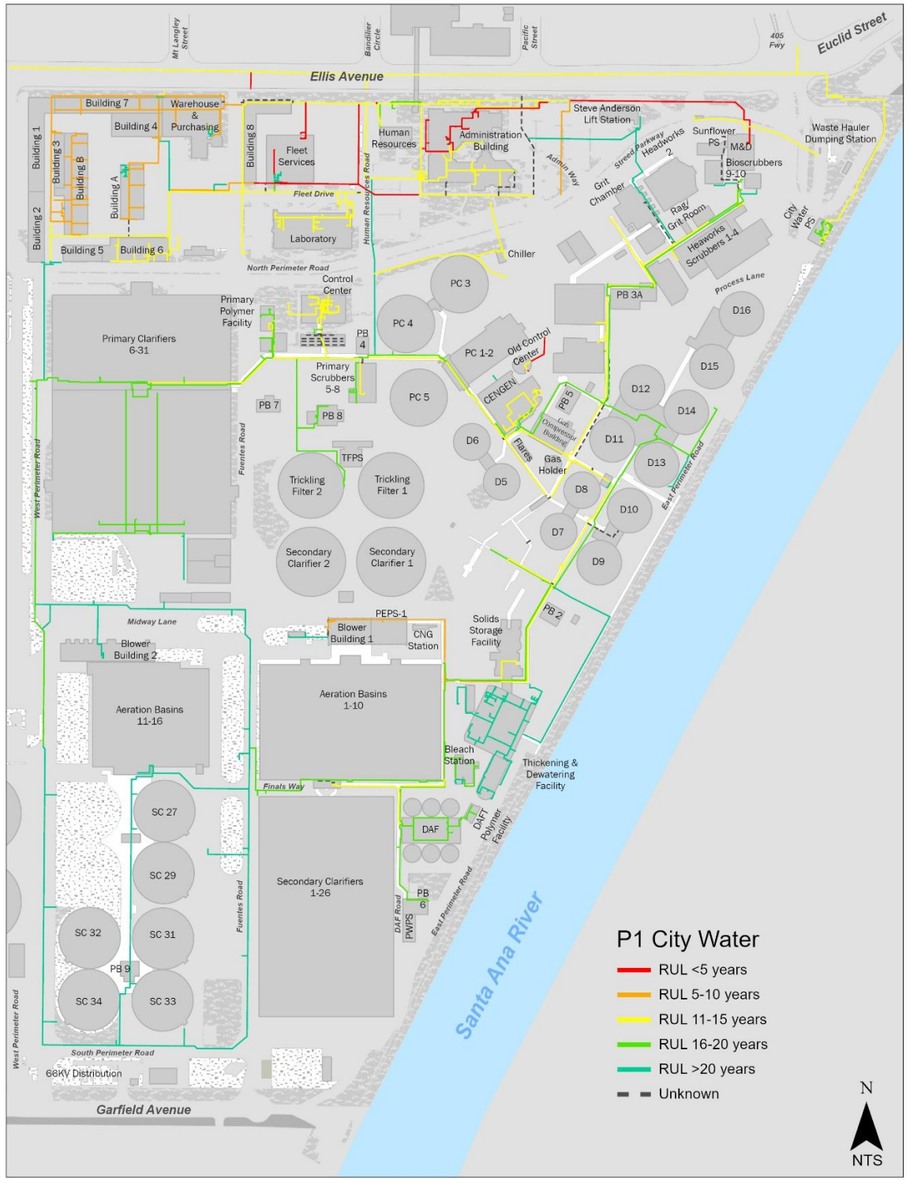
Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
FE18-06	Instrument Air Compressors at CenGen	Instrument Air Piping															
P1-105	Headworks Rehabilitation at Plant No. 1	City Water Pump Station, Plant Air Compressors, Plant Air Lines															
FE20-05	Plant Water Piping Replacement at Secondary Clarifiers	Plant Water Piping															
P1-126	Primary Clarifier Replacement and Improvement	Plant Water Piping															
FE19-02	CenGen Plant Water Pipe Replacement at Plant No. 1	Plant Water Piping															
X-124	Fleet Services Rehabilitation/Replacement	City Water Piping Replacement															
X-038	City Water Pump Station Replacement	City Water Pump Station															
X-039	Plant Water Pump Station Rehabilitation	Plant Water Pump Station															
PS23-05	Utility Water Planning Study at Plant Nos. 1 and 2	City and Plant Water Pump Stations															
X-017	Primary Sedimentation Basins 6–31 Rehab at Plant No. 1	Plant Water Piping															
P1-140	Activated Sludge 1 Rehabilitation at Plant No. 1	Plant Water Piping															
PRN-00995	Plant Air Piping Study at Plant Nos. 1 and 2	Plant Air Piping															

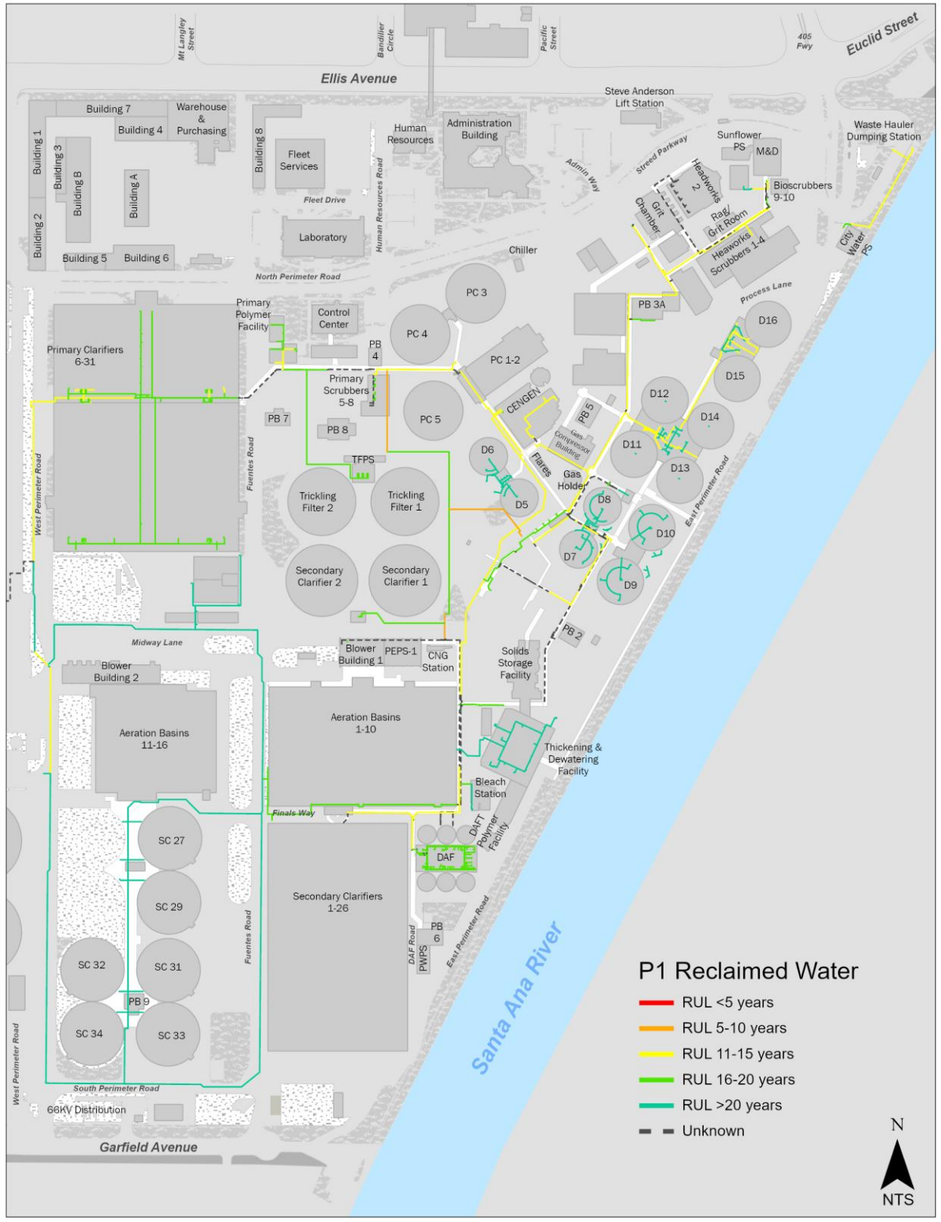
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREA 17 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 UTILITIES

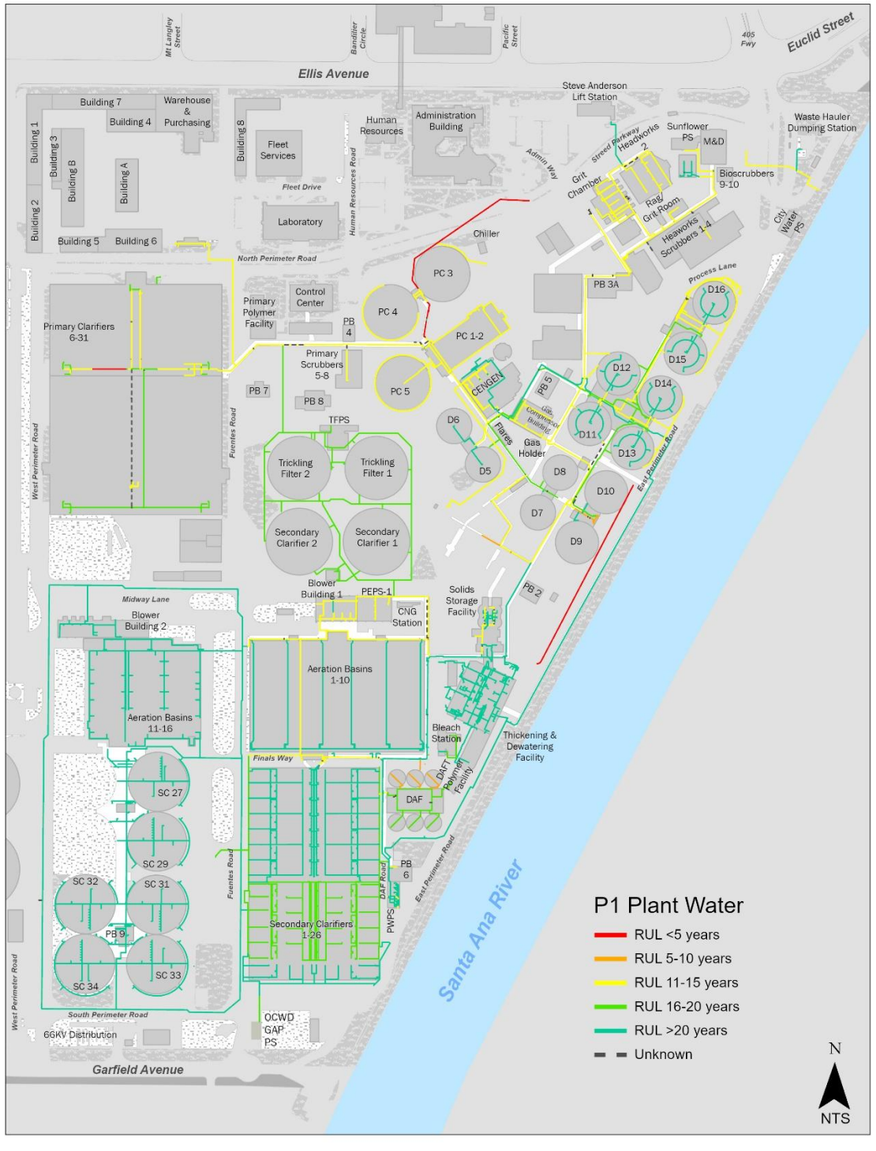
Remaining Useful Life of Utility Infrastructure

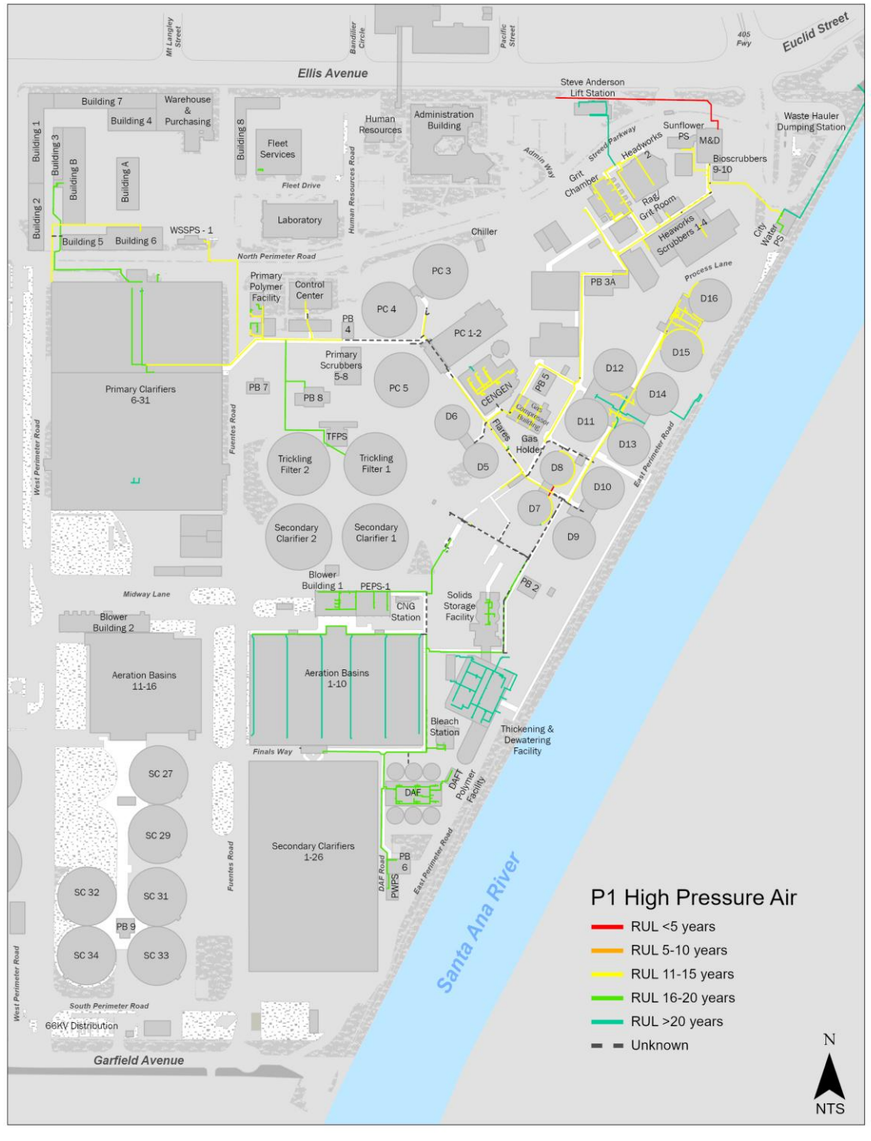




AREA 17 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 UTILITIES

Remaining Useful Life of Utility Infrastructure



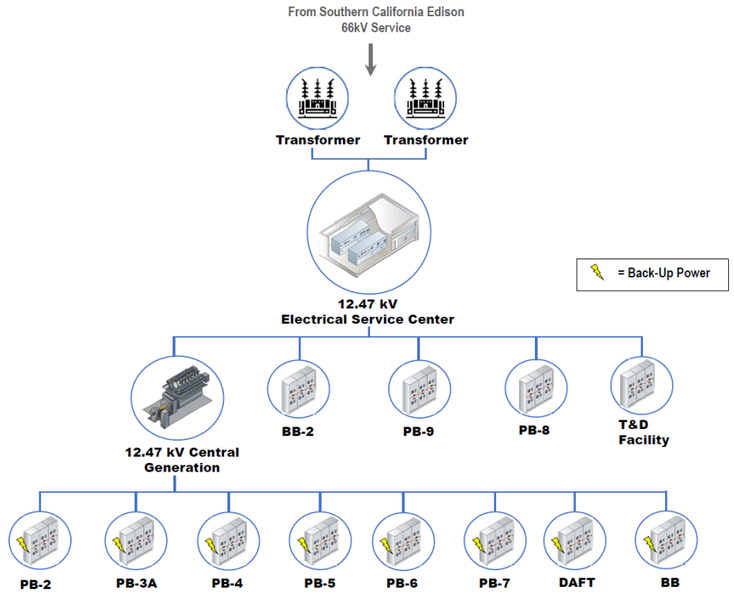


Please see the comprehensive Acronyms and Abbreviations list for definitions.

AREA 18 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 ELECTRICAL DISTRIBUTION

2.2.10 Plant No. 1 Electrical Distribution

Process Schematic



Major Assets

Major Assets	Quantities
12kV Transformers	40
Standby Generators	8
12kV Switchgear	14
5kV and 480V Switchgear	42
MCCs	89
VFDs	180
125VDC and 24VDC Battery Systems	25
Uninterruptible Power Supply (UPS)	24

Major Assets Remaining Useful Life

Asset Type	Service Center	CenGen	PB-2	PB-3A	PB-4	PB-5	PB-6	PB-7	PB-8	PB-9	DAFT	Blower Bldg.-1	Blower Bldg.-2	T&D Facility
Tier I – 12.47kV Primary Distribution Level														
12.47kV Feeders	1	4	4	4	4	4	4	1	1	1	3	4	1	1
12.47kV Switchgears	4	4	4	5	4	4	4	-	-	-	-	-	1	1
12.47kV Transfer Switchers	3	-	-	-		-	-	-	-	-	-	-	-	-
12.47kV Load Interrupter Switches	3	-	4	4	3	-	-	1	1	1	3	3	-	-
Transformers: 12.47kV/4.16kV	-	-	-	-	-	-	-	-	-	-	-	2	1	1
Transformers: 12.47kV/480V	4	4	3	3	3	2	3	1	2	1	3	3	1	1
Tier II – 4.16kV Distribution Level														
4.16kV Switchgears	-	-	-	-	-	-	-	-	-	-	-	3	1	-
4.16kV Feeders	-	-	-	-	-	-	-	-	-	-	-	3	1	-
Tier IV – 480V Distribution Level														
480V Switchgears	-	4	4	4	-	2	4	1	1	1	3	3	1	1
Transfer Switches	3	-	2	2	4	-	4	-	-	-	4	4	1	-
Generators	-	-	5	5	5	-	-	1	1	-	-	5	-	-
Tier V – Uninterruptible Power Supply														
UPSs Individual	-	2	-	5	-	-	4	5	4	4	5	4	3	-
Tier VI – 125VDC and 24VDC Battery Systems														
125VDC Chargers	2	2	4	5	-	2	3	3	3	3	4	-	3	1
125VDC Batteries	3	3	4	5	-	3	3	4	4	4	4	-	4	4
24VDC Chargers	-	2	4	5	4	-	-	3	3	-	-	4	-	1
24VDC Batteries	-	3	4	5	4	-	-	4	4	-	-	4	-	4
Standby Generator														
Generator Controls	-	5	5	5	5	-	-	1	1	-	-	5	-	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

AREA 18 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 ELECTRICAL DISTRIBUTION

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Variable Frequency Drive Obsolescence – Models across various areas of Plant No. 1 are becoming obsolete and are unsupported by the manufacturer.	Small Projects and Maintenance Projects are currently replacing VFDs as needed based on urgency.	Develop Service Contract for VFD condition assessment, repairs, and replacements.
480V and 120V Cable Failures – Multiple unexpected power and control cable failures have occurred within the past few years that indicate there may be underlying duct bank issues that may cause future failures.	Small Projects and Maintenance Projects (15-pack and informal bid) are currently replacing failed cables as needed.	Electrical Blanket Repair and Maintenance Contract is in development to replace cables more efficiently and cost effectively.

Current and Future Projects

Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
FR1-0005	CenGen and 12kV Service Center Switchgear Battery System Upgrades at Plant No. 1	Plant No. 1 Power Distribution															
MP1-015	Turbine Generator Battery Charger Replacement at Plant No. 1	Blower Building 1															
FE24-11	Steve Anderson Lift Station VFD Replacement at Plant No. 1	Steve Anderson Lift Station															
FR1-0011	P1 VFD Replacement at Plant No. 1	City Water Pump Station, RAS, DAFT, TF															
FR1-0023	Secondary Effluent Cable Replacement at Plant No. 1	Secondary Effluent Junction Box Gate Valves															
P1-132	Uninterruptable Power Supply Improvements at Plant No. 1	Plant No. 1 Multiple UPS Loads															
FR1-0019	Generator Protection Relay Replacements & Add Control Center Backup Power at Plant No. 1	Power Building 2, 4, 7, 8 Generator Controls, Control Center															
FR1-0024	PB-7 and PB-8 Generator and Centrifuge Motor Disconnect Improvements at Plant No. 1	Power Building 7 and 8 Generator, Centrifuge Motors															
P1-105	Headworks Rehabilitation at Plant No. 1	Plant No. 1 Headworks, Bars Screen, Metering Structure, PBs															
J-98	Electrical Power Distribution System Improvements	Various Plant No. 1 and Plant No. 2 Conditions-Based Electrical Distribution Systems															
P1-126	Primary Sedimentation Basins Nos. 3–5 Replacement at Plant No. 1	Plant No. 1 Power Distribution															
J-142	Power Distribution Systems and Power Building C Replacements at Plant No. 1 and No. 2	Service Center, Central Generation															
P1-133	Primary Sedimentation Basins No. 6–31 Reliability Improvements at Plant No. 1	Sludge Pump VFD Replacement															
P1-140	Activated Sludge 1 and Secondary Clarifier Rehabilitation	PB-2, DAFT, and Blower Building 1 Electrical Equipment															
J-124	Digester Gas Facilities Rehabilitation	PB-5 MCCs															
FE23-10	12kV Switchgear Replacement for PB-5 at Plant No. 1	PB-5 12kV Switchgear															
J-133	Laboratory Replacement at Plant No. 1	Lab Power Feed															
X-038	City Water Pump Station Rehabilitation at Plant No. 1	City Water Pump Station MCC															
X-039	Plant Water Pump Station Rehabilitation at Plant No. 1	PB-6 Electrical Equipment															
X-006	Waste Sidestream Pump Station Rehabilitation at Plant No. 1	MCCs, VFDs															

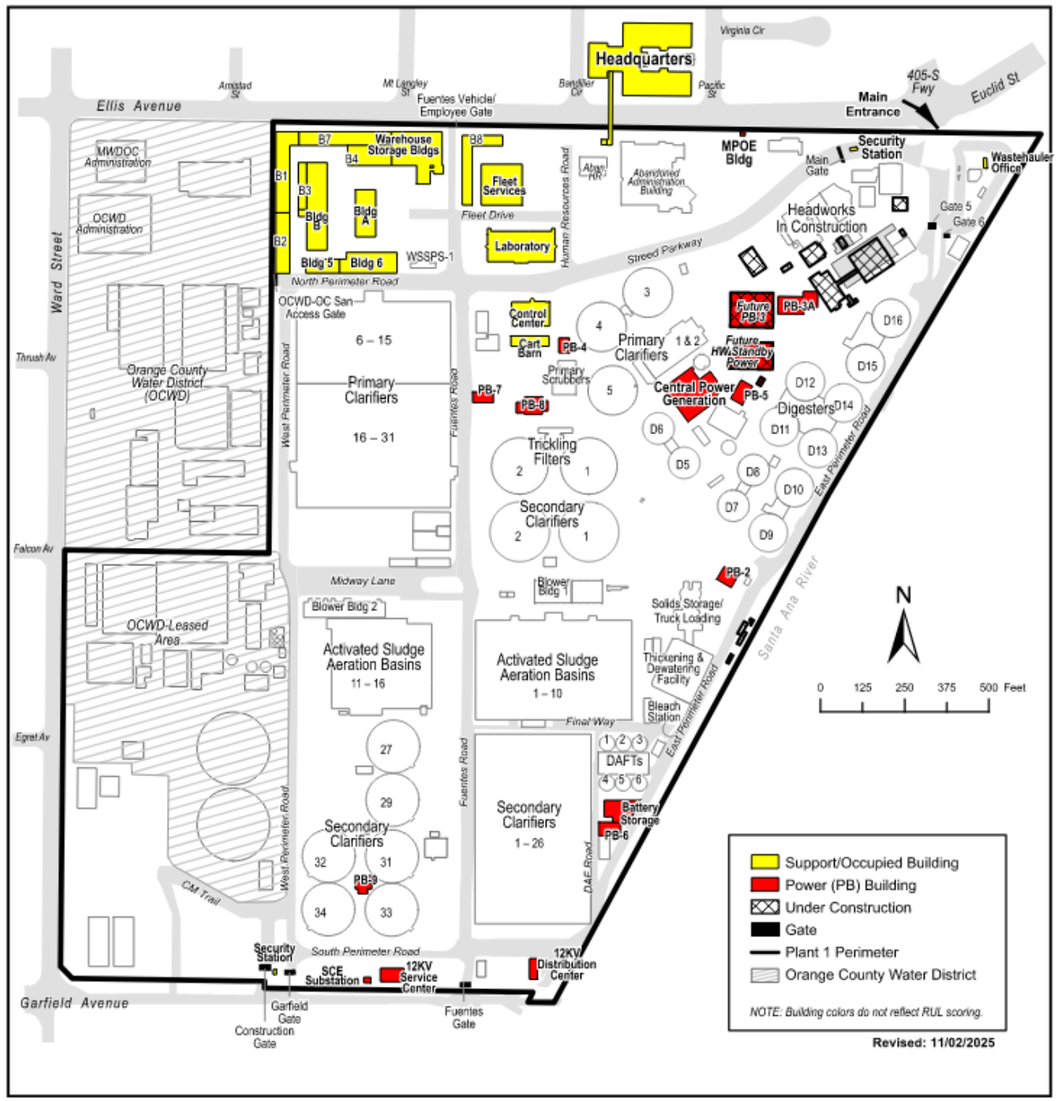
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREA 19 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 OCCUPIED AND POWER BUILDINGS

2.2.11 Plant No. 1 Occupied and Power Buildings

Occupied and Power Building Site Plan at Plant No. 1



Note: Building colors are used to help identify the buildings and do not represent RUL scores.

Major Assets Remaining Useful Life

Buildings	Building Roof	Building Electrical	HVAC	Seismic (PS15-06)	Elevator
Headquarters	1	1	1	-	-
Building "Shop" A	1	3	4	3	-
Building "Shop" B	2	4	4	4	-
Fleet Services	3	2	4	4	-
Building 4	2	2	4	-	-
Building 1	2	3	-	-	-
Building 2	2	2	-	-	-
Building 3	2	2	-	4	-
Building 5	2	2	4	5	-
Building 6	2	3	4	5	4
Building 7	2	2	4	-	-
Building 8	2	3	-	-	-
Cart Barn	4	3	-	-	-
Laboratory	2	4	3	5	4
Purchasing Building	5	4	4	3	-
Warehouse Building	1	4	4	3	-
Purchasing Building Conference Rm	1	2	4	-	-
Control Center	3	4	5	5	4
12KV Distribution Center	4	-	3	-	-
12KV Service Center	3	-	2	5	-
Power Building 2	4	-	3	2	-
Power Building 3A	3	-	3	-	-
Power Building 4	3	-	3	2	-
Power Building 5	3	-	3	2	-
Power Building 6	3	-	3	2	-
Power Building 7	5	-	3	-	-
Power Building 8	5	-	3	-	-
Power Building 9	1	-	3	-	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

AREA 19 ASSET MANAGEMENT SUMMARY – PLANT NO. 1 OCCUPIED AND POWER BUILDINGS

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Seismic Deficiencies – A recent planning study (PS15-06) recommended seismic retrofits to several buildings to avoid serious damage during an earthquake	N/A	Project P1-137 will make seismic modifications to several support buildings in Plant No. 1.
Aging Elevators – Elevators at Building 6, Control Center, and Lab need to be rehabilitated and modernized.	N/A	As the building elevators age and are less reliable over time, projects are being created to address modernization and upgrades as needed. FE24-08 is one such project.
Building Roofs Reaching Their Useful Life – Power Buildings 7 and 8 and Purchasing Building roofs need to be replaced.	N/A	As roofs reach the end of their useful life and are no longer repairable, Small Projects will be created to replace them.
Electric Vehicle Fleet Require Service Center – As more of the OC San District fleet becomes electric, there is a need for a specialized service center.	N/A	PS23-01 will provide recommendations on rehabilitating the existing fleet services building or building a new facility to address the servicing of electric vehicles.

Current and Future Projects

Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
FE23-08	PB-7 and PB-8 HVAC Replacement at Plant No. 1	Power Buildings 7 and 8															
PS23-01	Fleet Facilities Improvements Study	Fleet Building															
PRN-00955	Purchasing, PB-7, and PB-8 Roof Replacement	Purchasing Building, Power Buildings 7 and 8															
PRN-00960	Control Center HVAC Replacement	Control Center															
X-124	Electric Vehicle Fleet Services Building	Fleet Building															
P1-105	Headworks Rehabilitation at Plant No. 1	Power Buildings 3 and 3A															
P1-137	Support Building Seismic Improvements at Plant No. 1	Fleet Building, Control Center, Rebuild Shop, Shop A, Shop B, 12kV Service Center, Buildings 5 and 6															
J-133	Laboratory Replacement at Plant No. 1	Laboratory															
P1-141	Administration Facilities Demolition	Administration Building															
FE24-08	Building 6, Control Center, Lab Elevator Modernization	Building 6, Control Center, Laboratory															
P1-140	Activated Sludge 1 Rehabilitation at Plant No. 1	12kV Distribution Center, Power Building 2															
J-141	Public Address System Replacement	Plant 1 Plantwide															

Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

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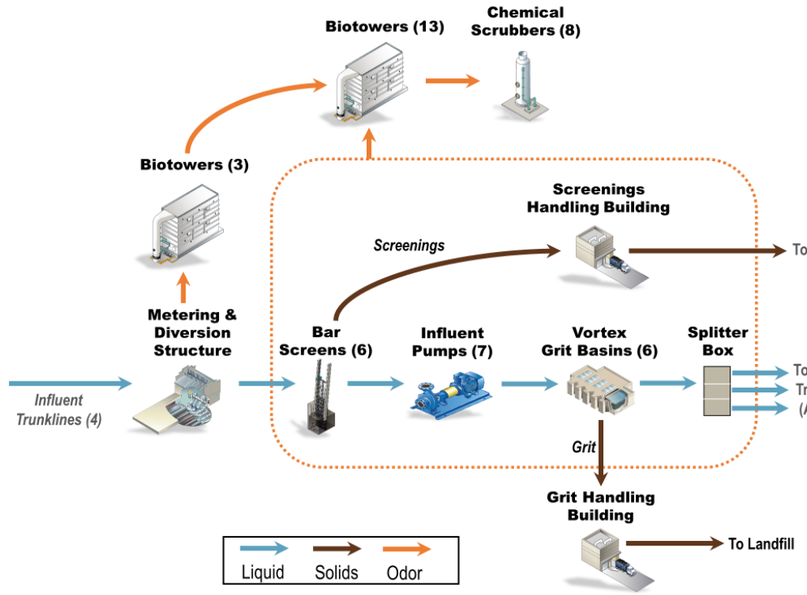
Plant No. 2 Area Asset Management Summaries

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AREA 20 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 PRELIMINARY TREATMENT

2.2.12 Plant No. 2 Preliminary Treatment

Process Schematic



Note: Process Schematic is general in nature. A detailed process diagram is provided in Appendix D.

Major Assets Remaining Useful Life

Asset Type	Headworks					Trunkline Odor Control	Headworks Odor Control	PB-D	Distribution Center H
	Metering & Diversion	Bar Screens	Main Sewage Pump	Grit Basins	Splitter & Metering				
Civil									
Effluent Piping	-	-	-	-	1	-	-	-	-
Structural									
Building	1	1	1	1	1	-	-	1	1
Concrete and Tanks	1	1	1	1	1	2	2	-	-
Mechanical									
Piping and Valve	2	-	2	2	2	-	-	-	-
Pump	-	-	4	3	-	3	3	-	-
Bar Screens	-	4	-	-	-	-	-	-	-
Screening Washer Compactor	-	3	-	-	-	-	-	-	-
Grit Cyclone/Classifier	-	-	-	3	-	-	-	-	-
Conveyor	-	3	-	3	-	-	-	-	-
Fans and Blower	-	-	-	-	-	3	3	-	-
Control Gate	3	3	3	3	3	-	-	-	-
Media	-	-	-	-	-	5	5	-	-
Electrical									
VFDs	-	-	5	-	-	5	5	-	-
MCCs	-	-	-	-	-	-	-	4	2
Instrumentation									
PLCs, Flow Meters	3	3	3	3	3	3	3	-	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

Major Assets

Major Assets	Quantities
Metering and Diversion Structure	
Influent Flow Meter	4
Control Gate	7
Trunk Odor Control	
Supply Fan	3
Biotower	3
Recirculation Pump	6

Major Assets	Quantities
Bar Screens	
Bar Screen	6
Screening Washer Compacter	3
Screenings Conveyor	4
Control Gate	14

Major Assets	Quantities
Main Sewage Pump	
Pump	7
Control Gate	16
Splitter and Metering	
Flow Meter	3
Control Gate	26

Major Assets	Quantities
Grit Basins	
Grit Basins	6
Grit Slurry Pump	6
Grit Cyclone/Classifier	4
Control Gate	12

Major Assets	Quantities
Headworks Odor Control	
Supply Fan	21
Biotower	13
Chemical Scrubber	8
Recirculation Pump	42
Bleach Tank	1

Major Assets	Quantities
Headworks Odor Control (Cont'd)	
Bleach Pump	16
Acid Tank	1
Acid Pump	2
Caustic Tank	1

AREA 20 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 PRELIMINARY TREATMENT

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Bar Screens Reliability – **Bar** screens have issues with misalignment and worn parts due to operating more frequently than intended and slugs of grit causing bending and misalignment of parts.	Maintenance purchased and received two new bar screens. Bar screen #3 is currently in the process of being replaced with one of the new ones. The other will be available as a shelf spare.	O&M plans for more frequent flushing and planned maintenance to prevent and minimize damage to parts.
Washer Compactor Redundancy – On August 21, 2021, Plant No. 2 experienced a slug of rags that plugged two washer compactors. An additional plugging issue occurred on one of the units on February 14, 2025, which was challenging to address due to the many man hours required by Maintenance to unplug the unit. With the plant operating in separated mode following the completion of P2-122, redundancy has been reduced, with one swing unit on standby available for the non-reclaimable or reclaimable stream.	Continue to address plugging through Maintenance work orders and performing PMs. An emergency mechanical services contract will be bid in fall/winter 2025 to provide an additional labor resource to expedite response and mitigation time for future issues.	Planning Study, PS24-07 is currently in the development phase to bid an engineering consultant in fall 2025. The study will research and develop concepts to increase redundancy to the system by adding a fourth unit, identify newer washer compactor equipment models that are less prone to plugging, and provide other options to increase the reliability of the washer compactor system and provide a feasible solution.
Main Sewage Pump (MSP) Vibration Monitoring System – The current vibration monitoring system is obsolete. It needs to be modernized to continue to protect both pumps and motors.	The Reliability Group uses infrared thermometers to measure temperature of the asset and manual vibration readings to cover the deficiency.	FE24-07 is currently in the development phase to bid an engineering consultant to assist in replacement of the obsolete system with the Bently Nevada Orbit 60.
Main Sewage Pumps Condition – The five large main sewage pumps and warehouse spare pump have worn parts and are in need of repair and replacement of parts such as mechanical seals, bearings, shaft sleeves, and O-rings. MSP-7 failed in operation after being out of service during repair of the VFD. The MSP was transported to a pump repair facility for inspection and repairs under a maintenance work order.	Continue to monitor and provide short-term maintenance repairs.	MP2-018, Main Sewage Pumps Repair at Plant No. 2, is in progress with a pump repair facility to make repairs on the spare large pump and MSP-1. A future project will be requested to apply similar repairs to the remaining MSPs (5 and 6).

Current and Future Projects

Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
FE24-07	Main Sewage Pump Vibration Monitoring System Modernization at Plant No. 2	Influent PS															
PS24-07	Screenings Washer Compactor Improvements Study at Plant No. 2	Screenings Washing															
MP2-018	Main Sewage Pumps Repair at Plant No. 2	Influent PS															
X-030	Headworks Rehabilitation at Plant No. 2	Headworks															

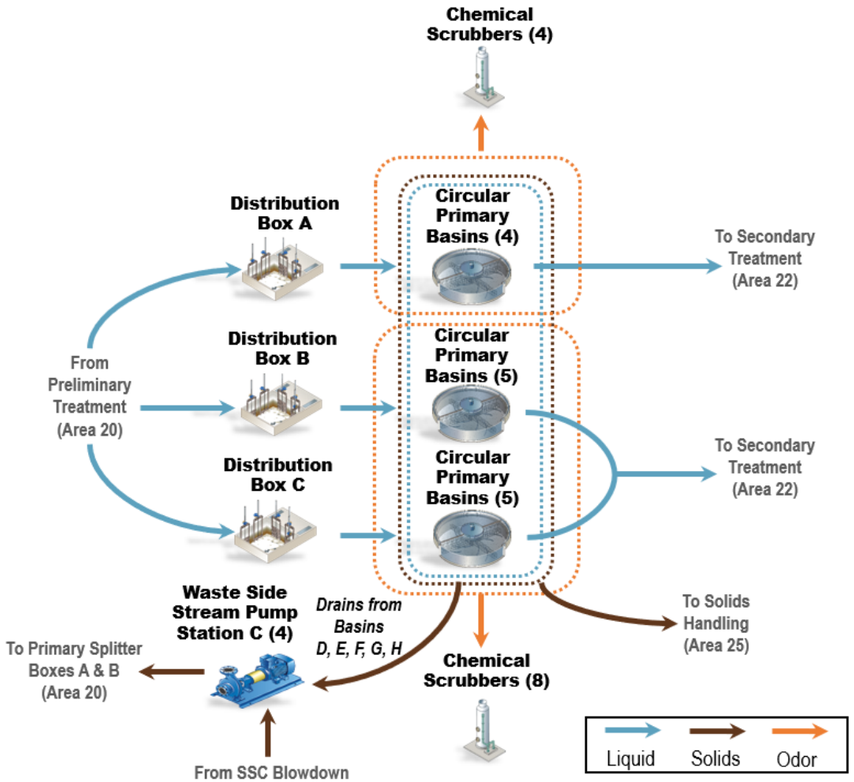
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREA 21 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 PRIMARY TREATMENT

2.2.13 Plant No. 2 Primary Treatment

Process Schematic



Major Assets Remaining Useful Life

Asset Type	A-Side				B-Side					C-Side										
	PSB-D	PSB-E	PSB-F	PB-G	PB-H	PB-I	PB-J	PB-K	PB-L	PB-M	PB-N	PB-O	PB-P	PB-Q	NSC	SSC	Polymer System	Ferric System	Distribution Box	WSSPS-C
Civil																				
Effluent Piping	5	5	5	5	4	4	4	4	4	4	4	4	4	4	-	-	-	-	-	2
Structural																				
General	5	5	5	5	3	3	3	3	3	3	2	2	2	2	3	4	3	2	4	1
Dome	5	5	5	5	3	3	3	3	3	3	3	3	3	3	-	-	-	-	-	-
Mechanical																				
Piping	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	4	3	2	3	2
Internal Mechanism and Gates	5	5	5	5	4	4	4	4	4	4	5	4	4	4	-	-	-	-	5	-
Fans and Pumps	5		5		3		3		3		3		3		3	5	5	2	-	2
Electrical																				
VFDs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-
MCCs	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	5	-	-	-	-
Instrumentation																				
PLC, Flow Meters	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5	3	-	3

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years | RUL 5–10 years | RUL 11–15 years | RUL 16–20 years | RUL > 20 years

Major Assets

Major Assets	Quantities
Primary Basin – A-Side	
Primary Basin	4
Sludge/Scum Collectors	4
Sludge/Scum Pump	8
Supply Fan	6
Primary Basin – B-Side	
Primary Basin	5
Sludge/Scum Collectors	5
Sludge/Scum Pump	10
Supply Fan	7

Major Assets	Quantities
Primary Basin – C-Side	
Primary Basin	5
Sludge/Scum Collectors	5
Sludge/Scum Pump	10
Supply Fan	8
North Scrubber Complex	
Chemical Scrubber	7
Bio Scrubber	1
Recirculation Pump	16
Supply Fan	8
Caustic Tank	1

Major Assets	Quantities
North Scrubber Complex (Continued)	
Acid Feed Pump	2
Bleach Tank	1
Bleach Feed Pump	14
Caustic Feed Pump	16
Acid Tank	1
Acid Feed Pump	2
South Scrubber Complex (SSC)	
Supply Fan	4
Scrubbers	4
Recirculation Pump	8
Caustic Tank	1

Major Assets	Quantities
South Scrubber Complex (Continued)	
Caustic Feed Pump	8
Acid Tank	1
Acid Feed Pump	2
Bleach Tank	1
Bleach Feed Pump	3
Polymer System	
Polymer Bulk Tank	3
Polymer Bulk Transfer Pump	4
Polymer Mix Tank	2

Major Assets	Quantities
Polymer System (Continued)	
Polymer Feed Pump	4
Ferric System	
Ferric Bulk Tank	2
Ferric Feed Pump	6
Distribution Boxes	
Structure	3
Sluice Gates	24
Waste Sidestream Pump Station C	
Waste Sidestream Pump	4

AREA 21 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 PRIMARY TREATMENT

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Reliability of A-Side Primary Clarifier Basins – The A-side basins were built in the 1960s. Aluminum dome supports for A-Side Primary Basins E and G are corroded. Currently, Basins F and G are not available due to loss of structural integrity from severe corrosion of the rotating mechanisms. Availability of A-side basins is critical to process non-reclaimable flow until P2-98A commissions four new primary basins.	FE23-09 (formerly MP2-007) is in progress to rehabilitate failed and corroded rotating mechanisms at Primary Clarifiers F and G.	P2-98A is in the construction phase to replace all four A-side primary basins.
Reliability of B- and C-Side Primary Clarifier Basins – B-side and C-side primary basins were built in the 1970s and 1980s, respectively. These basins are close to the end of their useful lives and require major rehabilitation to continue to operate reliably for next 30+ years. A main component of primary clarifier operability is the rotating mechanism drives. In April 2024, Maintenance staff observed noise from the drive at Primary Clarifier N, and OC San coordinated efforts for the Original Equipment Manufacturers (OEMs) to provide an assessment and identify issues.	Condition assessments are currently being conducted on each clarifier, including its rotating mechanisms, to verify RUL and timing of the P2-133 project, and to identify short-term projects to be completed ahead of P2-133. Assessments are scheduled to be completed by fall 2025. PRN-1020 will replace three clarifier drives (J, P, and Q) with new drives. The existing drives will be rebuilt to replace two other B/C-side clarifiers, selected based on criticality. The remaining rebuilt drive will be retained as a shelf spare. Following the OEM's assessment on the drive for Primary Clarifier N and recommended replacement of the drive, MP2-023 is currently in progress to replace the drive.	P2-133 will provide long-term rehabilitation on B- and C-side primary basins.
Functionality of Distribution Box B Gates – Distribution Box B has 10 leaking slide gates due to the absence of side seals in the original design.	One gate will be repaired and have seals installed as a test. The remaining gates will be repaired following a successful installation/test under the Planning task order.	P2-133 will provide long-term rehabilitation on B- and C-side primary basins and related systems such as Distribution Box B.
Condition of Primary Effluent Junction Boxes – Junction Boxes 2, A, B, C, D, and F were constructed in the 1970s, and Junction Box E was built in 1983. Several of these structures have leaks at the pressurized manhole covers and will need repair or rehabilitation. Primary Effluent Junction Box 2 was inspected, and a heavily corroded roof structure was identified.	P2-98A will address the corroded roof for Primary Effluent Junction Box 2, but other effluent junction boxes (JB-A to JB-F), which have pressure manhole covers, are in the process of being assessed.	N/A until short-term action to perform condition assessment is completed.
Reliability of Polymer System – The polymer system was built in 1988, and the RUL is limited. Instrumentation is obsolete and parts are no longer readily available.	The replacement of instrumentation and associated electrical has been added to Project P2-135, Chemical Systems Rehabilitation at Plant No. 2.	The full system will be replaced under P2-133.

Current and Future Projects

Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
P2-98A	A-Side Primary Clarifiers Replacement at Plant No. 2	A-Side Primary Clarifiers															
P2-135	Chemical Systems Rehabilitation at Plant No. 2	Anionic Polymer System															
FE23-09	Primary Clarifiers F and G Rotating Mechanisms Rehabilitation at Plant No. 2	Primary Clarifier F and G															
MP2-023	Primary Clarifier N Drive Replacement	Primary Clarifier N															
PRN-1020	B- and C-Side Primary Clarifier Drive Replacements at Plant No. 2	B- and C-Side Primary Clarifiers															
P2-133	B- and C-Side Primary Clarifiers Rehabilitation at Plant No. 2	B- and C-Side Primary Clarifiers															
X-030	Headworks Rehabilitation at Plant No. 2	Ferric Chloride and WSSPS-C															

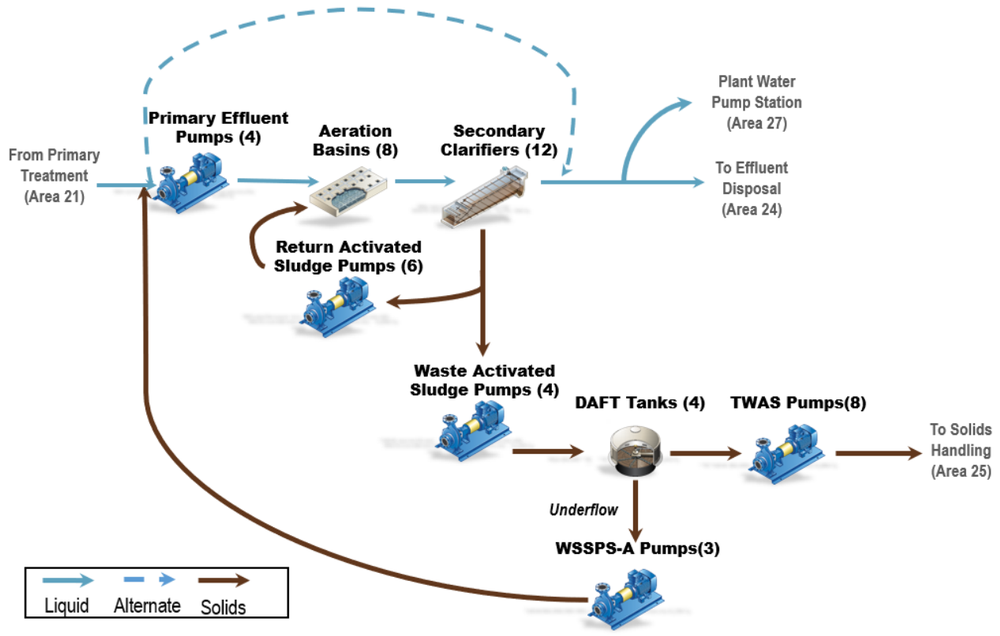
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREAS 22 AND 23 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 SECONDARY TREATMENT – ACTIVATED SLUDGE AND OXYGEN FACILITY

2.2.14 Plant No. 2 Secondary Treatment – Activated Sludge and Oxygen Facility

Process Schematic



Major Assets Remaining Useful Life

Asset Type	PEPS	Aeration Basins	Secondary Clarifiers A–L	SEJB	East RAS/WAS PS	West RAS/ WAS PS	Oxygen Facility	DAFTs A–D	DAFTs Polymer System	DAFTs Odor Control	WSSPS-A
Civil											
Effluent Piping	4	-	3	3	2	2	3	-	-	-	4
Structural											
Building	3	-	-	-	3	3	-	1	-	-	-
Structure	3	4	3	3	-	-	3	1	1	1	-
Mechanical											
Pump	4	-	-	-	3	3	-	2	2	-	3
Aerator	-	4	-	-	-	-	-	-	-	-	-
Piping and Valve	3	4	3	3	3	3	3	2	2	3	3
Clarifier/DAFT Moving Mechanism	-	-	4	-	-	-	-	4	-	-	-
Channel Air Blower	-	-	-	-	-	3	-	-	-	-	-
Control Gate	-	4	2	3	-	-	-	-	-	2	3
LOX Facility	-	-	-	-	-	-	3	-	-	-	-
HVAC and Ventilation	3	-	-	-	3	3	-	-	-	-	-
Electrical											
MCCs	4	3	3	-	3	3	4	1	1	1	1
VFDs	5	-	-	-	5	5	-	4	4	-	-
Instrumentation											
PLC and Flow Meter	3	4	3	-	3	3	4	3	3	-	3

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

Major Assets

Major Assets	Quantities
Primary Effluent Pump Station	
Building	1
Wet Well	1
Pumps	4
Bridge Crane	1
Aeration Basins	
Basins	8
Surface Aerators	32
Inlet Gates	8
Purge Air Fans	4

Major Assets	Quantities
Secondary Clarifiers A-L	
Basins	12
Inlet Gates	36
Sludge Collectors	24
Secondary Effluent Junction Box (SEJB)	
Structure	1
Control Gate	1

Major Assets	Quantities
East RAS/WAS PS	
RAS Pumps	3
WAS Pumps	2
West RAS/WAS PS	
RAS Pumps	3
WAS Pumps	2
Channel Air Blowers	2
Oxygen Facility	
LOX Storage Tanks	2
Vaporizer	6

Major Assets	Quantities
DAFTs A-D	
Concrete Tanks	4
Mechanical Sweep	4
Recycle Pumps	6
Saturation Tank	4
TWAS Pumps	8
DAFTs Polymer System	
Storage Tank	1
Aging Tank	2

Major Assets	Quantities
DAFTs Polymer System (Continued)	
Storage Tank Rec. Pumps	2
Blend Pumps	2
Feed Pumps	6
DAFTs Odor Control	
Biofilters	3
Foul Air Fans	3
Waste Sidestream Pump Station	
Pumps	3

AREAS 22 AND 23 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 SECONDARY TREATMENT – ACTIVATED SLUDGE AND OXYGEN FACILITY

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Primary Effluent Pump Station (PEPS) – Obsolete VFD parts; aged PEPS pumps and corrosion on suction pipes; missing flapper gates on the area drain inlets to the wet well; corroded individual pump discharge header; poor coating condition on pump discharge header.	Perform condition assessment of the discharge header and replace the pipes as incidental repair. Pump #3 discharge header condition assessment and replacement completed in 2025.	FE19-08 (combined with FR1-011) will replace the PEPS VFDs. MP2-0010 is scoped to overhaul Pumps #1, #2, and #3. Pump #3 was completed in Aug-2025, Pump #1 will be removed in fall 2025, and the Pump #2 overhaul will start in 2026, when Pump #1 is back online, and be completed in 2027. (Pump #4 overhaul was completed in 2022.) X-052 will replace the PEPS pumps with all electrical works including switchgears, rehabilitate the major discharge header, and replace the missing flapper gates.
Aeration Basin Reliability – Concrete deck cracking and structural integrity concerns; aerator motor corrosion and oxygen piping corrosion; aged oxygen analyzer panels and no air conditioning.	Continue the aerator motor rebuild as needed.	P2-136 will replace all oxygen piping, perform structural rehabilitation of the aeration basins, replace all aerators, and replace all inlet gates and oxygen analyzer panels.
Secondary Clarifiers – Collapsed mechanisms in Clarifiers D, G, and L; unsafe access into clarifier basins; scum accumulation and nocardia growth issue (scum is currently flowing to WSSPS-A and then is pumped back to PEPS to keep it in the non-reclaimable stream); some handrails do not meet Occupational Safety and Health Administration (OSHA) requirements.	A temporary bleach tote was installed for injection to WSSPS wet well for nocardia control. Maintenance will route a permanent bleach line to replace this tote. A vactor truck will remove scum.	FR2-0031 will provide a temporary solution to reroute the scum to DAFTs. P2-136 will replace the non-compliant handrails. FE24-10 will rebuild Clarifiers D, G, and L and add an alignment monitoring system. P2-143 will route WSSPS-A discharge to the new A-side primary basin.
RAS/WAS Pump Station Reliability and Sizing – Obsolete VFDs; aged pumps; seismic risks; WAS pumps are oversized to cover low-flow condition.	Continue to complete the pump overhaul being led by Maintenance.	FE19-08 (FR1-011) will replace the RAS and WAS VFDs. X-107 will add structural improvements to mitigate seismic risks at East and West RAS/WAS PSs. X-052 will replace all RAS and WAS pumps and will consider WAS pumps to cover low-flow conditions.
Liquid Oxygen (LOX) Supply and Storage Issues – LOX Tank B is over 40 years old and at the end of its useful life.	Continue the maintenance activities to maintain the temporary LOX trailer until Tank B replacement.	FE21-07 is in the final completion phase of construction for Tank A replacement. FE22-02 is in the construction phase to replace LOX Tank B. P2-142 will install Vacuum Swing Adsorption-type on-site oxygen generation units.
WSSPS-A Vulnerability – Flooding of the pump dry well has occurred in the past causing WSSPS pump motor damage.	Maintain the sump pump to avoid flooding; rebuild the main pumps as needed.	P2-143 will replace the pumps with dry pit submersible types, and P2-98A will install new discharge piping to route the discharge to the new A-side primary basin.
DAFTs Mechanism Corrosion and Lack of Safe Access, and DAFT D Seismic Issues – DAFTs A and D condition assessments found mechanisms severely corroded. DAFT D structure is vulnerable to a seismic event. DAFT mechanisms lack fall protection tie-off points for maintenance activities.	Conduct a condition assessment and coat DAFT interior mechanism based on the assessment findings. (DAFT A and D coating was completed in 2025, and coating work will continue in 2026 to complete DAFT B and C.)	X-107 will add structural improvements to mitigate seismic risks at DAFT D. FR2-0023 is under construction to install fall protection tie-off points.

Current and Future Projects

Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
MP2-0010	PEPS Pump #1, #2, and #3 Overhaul	PEPS															
FR2-0023	Activated Sludge Clarifier Entry Improvements	Secondary Clarifiers; DAFTs															
FE19-08	Plant No. 1, Plant No. 2, Collections VFD Drives Replacement	PEPS, RAS, RSS Pump Stations															
P2-136	Activated Sludge Aeration Basin Rehabilitation	AS Plant															
X-052	Activated Sludge RAS/WAS/PEPS/Vaporizers Rehabilitation	AS Plant															
FE21-07	LOX Tank A Replacement	LOX Facility															
FE22-02	LOX Tank B Replacement	LOX Facility															
FR2-0031	Activated Sludge System Scum Rerouting	AS Plant															
FE24-10	Activated Sludge Clarifier D, G, and J Equipment Replacement	Secondary Clarifiers															
P2-136	Activated Sludge Aeration Basin Rehabilitation	AS Plant															
P2-142	Oxygen Gas Generation Facility	LOX, AS Plant															
P2-143	Waste Sidestream Pump Station A Improvements	WSSPS A															
X-107	Seismic Improvements to DAFTs Area	DAFT D, East and West RAS/WAS PSs															
X-052	Activated Sludge RAS/WAS/PEPS/Vaporizers Rehabilitation	AS Plant															
TBD	Activated Sludge Facility Replacement Planning Study	AS Plant															
X-114	Activated Sludge Facility Replacement at Plant No. 2	AS Plant	**Project plan to start in 2041 with construction from 2046 to 2052**														

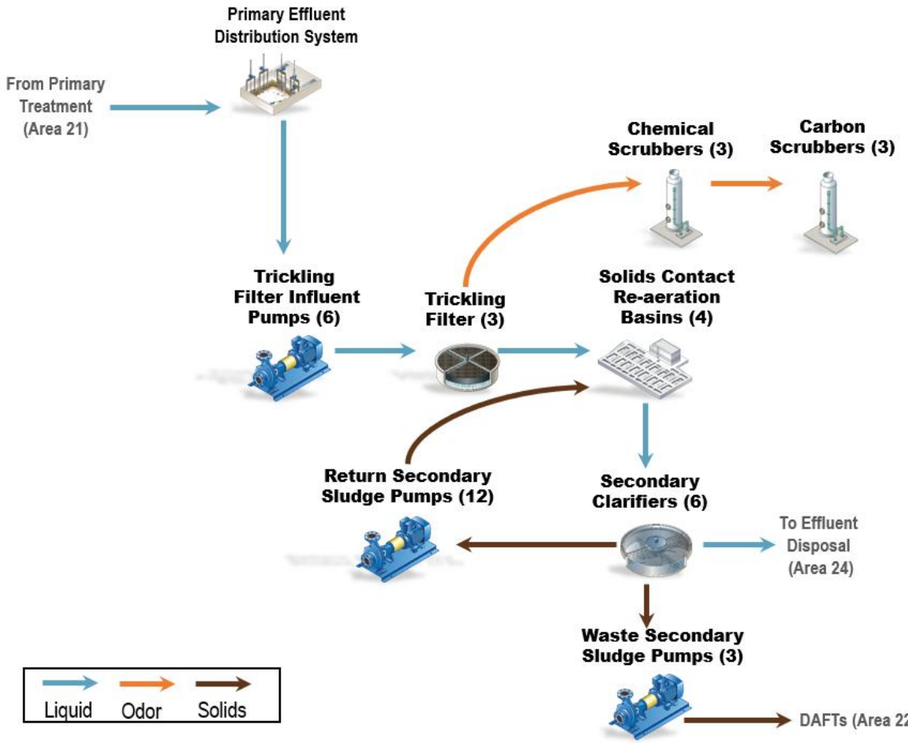
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREA 22 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 SECONDARY TREATMENT – TRICKLING FILTERS AND SOLIDS CONTACT

2.2.15 Plant No. 2 Secondary Treatment – Trickling Filters and Solids Contact

Process Schematic



Major Assets Remaining Useful Life

Asset Type	TFPS & Elec. Room	Trickling Filters A–C	Solids Contact & Blowers	WSS PS	Secondary Clarifiers A–F	RSS PS-A	RSS PS-B	RSS PS-C & Elec. Room	Odor Control Facility	Chemical Facility
Civil										
Effluent Piping	2	2	2	2	2	2	2	2	2	2
Structural										
Building	1	-	-	1	-	1	1	1	-	-
Structure	1	1	1	-	1	-	-	-	2	2
Mechanical										
Pump	2	-	-	2	2	3	3	3	2	3
TF Rotary Distributor	-	3	-	-	-	-	-	-	-	-
TF Media	-	3	-	-	-	-	-	-	-	-
Clarifier Sludge Collector	-	-	-	-	4	-	-	-	-	-
Blower and Fan	-	2	-	2	-	-	-	-	2	-
Control Gate	-	3	3	3	3	-	-	-	-	-
Piping and Valve	2	2	2	2	2	2	2	2	2	2
Fine Buddle Diffusor	-	-	2	-	-	-	-	-	-	-
HVAC and Ventilation	2	-	-	2	-	2	2	2	-	-
Electrical										
MCCs	1	1	1	1	1	1	1	1	1	1
VFDs	3	4	-	4	-	4	4	4	4	4
Instrumentation										
PLCs and Flow Meters	3	3	-	3	3	3	3	3	3	3

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

Major Assets

Major Assets	Quantities
Trickling Filter Pump Station	
Building	1
Pumps	6
Trickling Filters A–C	
Basins	3
TF Media	multiple
Rotary Distributor	3
Recirculation Fans	6
Foul Air Fans	3
Drain Gates	3

Major Assets	Quantities
SC/SR and ML Channel	
Structures	4 SCRs, 4 SRRs, 2 MLs
Control Gates	multiple
Diffusors	multiple
Blower/WSS PS Building	
Building	1
SR Blowers	3
SC Blowers	3
WSS Pumps	3

Major Assets	Quantities
Secondary Clarifiers A–F	
Basins	6
Sludge Collector	6
Scum Pumps	6
RSS PS-A	
Buildings	1
RSS Pumps	4

Major Assets	Quantities
RSS PS-B	
Buildings	1
RSS Pumps	4
RSS PS-C and Electrical Room	
Buildings	1
RSS Pumps	4

Major Assets	Quantities
Odor Control Facility	
Chemical Scrubbers	3
Carbon Units	3
Chemical System	
Bleach Storage Tanks	2
Caustic Storage Tank	1
Bleach Pumps	7
Caustic Pumps	6

AREA 22 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 SECONDARY TREATMENT – TRICKLING FILTERS AND SOLIDS CONTACT

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Trickling Filter Pump Station Back-up Power – No backup power to Trickling Filter Pump Station (TFPS); pump failure could result in primary effluent to ocean outfall.	N/A	J-117B will provide a plantwide load-shedding system to power critical Distribution Center J loads from CenGen.
Secondary Clarifier Corrosion and Damage – A condition assessment was done on Clarifiers B and D. Corroded areas have been discovered on walkways and clarifier moving mechanisms.	Maintenance projects will repair and replace parts. The Coating Program is working on coating the walkways and moving mechanism parts.	X-031 will perform a major rehabilitation of the secondary clarifiers.
Return Secondary Sludge (RSS) Pump Damage – Several RSS pumps need to be removed for overhaul due to damage related to clarifier broken parts.	Overhauling pumps, repairing clarifier, and purchasing two spare RSS pumps.	X-031 will perform a major rehabilitation of the secondary clarifiers.
Solids Contact/Sludge Reaeration Biomass Recycling – Using temporary piping to route the area drain pump station to SC/SR basins instead of headworks to keep the microorganisms in the biological process area.	Maintenance will continue to maintain existing hose.	PRN-00703 will reroute area drain PS discharge to SC/SR basins instead of headworks. Handed off to the Project Management Office group as Facilities Engineering project.
Trickling Filter Snail Control – Signs of snail shell accumulation at process area and excessive wearing on RSS and waste secondary sludge (WSS) pipes. Shells were found in long outfall pipeline.	Operations and Asset Management will continue to monitor the problem.	Changed from 25% caustic injection to 50%. PS18-10 recommended to change back to original design of flooding with 50% caustic at shorter duration. Need to schedule flooding test.

Current and Future Projects

Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
MP2-031	Trickling Filter Clarifier B Repair	Clarifier B															
PRN-00703	Trickling Filter Process Drain Improvements	TF/SC															
J-117B	Outfall Low Flow Pump Station	DC-J, TFPS															
X-031	TF/SC Rehabilitation	TF/SC facility															

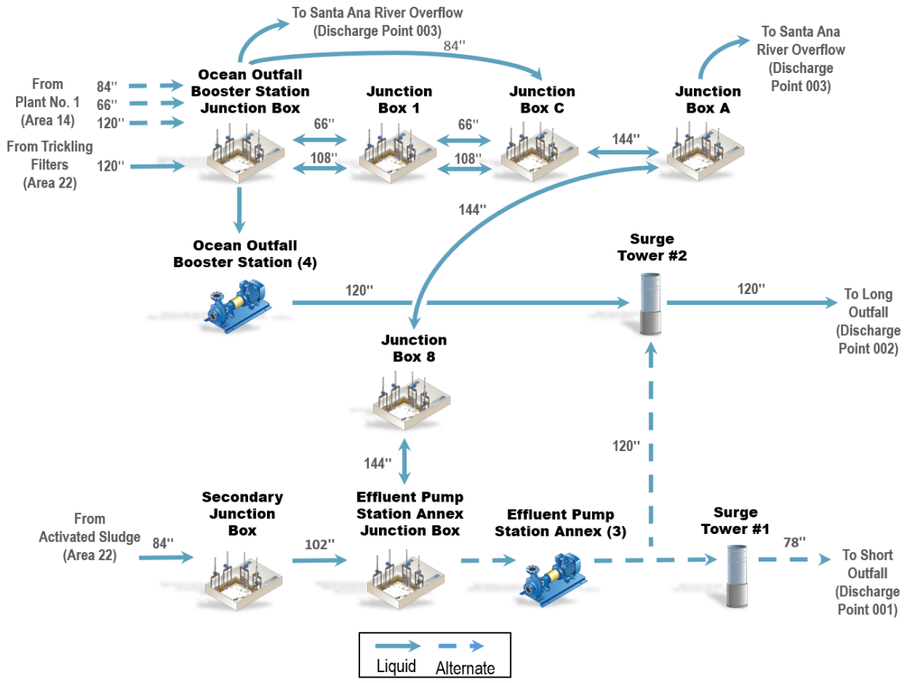
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREA 24 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 EFFLUENT DISPOSAL

2.2.16 Plant No. 2 Effluent Disposal

Process Schematic



Major Assets Remaining Useful Life

Asset Type	OOBS	Junction Boxes				EPSA	Disinfection System	Land Outfalls				120" Ocean Outfall	78" Ocean Outfall
		JB-1	JB-C	JB-A	JB-8			Surge Tower #1	Surge Tower #2	Sample Building	Beach Box		
Civil													
Effluent Piping	1	2	2	4	2	2	-	1	2	1	2	4	-[a]
Structural													
Structures, Buildings	4	2	2	4	2	2	2	1	2	1	2	4	1
Mechanical													
Pumps, Fans	3	-	-	-	-	2	2	-	-	-	-	-	-
Gates/Valves	5	3	3	3	3	3	-	3	3	-	-	-	-
Pipes	2	2	2	2	2	2	3	1	2	1	1	4	-
Tank	-	-	-	-	-	-	5	-	-	-	-	-	-
Manhole Covers	-	-	-	-	-	-	-	-	-	-	-	4	4
Ballast	-	-	-	-	-	-	-	-	-	-	-	4	4
Electrical													
VFDs	5	-	-	-	-	5	-	-	-	5	-	-	-
MCCs	5	-	-	-	-	3	-	-	-	3	-	-	-
Instrumentation													
PLC, Flow Meters	5	-	-	-	-	3	4	3	3	3	-	-	-
Actuators	4	4	4	4	4	4	-	4	4	-	-	-	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

[a] See Key Issue regarding condition

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

Major Assets

Major Assets	Quantities
Ocean Outfall Booster Station	
Pump	5
Wingwall Structure	1
Gate	3
Junction Boxes	
Junction Boxes	4
Wingwall Structure	1
Gate	13

Major Assets	Quantities
Effluent Pump Station Annex	
Pump	3
Gate	14
Disinfection Facility	
Sodium Bisulfite Tank	3
Sodium Bisulfite Feed Pump	6
Bleach Tank	6
Bleach Feed Pump	8

Major Assets	Quantities
Land Outfalls	
Surge Tower	2
Valve	2
Sample Building	1
Flowmeters	3
Beach Box	1

Major Assets	Quantities
120" Ocean Outfall	
Port Hole	500
Manhole Cover	47
78" Ocean Outfall	
Port Hole	125
Manhole Cover	14

AREA 24 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 EFFLUENT DISPOSAL

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
OOBS and Effluent Pump Station Annex (EPSA) Operation and Maintainability Strategy – After J-117B completion, the Low Flow Pump Station will be the primary system of operation for final effluent discharge pumping, with OOBS and EPSA on standby for service during peak wet weather flows (PWWFs). EPSA will function as the secondary backup system, and it will be critical to have a modified maintenance plan to ensure its reliability and readiness for service when needed.	Continue current maintenance strategy for EPSA and OOBS.	A future planning study will be created to identify operational and maintenance strategies for OOBS and EPSA.
Condition of 120-inch Long Outfall – Planning Study PS18-09, Ocean Outfall Condition Assessment and Scoping Study, performed a detailed inspection of the interior and exterior of the outfall, the ballast, and all associated components from the beach box to the end flap gate. The study identified 10 required project elements, four of which were immediate needs that were added as tasks to the project and resolved. However, six project elements remain that need to be addressed (see Long-Term Actions and Recommendations for details).	N/A	Project J-137 will address the remaining project elements identified from PS18-09: • Remove debris blocking diffuser access • Replace inspection opening hold-down hardware • Add additional ballast rock in areas identified by 3-D bathymetry survey • Replace existing manhole covers and appurtenances • Remove outfall sediment deposits • Replace flap gate
Condition of 78-inch Short Outfall – The short outfall was last used in 2012, and its condition is largely unknown. The U.S. Environmental Protection Agency recently added NPDES requirements for external inspection of the short outfall every 2.5 years.	External remotely operated vehicle inspection and reporting on the marine portion of the short outfall was completed in July 2023 and concluded that there were no significant observations requiring immediate attention or action.	J-137 will provide rehabilitation of the 120-inch Ocean Outfall as well as inspection and recommended repairs on the 78-inch Outfall.
Deterioration of Emergency Overflow Wingwalls – The two emergency overflow weirs allow emergency overflow discharges to the Santa Ana River via concrete wingwall structures. Investigations performed under PS17-10 concluded that both structures are gradually deteriorating and if not addressed soon, could require substantial rehabilitation within 6 to 7 years.	N/A	P2-139 scope is being updated to from a rehabilitation project to a replacement project, which will include design to meet current seismic standards.
Reliability of Sodium Bisulfite System (SBS) – The SBS has only been utilized a few times since 2015. Prior to this, higher discharges of effluent to the ocean outfall required dechlorination of disinfected effluent. The infrequent usage of the system led to sodium bisulfite crystallization in tanks, piping, and other appurtenances. Additionally, the equipment at the station is in poor condition and overdesigned for its current usage.	Installation of a tank-level transmitter along with associated wiring and conduit is in progress. A recirculation loop was installed from the existing pumps to the temporary tank to prevent crystallization of sodium bisulfite within the tank. This system will be used temporarily if needed during construction activities of P2-135 and J-137.	P2-135 will replace the sodium bisulfite chemical feed and storage system.
Obsolescence of Gate and Valve Actuators – All actuators in Area 24 are obsolete. Some are failing and have been replaced.	OC San will monitor conditions for actuators and will note which ones are difficult to operate during regular PM activities. Since it would be a substantial effort to replace all actuators, a path for replacement/repair will be determined on a case-by-case basis depending on criticality.	N/A

Current and Future Projects

Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
J-117B	Outfall Low Flow Pump Station	OOBS and New Low Flow Pump Station															
P2-135	Chemical Systems Rehabilitation at Plant No. 2	Sodium Bisulfite Station															
P2-139	Santa Ana River Wingwall Rehabilitation	OOBS and JB-A															
J-137	Ocean Outfalls Rehabilitation	120" and 78” Ocean Outfall															
J-138	CenGen Facilities and OOBS Seismic Upgrades	OOBS															
PS23-03	2025 Outfall Initial Dilution Model	120" and 78" Ocean Outfalls															
TBD	Ocean Outfall Land-Section Rehabilitation Study	120" and 78" Ocean Outfalls															
X-098	EPSA Rehabilitation	EPSA															
X-115	Short Outfall Rehabilitation	78” Ocean Outfall															
X-116	Outfall Land Section Rehabilitation	120” Ocean Outfall															
PRN-00381	42-inch Emergency Overflow Line	42” Overflow from JB-A to Headworks															
N/A	Outfall External Inspection	120" and 78" Ocean Outfalls															
N/A	Outfall Structural Integrity Report	120” and 78” Ocean Outfalls															

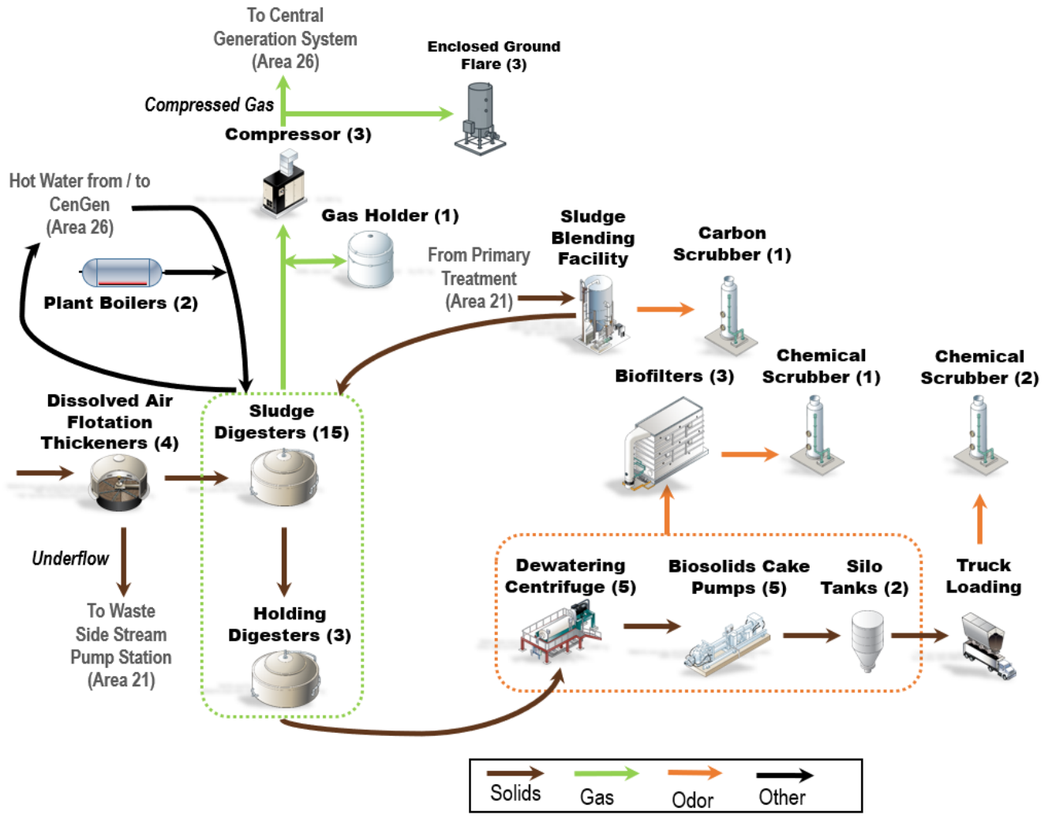
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREA 25 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 SOLIDS HANDLING – DIGESTERS

2.2.17 Plant No. 2 Solids Handling – Digesters

Process Schematic



Note: Process Schematic shows entire Area 25 Solids Handling Facility.

Major Assets Remaining Useful Life

Asset Type	Digester C	Digester D	Digester E	Digester F	Digester G	Digester H	Digester I	Digester J	Digester K	Digester L	Digester M	Digester N	Digester O	Digester P	Digester Q	Digester R	Digester S	Digester T	Digester Ferric
Civil																			
Effluent Piping	4	4	4	4	4	4	3	3	4	4	4	4	4	4	4	4	4	4	2
Structural																			
Structure	4	4	4	4	4	4	3	3	5	4	4	4	4	5	4	5	4	4	2
Digester Dome	4	4	4	4	4	4	3	3	5	4	4	4	4	5	4	5	4	4	-
Mechanical																			
Sludge Mixing Pumps/Jet Mixing	4	4	3	4	4	3	2	2	3	3	3	3	3	3	3	3	3	3	-
Sludge Recirculation and Heating System	4	4	2	4	4	2	2	2	-	2	2	2	2	4	4	4	4	4	-
Hot Water System	4	4	4	4	4	4	2	2	-	4	4	4	4	4	4	4	4	4	-
Sludge Transfer Pump	4			4			3	3	4		4		4		4		4		-
Piping and Valve	4	4	4	4	4	4	2	2	4	4	4	4	4	4	4	4	4	4	2
Chemical Pump	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Electrical																			
MCCs	4	4	5	3	3	5	1	1	1	3	3	3	3	5	5	3	3	5	1
VFDs	-	-	-	-	-	-	4	4	4	-	-	-	-	-	-	-	-	-	-
Instrumentation																			
PLC and Flow Meter	4	4	4	4	4	4	2	2	2	3	3	3	3	4	4	4	4	4	2

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

Major Assets

Major Assets	Quantities
Anaerobic Digesters (C–T)	
Active Digesters	15
Active/Holding Digesters (I and J)	2
Holding Digester (K)	1
Sludge Mixing Pumps	15+1+4 (1 each Digester + 1 at Digester K + 1 backup in each Digester L, M, N, & O)

Major Assets	Quantities
Anaerobic Digesters (C–T) (Continued)	
Jet Mixing Pumps	4 (2 each in Digesters I and J)
Sludge Recirculation Pumps	17
Hot Water Circulation Pumps	17
Heat Exchangers	17
Bottom Sludge Pumps	10

Major Assets	Quantities
Digester Ferric Facility	
Digester Ferric Storage Tanks	2
Ferric Feed Pumps	6

AREA 25 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 SOLIDS HANDLING – DIGESTERS

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Digester K Dome Integrity – Gas is leaking from dome and numerous cracks were found.	Keep Holder K out of service. Minimize shutdown time of Holders I and J.	FR2-0032 is under construction to repair the Digester K dome by overlaying polymer concrete based on the condition assessment and structural analysis report.
Digester C, D, F, G Mechanical Equipment Reliability – Digesters C, D, F, and G are the only four digesters that need to be upgraded with chopper pumps for the high-rate mixing pumps. All the high-rate mixing pumps on the other P2 digesters have been replaced with chopper pumps. Other pumps and the heat exchangers at the four digesters are also aged and need to be replaced.	Heat exchangers have already been purchased and are stocked on site in preparation for FE20-02.	FE20-02 is under construction to replace high-rate mixing pumps, heat exchangers, sludge recirculation pumps, bottom sludge transfer pumps, and hot water pumps and piping.
Digester Gas Balance Line Material Compatibility – Digester C, D, F, G, and I gas balance lines were constructed of polyvinyl chloride (PVC) pipes. The remaining gas balance lines were constructed of carbon steel pipes. These gas lines are not meeting the current digester gas line standard of stainless steel and are prone to failure or corrosion.	Finish the condition assessment of the carbon steel lines and apply protective coating as necessary based on the findings.	FE19-10 is under construction to replace the PVC gas balance lines with stainless steel lines (FE19-10 was combined with FE20-02 as one bid). P2-137 will replace the carbon steel gas balance lines between Digesters P and S. Other replacement needs will be planned based on the condition assessment findings and the remaining years in service.
Digesters P and R Structural Issue – The post-tensioned ring has deteriorated, impacting the structural integrity of the concrete domes.	Digesters P and R have been taken out of service.	P2-137A is in the completion phase to repair Digesters P and R post-tensioned rings and demolish Q-R bridge.
Walking Bridge Structural Deficiencies – Six out of 13 bridges were red taped to prevent access after unsafe conditions were found from assessments due to major cracking, buckling, and potential rebar corrosion.	Coat the steel bridges. Repair projects will incorporate inspection of the bridges on a regular basis before the repairs.	FE19-10 is repairing Digesters F and G and D-I bridges. FR2-0033 is repairing Digester O-T bridge. P2-137 will repair the remaining 13 bridges and replace the Digester Q-R bridge demolished by P2-137A.
Viewport Corrosion – There are three viewports on each digester. Most viewports are corroded, leaking gas from the seal, and need to be replaced.	Maintenance is scheduled to replace the seals.	P2-137 will replace one viewport and abandon the remaining two per digester.
Digester E and H Flame Arrestors Access – There's no safe access to do maintenance work on the flame arrestors on the gas balance lines.	Maintenance continues to set up a manlift to access.	P2-137 will add access platforms to those four flame arrestors.
Heat Exchangers, Sludge Recirculation Pump, and Sludge Transfer Pump Reliability – Digester heat exchangers, recirculation pumps, and bottom sludge transfer pumps are nearing the end of their useful lives and need to be replaced.	Maintenance will store spare heat exchangers, sludge recirculation pumps, and bottom sludge transfer pumps.	PRN-00684 Maintenance projects will replace heat exchangers, sludge recirculation pumps, and bottom sludge transfer pumps. (Digester E, H, L, M, N and O heat exchanger replacement and E and H pump replacement are completed.) FE20-02 will replace those units on Digesters C, D, F, and G.
Digester I and J Coating Failure – Interior coating on walls and ceiling installed by P2-89 are peeling off gradually.	Wash off the peeled coating after digester cleaning to avoid clogging the mixing pump and piping.	Creating project to recoat Digester I, J, and K interiors. Digester Holder K needs to be coated.
Overall Digester Reliability – Digesters are approaching the end of their useful lives and pose a risk of failure during a seismic event. Building new digesters is recommended by the Biosolids Master Plan to address the seismic risk and provide long-term Class B digestion reliability with the ability to convert to Class A digestion in the future.	Perform PM, condition assessment, and incidental repairs.	P2-137 will rehabilitate digesters including repairing domes and walls, replacing electrical and motor control centers (MCCs), relocating carbon canisters to ground level, and addressing other project elements mentioned above. P2-128 will build six new digesters. X-135 will replace Digesters P, Q, R, and S. XP2-131 will build three digesters/holders to replace Digesters I, J, and K.

Current and Future Projects

Project No.	Project Title[a]	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
PRN-00684	P2 Digester Maintenance Projects	Digesters E, H, L, M, N, O, P, Q, R, S, and T															
FE20-02 (incl. FE19-10)	Digesters C, D, F, and G Rehabilitation	Digesters C, D, F, G, and I															
FR2-0033	Digester O-T Bridge Repair	Digesters O and T															
FR2-0032	Digester K Dome Repair	Digester K															
P2-137A	Digester P and R Dome Tendon Repair	Digesters P and R															
P2-137	Digesters Rehabilitation	Digesters C, D, F, G, H, L, M, N, O, P, Q, R, and S															
P2-124	Interim Food Waste Receiving Facility	Digester M, Gas Treatment Facilities, and CenGen	**Design completed. Construction is pending food waste contract.**														
J-124	Digester Gas Facilities Rehabilitation	Digester T															
P2-128	Digester Replacement	New and Existing Digesters															
X-135	Digesters P, Q, R, and S Replacement	Digesters P, Q, R, and S															
XP2-130	Food Waste Receiving Facility	All Digesters, Gas Treatment Facilities, and CenGen															
XP2-131	Digesters I, J, and K Replacement	Digesters I, J, K, M, N, and O															

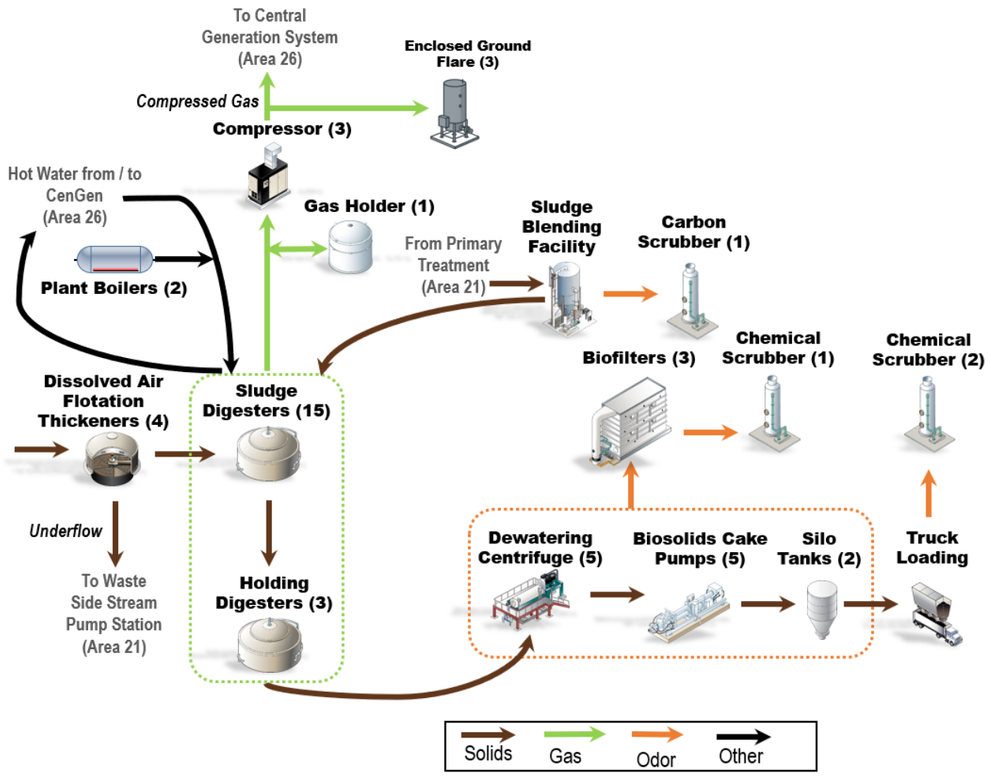
[a] For simplicity, Project Titles are missing "At Plant No. 2."
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREA 25 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 SOLIDS HANDLING – REMAINING FACILITIES

2.2.18 Plant No. 2 Solids Handling – Remaining Facilities

Process Schematic



Note: Process Schematic shows entire Area 25 Solids Handling Facility.

Major Assets Remaining Useful Life

Asset Type	Sludge Blending Facility	Plant Boiler	Centrifuge Dewatering	Centrifuge Bldg. & Silos Odor Control	Truck Loading Bay Odor Control	Truck Loading	Gas Handling	Gas Holder	Gas Flares
Civil									
Effluent Piping	2	-	-	-	-	-	-	-	-
Structural									
Structure	2	-	1	1	1	1	-	3	3
Building	1	3	1	-	-	-	4	-	-
Mechanical									
Pump	3	-	1	-	-	-	-	-	-
Fan	-	-	-	3	2	-	-	-	-
Boiler and Heat Exchanger	-	2	-	-	-	-	-	-	-
Centrifuge	-	-	1	-	-	-	-	-	-
Polymer System	-	-	1	-	-	-	-	-	-
Biofilter	-	-	-	1	-	-	-	-	-
Chemical System	-	-	-	2	2	-	-	-	-
Gas Cleaning Vessel	-	-	-	-	-	-	3	-	-
Gas Compressor	-	-	-	-	-	-	4	-	-
Gas Dryer	-	-	-	-	-	-	5	-	-
Screw Conveyor	-	-	-	-	-	2	-	-	-
Sliding Frame	-	-	-	-	-	2	-	-	-
Piping and Valve	3	3	2	2	2	3	4	3	3
Scale	-	-	-	-	-	1	-	-	-
Electrical									
MCCs	1	2	1	1	1	2	4	-	-
VFDs	4	-	3	-	-	-	-	-	-
Instrumentation									
PLCs and Flow Meters	3	3	2	2	2	3	4	-	3

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

Major Assets

Major Assets	Quantities
Sludge Blending Facility	
Sludge Blending Tanks	2
Digester Feed Pumps	6
Recirculation Pumps	3
Electrical Building	1
Plant Boiler Facility	
Building	1
Boilers and Heat Exchangers	2

Major Assets	Quantities
Centrifuge Building and Silos Odor Control	
Biofilters	3
Ammonia Scrubber	1
Acid Tank	1
Gas Handling	
Gas Compressors	3
Low Pressure Gas Holder	1
Gas Dryers	2
Gas Flares	3
Carbon Media	3

Major Assets	Quantities
Dewatering Centrifuge Facility	
Building	1
Centrifuges	5
Sludge Feed Pumps	5
Cake Transfer Pumps	5
Centrate Pumps	2
Polymer System	1

Major Assets	Quantities
Truck Loading	
Cake Storage Silos	2
Sliding Frames	2
Screw Conveyors	12
Scales	2

Major Assets	Quantities
Truck Loading Bay Odor Control	
Chemical Scrubbers	2
Bleach Tank	1
Caustic Tank	1
Bleach Pumps	4
Caustic Pumps	4

AREA 25 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 SOLIDS HANDLING – REMAINING FACILITIES

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Boiler and Heat Exchanger Reliability and Vulnerabilities – Equipment is nearing the end of its useful life. Facility has reliability and seismic vulnerabilities.	N/A	P2-128 will install hot water boilers in the building to replace the existing steam boilers. J-138 will address the building's seismic deficiencies.
Gas Handling System Reliability – The aging facility requires replacement or rehabilitation to meet current and future process needs and regulatory requirements. Gas compressor system is aging and needs major rehabilitation.	Continue to actively monitor the condition of aging assets until replacement and overhaul.	J-124, Digester Gas Facilities Rehabilitation, will replace existing flares and compressor inlet moisture separator systems; install new closed-loop cooling water systems; rehabilitate the building; and perform various electrical, instrumentation, and control upgrades to improve reliability. Gas compressors will be overhauled by Maintenance. The remaining instrumentation upgrades will be completed under Project FE24-02.
Refrigerated Gas Dryer Reliability – Inefficient capacity and unreliable. Requires significant maintenance.	N/A	The refrigerated gas dryer systems will be replaced by FE23-01. The remaining dryer instrumentation upgrades will be completed under Project FE24-02.
Truck Loading Facility Area Issues – Truck loading bay fugitive odors escape during cake loading operations; screw conveyor has high torque alarms.	Monitor and investigate the problem.	P2-140 will implement the recommended odor capture improvements from the PS20-03 planning study. Plan to upsize the screw conveyor motors and gear boxes.
Centrifuge Dewatering Issues – Cake pipe lube ring pump replacement parts are not readily available, making it difficult to maintain and keep operational; vivianite build-up in centrate collecting lines.	Stock spare parts for lube ring pump. Maintenance will conduct reoccurring centrate line inspection and cleaning to break down the vivianite build-up, and add a flush line to help the cleaning.	MP2-015 completed the replacement option evaluation and will replace the lube ring pumps with hydraulic diaphragm pumps. Planning study to develop engineering solution to prevent vivianite build-up as the problem grows.
Centrifuge and Silo Odor Control Issues – Odor control fans are experiencing low air flow output; a condition assessment of the downstream biofilter found that the media was plugged and need replacement.	Continue the investigation of the root cause of the media plugging. Maintenance will purchase a spare fan.	Plan project to replace the biofilter media.

Current and Future Projects

Project No.	Project Title[a]	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
FE23-01	Digester Gas Compressor Dryer Replacements at Plants No. 1 and No. 2	Refrigerated Gas Dryers															
FE24-02	Gas Compressor Chilled Water Exchangers and Condensate Separator Replacements and Instrumentation Upgrades	Chilled Water Gas Heat Exchangers and Condensate Separator, Gas Dryer Instrumentation, Gas Header Instrumentation															
J-124	Digester Gas Facilities Rehabilitation	Electrical and Instrumentation, Building, Compressor Inlet Separators, Cooling System, Flares															
N/A	Digester Gas Compressor Overhauls at Plants No. 1 and No. 2 (Maintenance Service)	Gas Compressors															
P2-140	Truck Loading Bay Odor Control Improvements	Truck Loading Facility															
P2-128	Digester Replacement	Boiler Facility															
J-138	CenGen Facilities and OOBS Seismic Upgrades	CenGen, OOBS, Boiler Bldg., PB-B															
MP2-015	Cake Pipe Lube Ring Pump Replacement	Centrifuge and Truck Loading Facilities															
SC22-02	Centrifuge Server Room HVAC Replacement	Centrifuge Facility															
TBD	LPDG Drip Trap Improvements at Plant No. 2	LPDG Drip Traps															

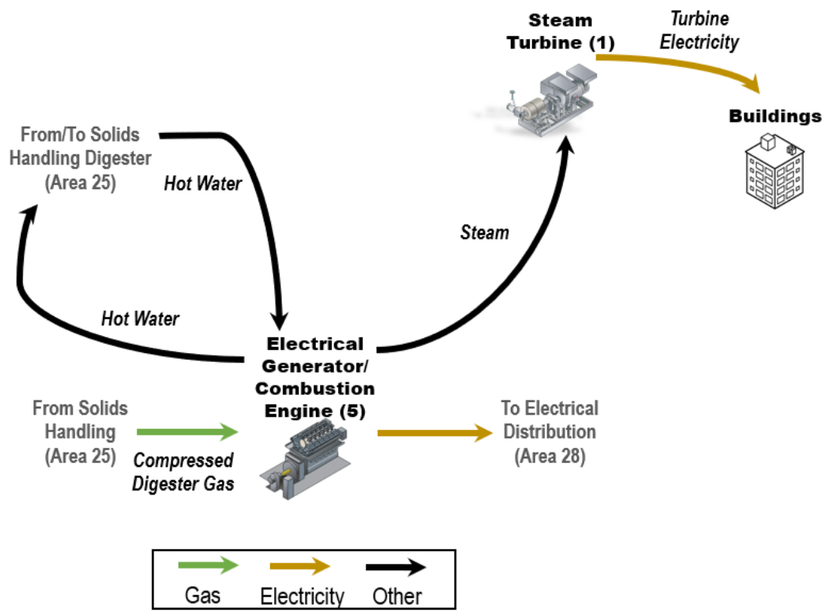
[a] For simplicity, Project Titles are missing "At Plant No. 2."
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREA 26 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 CENTRAL GENERATION

2.2.19 Plant No. 2 Central Generation

Process Schematic



Major Assets

Major Assets	Quantities
Engine Generator	
Gas Engine (16 Cylinders)	5
Electrical Generator	5
Engine Lube Oil System	5
Steam Turbine Generator	
Steam Turbine	1
Electrical Generator	1
Steam Condenser	1
Deaerator Vessel	1
HVAC	
Ventilation Supply Fans	5
Ventilation Exhaust Fans	6
Air Compressors	
Engine Starting Air	3
Instrument Air	2

Major Assets	Quantities
Heat Recovery System	
Heat Recovery Boiler	5
Building	
Building	1
Piping	Various
Engine Emission Control	
OXI Catalyst	5
SCR Catalyst	5
Urea Injection System	5
Heat Exchanger Systems	
Jacket Water System	5
Aux. Waste Heat System	5
Waste Heat System	2

Major Assets Remaining Useful Life

Asset Type	Engine Generator #1	Engine Generator #2	Engine Generator #3	Engine Generator #4	Engine Generator #5	Steam Turbine Generator	Hot Water/ Supplemental Heat	Boiler Feed Water/ Steam	Waste Heat	Plant Water Piping	Oil Storage/ Handling	Instrument Air	Start Air	Building HVAC	Urea Storage/ Handling
Structural															
Buildings[a]	1														
Structures	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mechanical															
Combustion Engine	3	5	5	5	5	-	-	-	-	-	-	-	-	-	-
Lube Oil System	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-
Engine Jacket Water	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-
Auxiliary Waster Heat	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-
Heat Recovery Boiler	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-
OXI/ SCR/ Urea Injection	4	3	3	3	4	-	-	-	-	-	-	-	-	-	-
Piping/ Ducting	-	-	-	-	-	4	3	3	3	5	3	3	3	4	3
Heat Exchanger	-	-	-	-	-	-	3	-	3	-	-	-	-	-	-
Pump	-	-	-	-	-	-	3	4	3	-	3	-	-	-	3
Vessel/ Tank	-	-	-	-	-	3	-	4	-	-	3	3	3	-	3
Steam Turbine	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-
Centrifuge	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-
Compressor	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
Dryer	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-
Fan/ Air Handling Unit	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
Electrical[b]															
Generator	3	5	5	5	3	4	-	-	-	-	-	-	-	-	-
VFDs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MCCs	4	4	4	4	4	4	-	-	-	-	-	2	2	4	4
Instrumentation															
General / PLCs / CEMS	5	5	5	5	5	5	4	4	4	4	4	3	3	3	3

Please see the comprehensive Acronyms and Abbreviations list for definitions.
[a] Building is common for all assets.
[b] Refer to Area 18 (Section 2.2.10) for switchgears, batteries, and other electrical assets.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

AREA 26 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 CENTRAL GENERATION

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Gas Engine Generator Set Reliability – Aging components and systems required to operate the five CenGen engines are creating reliability issues and need to be addressed.	Continue to perform engine/generator PMs and monitor engine/generator performance.	Project J-135B is executing major engine overhauls. Project J-135C will overhaul engine/generator sets #2 and #4 after J-135B is complete in 2026. Project J-140 will upgrade various obsolete instrumentation and control systems. Project J-117B will replace switchgears, MCCs, battery backup, etc.
Engine Lube Oil System Reliability – Lube oil centrifuge instrumentation and controls need to be upgraded.	N/A	Install new instrumentation and controls onto the existing two units (PRN-00211).
Plant Water Piping Corrosion – Plant water (that is, cooling water) piping has degraded and needs replacement.	N/A	Project FE20-04 will replace all plant water piping in the basement of CenGen.
Emission Control System Cracking/Overpressure Protection – Housings on the oxidizer catalysts are failing prematurely and lack overpressure protection.	Continue to perform housing PMs and provide as-needed CMs until replacement. Evaluate additional logic/alarms to notify Operations of abnormal conditions and assist with decision making.	Investigate failures; redesign and install new catalyst housings and emissions devices as needed; evaluate the feasibility of adding overpressure protection to the exhaust system (PRN-00977/AI-184).
Exhaust Heat Recovery Boiler Reliability – The boilers need to be inspected both internally and externally.	Perform as-needed repairs based on inspection results to improve boiler performance and reliability.	The boilers will be cleaned and inspected through Maintenance Service Contract CS-2025-650BD. As-needed repairs will be performed through Maintenance or a separate contract based on inspection results to improve boiler performance and reliability.
Engine PLC Obsolescence – The existing engine PLCs and RIO cards are obsolete.	Continue to perform PLC PMs, provide as-needed CMs, and monitor equipment performance until replacement.	Project J-140 will replace obsolete PLCs and RIO cards with new Modicon M580 PLCs and new RIO cards.
Engine Protection System Obsolescence and Limited Engine Diagnostics – The existing engine vibration monitoring systems are aging, obsolete, and lack diagnostic capability.	Continue to actively monitor obsolete asset performance until replacement.	Project J-140 will upgrade the Engine Condition Monitoring System and include diagnostic capabilities.
Engine Cylinder Pressure Monitoring and Balancing – There is no online engine cylinder pressure monitoring to assist with engine load balancing/troubleshooting.	N/A	Project J-140 will add pressure sensors to monitor individual cylinder's pressure.
Exhaust Heat Recovery Boiler Reliability – The boilers need to be inspected both internally and externally.	N/A	The boilers will be cleaned and inspected through Maintenance Service Contract CS-2025-650BD. As-needed repairs will be performed through Maintenance or a separate contract based on inspection results to improve boiler performance and reliability.
Engine Ignition Control System Obsolescence – The existing engine controls are aging and obsolete.	Continue to actively monitor the obsolete assets and perform as-needed CMs until replacement.	MPJ-002 (PRN-00965) is pilot testing a new engine ignition system on Plant 2 Engine 2 to test compatibility and performance prior to installing new ignition control systems onto each engine generator set.
Steam Turbine Reliability – The steam turbine has high-vibration issue.	N/A	Steam turbine gearbox will be rebuilt per manufacturer specifications. System realignment will be performed (Maintenance Service).
Deaerator Reliability – The deaerator system is aging and needs to be replaced to improve reliability.	Continue to perform PMs, provide as-needed CMs, and monitor equipment performance until replacement.	Plan a project to replace the deaerator system.
HVAC Reliability – The supply fan dampers and supply air filters are aging and need to be replaced to improve reliability.	Continue to perform PMs, provide as-needed CMs, and monitor equipment performance until replacement.	Plan a project to replace aging equipment.
CEMS Analyzer Obsolescence – The analyzers are obsolete and need to be replaced.	Continue to actively monitor the obsolete assets and perform as-needed CMs until replacement.	Plan a project to replace the obsolete analyzers.

AREA 26 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 CENTRAL GENERATION

Current and Future Projects

Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
FE20-04	CenGen Plant Water Pipe Replacement at Plant No. 2	Plant Water Piping															
J-135B	Engine and Generator Overhauls at Plant Nos. 1 and 2	Engine Generator															
J-135C	Engine and Generator Overhauls at Plant Nos. 1 and 2 Phase 2	Engine Generator Sets #2 and #4															
J-117B	Outfall Low Flow Pump Station	Switchgear, Battery Backup, HVAC, MCC															
J-140	CenGen Engine Monitoring System Improvements at Plants No. 1 and No. 2	Engine Generator, Heat Recovery System, Waste Heat, Steam, Hot Water, Instrument Air															
J-138	CenGen Facilities and OOBS Seismic Upgrades	CenGen Building															
MPJ-001	CenGen Exhaust Heat Recovery Boiler Cleaning/Assessment (Maintenance Service)	Heat Recovery System															
MPJ-002 (PRN-00965)	CenGen Engine Ignition Control System Obsolescence Replacement	Engine Generator															
TBD	CenGen Underground Storage Tank Assessment at Plants No. 1 and No. 2	CenGen Oil Storage/Handling															
TBD	CenGen Deaerator System Replacement at Plant No. 2	Deaerator System															
TBD	CenGen Lube Oil Control Panels Replacement at Plant No. 2	Lube Oil															
FR1-0021	CenGen Basement Access Hatch Fall Restraint at Plants No. 1 and No. 2	Building															
N/A	CenGen Steam Turbine Gearbox Rebuild/ Realignment (Maintenance Service)	Steam Turbine															
PRN-00977/ AI-184	CenGen Engine Exhaust Oxidizer Housing Redesign & Overpressure Protection Feasibility	Emission Control System															
AI-750/ AI-799	CenGen Supply Fan Dampers and Air Inlet Filter Replacement	HVAC															
AI-797	CenGen CEMS Analyzer Replacement Plants No. 1 and No. 2	CEMS															
TBD	Energy and Digester Gas Master Plan - Revisit	CenGen Facilities															

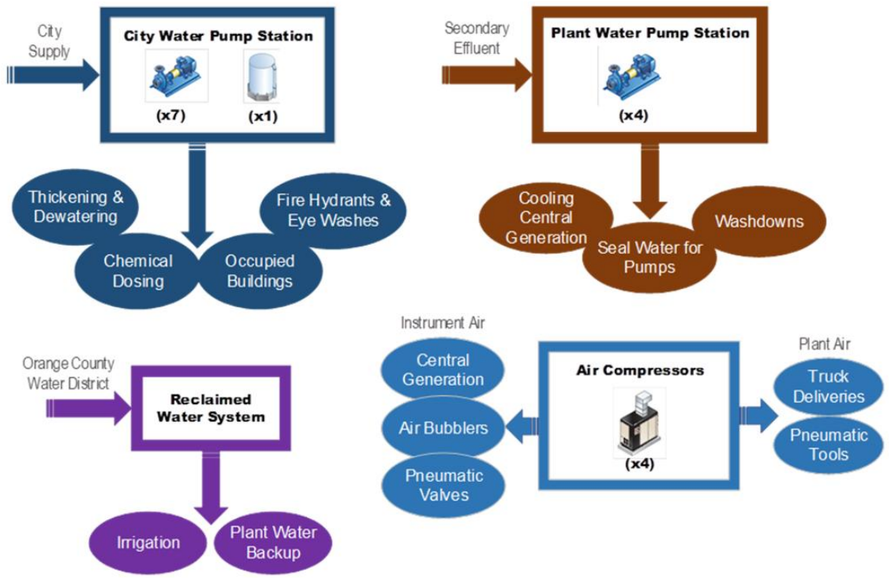
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: CIP – Planning | CIP – Design | CIP – Construction | Maintenance Project

AREA 27 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 UTILITIES

2.2.20 Plant No. 2 Utilities

Process Schematic



Major Assets Remaining Useful Life

Asset Type	City Water System	Plant Water System	Reclaimed Water Piping	Plant Air Systems
Civil				
Pipes	3	3	2	3
Structural				
Pump Station	1	1	-	-
Tanks	2	-	-	-
Mechanical				
Pumps	3	2	-	-
Strainers	-	2	-	-
Compressors	-	-	-	2
Ventilation System	4	2	-	-
Electrical				
MCCs	3	4	-	-
VFDs	5	5	-	-
Instrumentation				
PLC, Flowmeter	3	3	-	3

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

Major Assets

Major Assets	Quantities
City Water	
Pumps	7
Tanks	4
Piping	8.9 miles

Major Assets	Quantities
Plant Water	
Pumps	4
Strainers	4
Piping	10.6 miles

Major Assets	Quantities
Reclaimed Water	
Piping	6 miles

Major Assets	Quantities
Plant Air	
Compressors	3
Plant Air Piping	6.7 miles
Instrument Air Piping	1.6 miles

AREA 27 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 UTILITIES

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Plant/Instrument Air Line Issues – Excessive condensate and oversized piping is causing a large pressure drop, reducing compressor redundancy.	Continue to monitor existing piping and provide as-needed CMs until replacement.	Future Small Projects will be created to address oversized piping and several dead ends within the system. PRN-00995, Plant Air Piping Study, will provide recommendations.
Plant Water Piping Reliability – Due to the corrosive nature of the plant water, the current ductile iron pipes are corroding prematurely and causing leaks throughout the plant.	Continue to monitor existing piping and provide as-needed CMs until replacement.	FE18-14 will address corroded plant water piping in the tunnels. The goal for these and future projects is to replace ductile iron pipes with either fiberglass-reinforced or high-density polyethylene (HDPE) piping material.
Air Compressor Reliability – Instrument air compressors have failed due to reaching the end of their lives and need to be replaced.	N/A.	Air compressors at CenGen are being replaced via PRN-00536 due to multiple failures.
City Water Pump Station Aging – Pump station is getting old, requiring increased maintenance, and will not be reliable long term.	N/A	PS23-05, Utility Water Planning Study, will look into providing a recommendation for rehabilitation or replacement.

Current and Future Projects

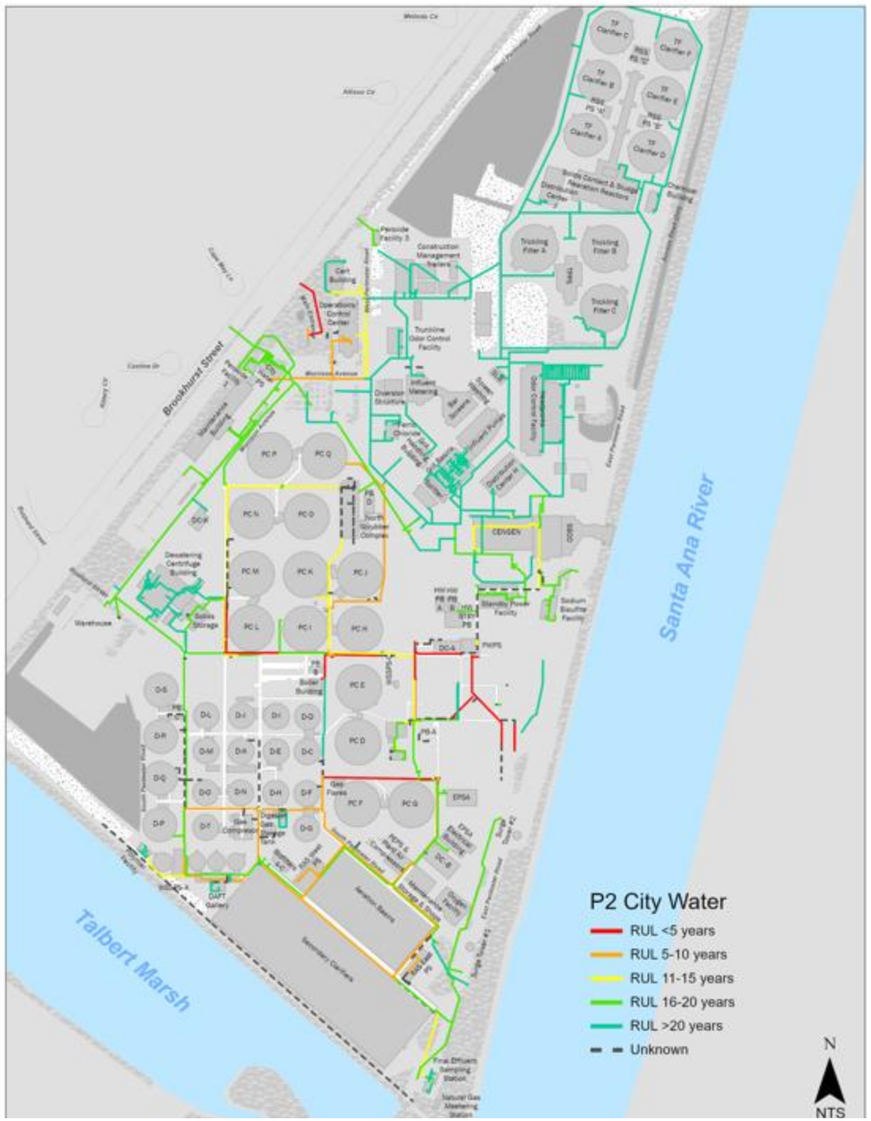
Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
J-117B	Outfall Low Flow Pump Station	New Plant Water Pump Station															
P2-133	B/C-Side Primary Sedimentation Basins Rehabilitation at Plant No. 2	City Water and Air Piping															
P2-98A	A-Side Primary Clarifiers Replacement at Plant No. 2	Plant Water Piping															
X-036	City Water Pump Station Rehabilitation at Plant No. 2	City Water Pump Station															
X-037	Plant Water Pump Station and 12kV Distribution Center A Demolition at Plant No. 2	Existing Plant Water Pump Station															
P2-136	Activated Sludge Aeration Basins Rehabilitation at Plant No. 2	Plant Water Piping															
PS23-05	Utility Water Planning Study at Plant Nos. 1 and 2	City Water Pump Station															
PRN-00995	Plant Air Piping Study at Plant Nos. 1 and 2	Plant Air Piping															

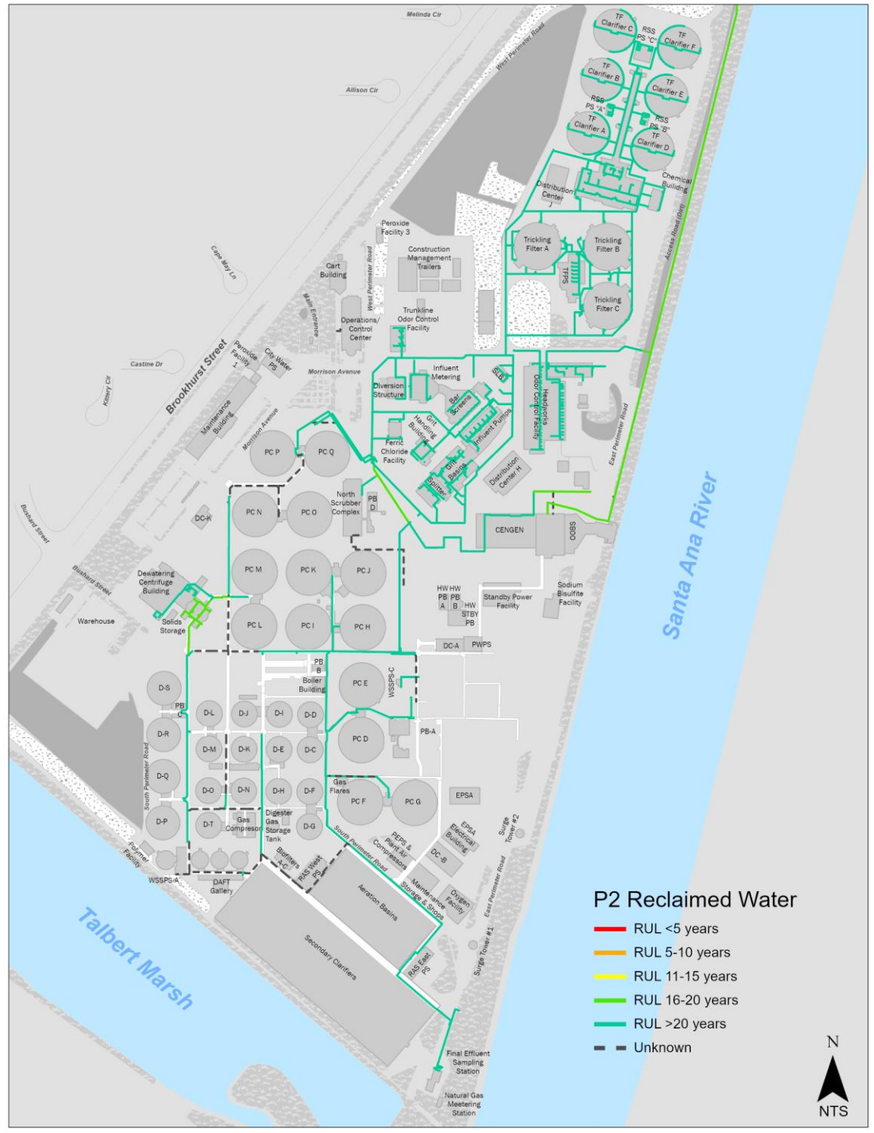
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREA 27 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 UTILITIES

Remaining Useful Life of Utility Infrastructure

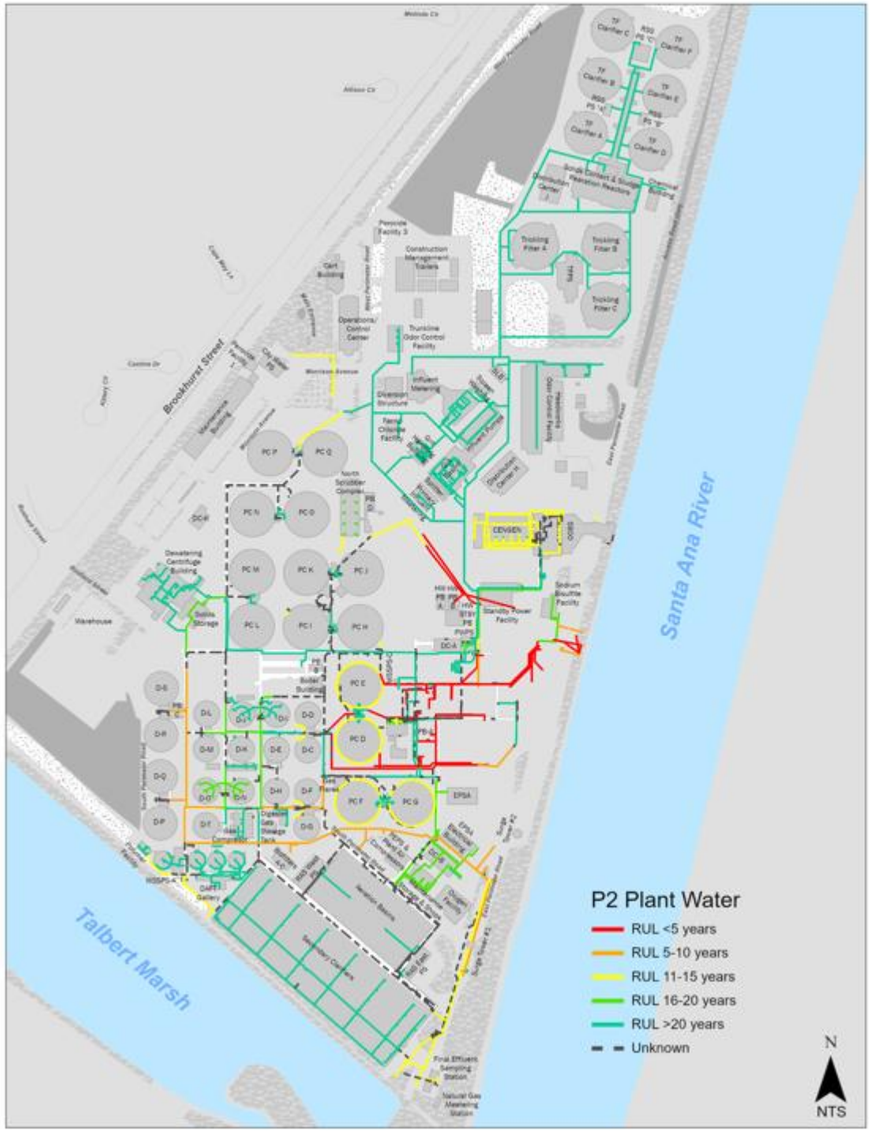


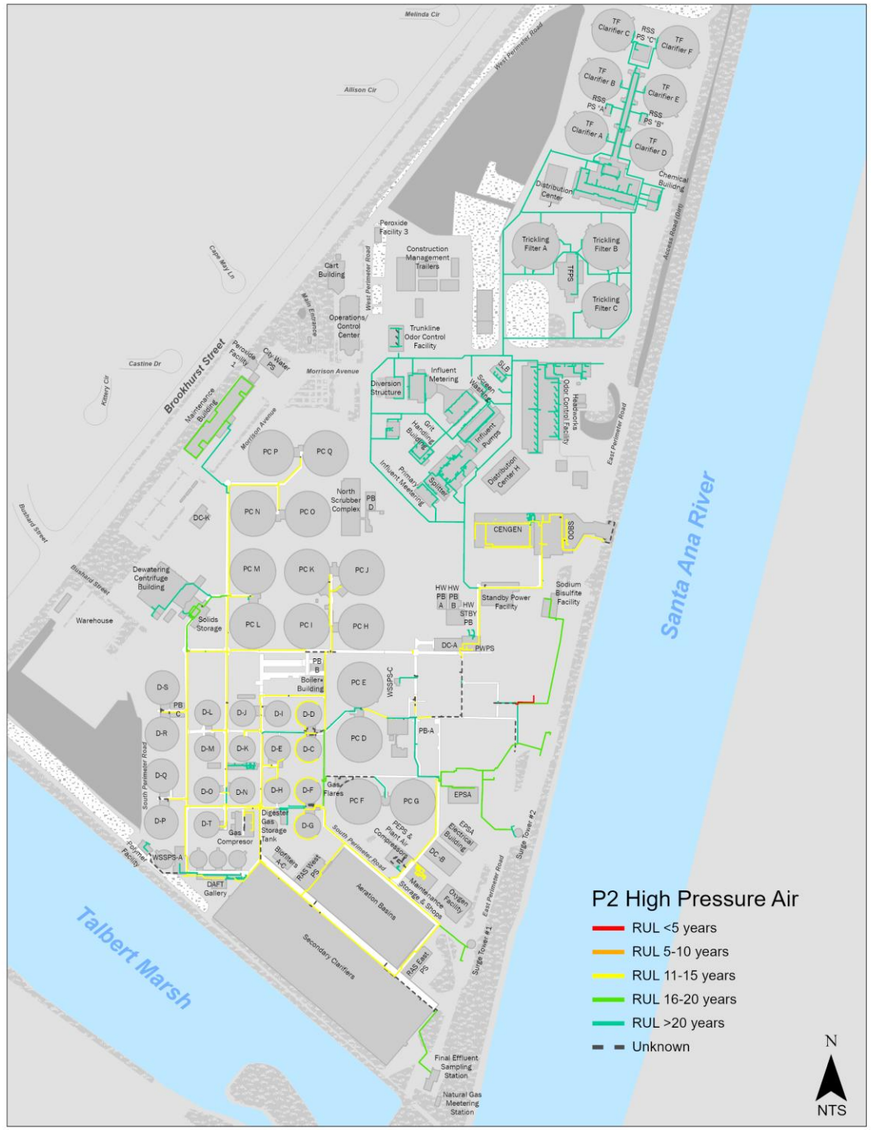


Please see the comprehensive Acronyms and Abbreviations list for definitions.

AREA 27 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 UTILITIES

Remaining Useful Life of Utility Infrastructure



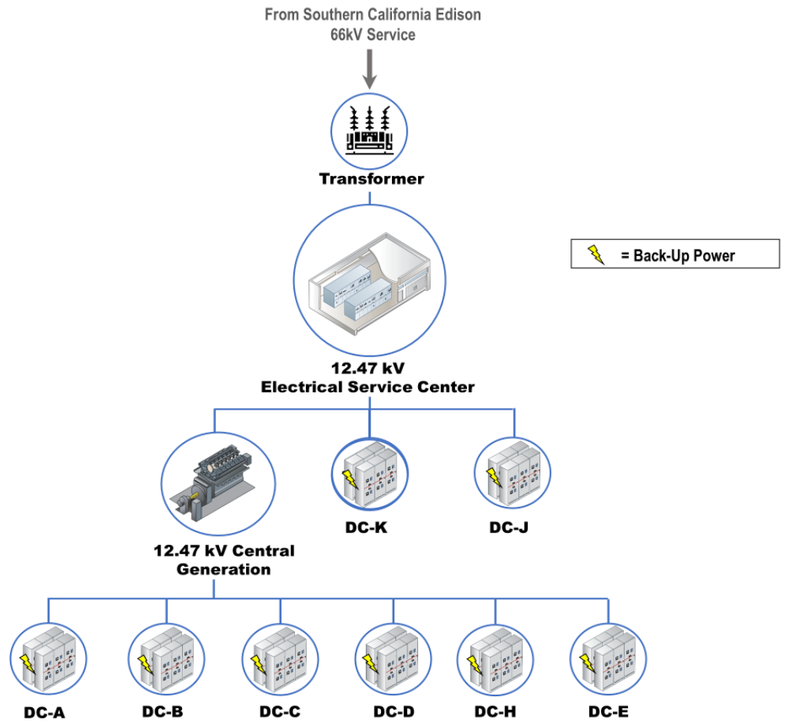


Please see the comprehensive Acronyms and Abbreviations list for definitions.

AREA 28 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 ELECTRICAL DISTRIBUTION

2.2.21 Plant No. 2 Electrical Distribution

Process Schematic



Major Assets

Major Assets	Quantities
12kV Transformers	64
Standby Generators	10
12kV Switchgears	31
5kV and 480V Switchgears	49
MCCs	101
VFDs	130
125VDC and 24VDC Battery Systems	38

Asset Type	Service Center	CenGen	DC-A	DC-B	DC-C	DC-D	EPSA/EPSA SPF	DC-H (Headworks)	Headworks Standby Building	DC-J	DC-K	PB-B	PB-C	PB-D
Tier I – 12.47kV Primary Distribution Level														
12.47kV Feeders	5	4	1	1	4	4	2	2	2	2	1	1	5	5
12.47kV Switchgears	3	5	3	3	4	4	2	2	2	2	1	-	-	-
12.47kV Load Interrupter Switches	-	-	-	3	-	-	-	-	-	-	1	1	5	5
12.47kV Generators	-	-	-	-	-	-	2	-	2	-	-	-	-	-
Transformers: 12.47kV/2.4kV	-	-	-	-	4	-	-	-	-	-	-	-	-	-
Transformers: 12.47kV/480V	3	4	3	3	4	3	-	2	-	2	1	5	4	4
Tier II – 4.16kV Distribution Level														
4.16kV Feeders	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Tier III – 2.4kV Distribution Level														
2.4kV Feeders	-	-	-	-	4	-	-	-	-	-	-	-	-	-
Tier IV – 480V Distribution Level														
480V Switchgears	-	4	3	3	4	4	-	2	3	2	1	2	5	-
Transfer Switches	-	-	-	-	-	-	-	-	-	-	-	2	5	5
Generators	-	-	-	-	-	-	-	-	-	-	-	-	5	5
Tier V – UPS														
UPSs Individual	-	5	-	-	5	4	4	4	-	-	5	5	-	-
UPSs Regional	-	-	-	4	-	-	4	-	-	4	-	-	-	-
Tier VI – 125VDC and 24VDC Battery Systems														
125VDC Chargers	5	5	5	5	-	-	4	4	5	3	2	4	-	-
125VDC Batteries	2	5	2	5	-	-	2	5	2	4	3	4	-	-
24VDC Chargers	-	5	-	-	-	-	4	-	4	-	-	-	5	5
24VDC Batteries	-	5	-	-	-	-	5	-	4	-	-	-	5	5
Generators														
Generator Controls	-	5	-	-	-	-	3	-	3	-	-	-	5	5

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

AREA 28 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 ELECTRICAL DISTRIBUTION

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Variable Frequency Drive Obsolescence – Models are becoming obsolete and are unsupported by the manufacturer.	Small Projects and Maintenance Projects are currently replacing VFDs, such as MP2-016 and FE19-08. Use of a co-op contract is being explored for the next projects.	Develop Service Contract for VFD condition assessment, repairs, and replacements.
Headworks Cable Failures – 480V and control cables are failing in the headworks area. Multiple cable failures occurred in the grit basin and grit handling system, causing a complete system failure.	FR2-0026R is replacing various 480V and 120V power and control cables in the headworks area, and other Maintenance Projects will address additional failed cables as needed.	P2-141 will replace all 480V and 120V cables in the headworks area. An Electrical Blanket Repair and Maintenance Contract is in development to replace cables more efficiently and cost effectively.

Current and Future Projects

Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
FR2-0026R	Headworks Phase 3 Cable Replacement at Plant No. 2	Grit Pumps at Headworks															
MP2-027	Power Building D Automatic Transfer Switch Replacement	Power Building D															
MP2-029	Generator Radiator Replacements	Headworks and EPSA Generators															
J-117B	Outfall Low Flow Pump Station	Power Distribution															
FE19-08	Secondary Treatment VFD Replacements at Plant No. 2	RAS, WAS, and PEPS Pumps															
P2-98A	A-Side Primary Basins Replacement at Plant No. 2	MCCs Associated with the A-Side Clarifiers (fed from PB-B).															
J-98	Electrical Power Distribution System Improvements	Various Plant No. 1 and Plant No. 2 Condition-Based Electrical Distribution Systems															
P2-137	Digester Rehabilitation at Plant No. 2	MCCs Fed from PBs B and C (MCC-E, MCC-F, MCC-S, MCC-PQ, MCC-PQS)															
P2-141	Headworks Electrical Distribution Improvements at Plant No. 2	Distribution Center H and Associated Headworks 480V and 120V Power and Control Cables															
J-142	Power Distribution Systems and Power Building C Replacements at Plants No. 1 and No. 2	Power Building C															
J-124	Digesters Gas Facility Replacement	MCCs Associated with Digesters															
P2-128	Digester Replacement at Plant No. 2	Power Distribution System															
P2-138	O&M Complex at Plant No. 2	Distribution Center D and Operations Buildings															
X-036	City Water Pump Station Rehabilitation at Plant No. 2	City Water Pump Station MCC and VFDs															
P2-133	Plant No. 2 B/C-Side Basins Rehabilitation	PB-B, PB-D															
X-098	Effluent Pump Station Annex Rehabilitation	EPSA Power Distribution															
X-095	Southern California Edison Substation and Service Center Replacement at Plant No. 2	SCE Substation and 12kV Service Center															
X-030	Headworks Rehabilitation	Distribution Center H, Waste Sidestream PS-C															
X-037	Plant Water Pump Station and 12kV Distribution Center A Demolition at Plant No. 2	Plant Water Pump Station and Distribution Center A															
X-135	Digester P, Q, R, and S Replacement	Digester P, Q, R, and S Associated Electrical															

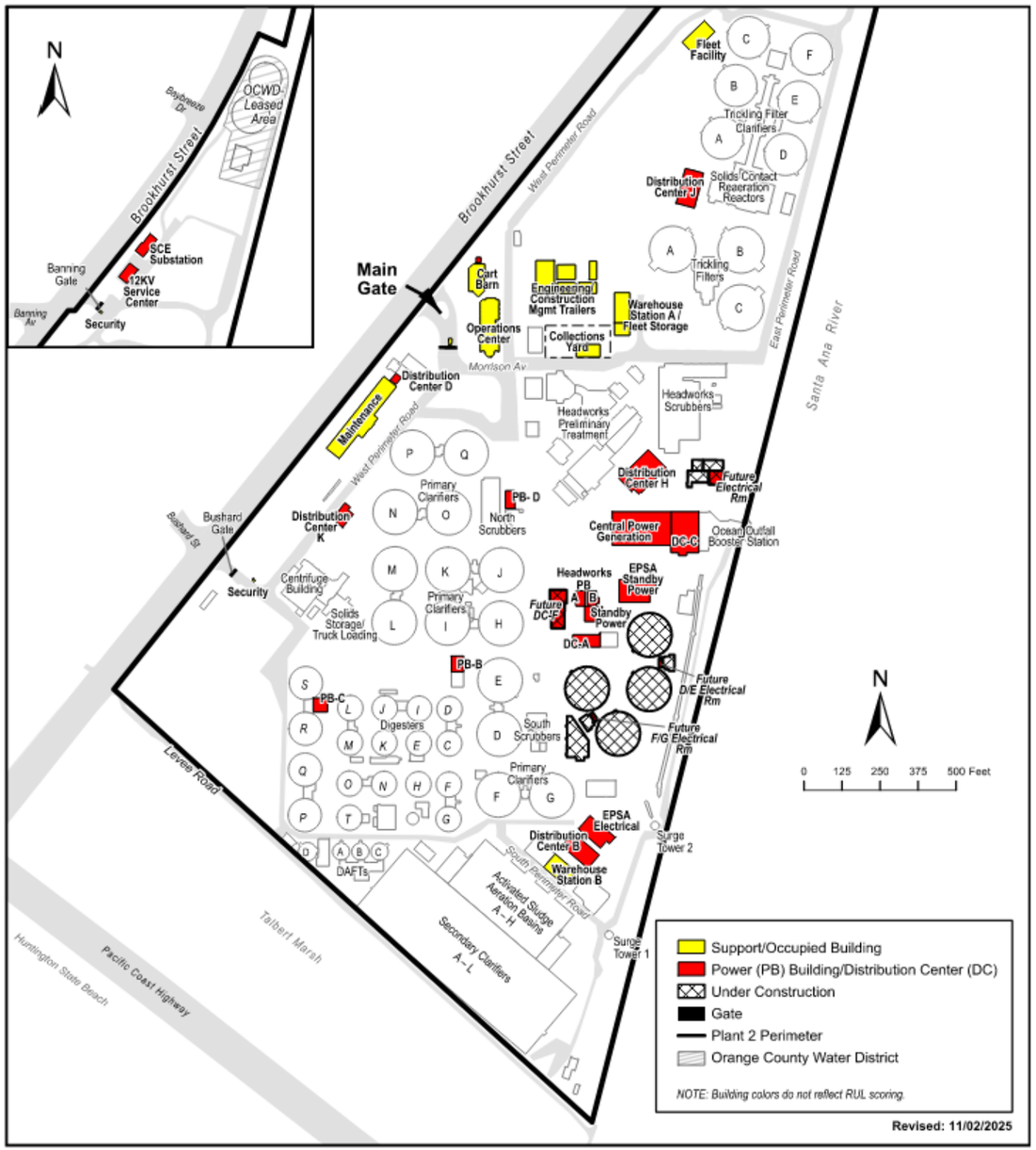
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

AREA 29 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 OCCUPIED AND POWER BUILDINGS

2.2.22 Plant No. 2 Occupied and Power Buildings

Occupied and Power Building Site Plan at Plant No. 2



Note: Building colors are used to help identify the buildings and do not represent RUL scores.

Major Assets Remaining Useful Life

Buildings	Building Roof	Building Electrical	HVAC	Seismic (PS15-06)	Elevator
Cart Building	4	-	-	-	-
Maintenance Building	4	2	5	5	2
Operations Center Building	3	4	5	4	4
12kV Distribution Center A	4	-	3	2	-
12kV Distribution Center B	4	-	3	2	-
12kV Distribution Center C	2	-	3	-	-
12kV Distribution Center D	2	-	3	2	-
Distribution Center H	1	-	4	-	-
Distribution Center J	2	-	3	-	-
Distribution Center K	2	-	3	-	-
12kV Service Center	4	-	3	4	-
Headworks Power Building A	3	-	3	2	-
Headworks Power Building B	3	-	3	2	-
EPSA Electrical Building	2	-	4	-	-
Power Building B	4	-	3	4	-
Power Building C	4	-	3	2	-
Power Building D	3	-	3	2	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

AREA 29 ASSET MANAGEMENT SUMMARY – PLANT NO. 2 OCCUPIED AND POWER BUILDINGS

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Seismic Retrofits Needed – Recent planning study (PS15-06) recommended seismic retrofits to several buildings.	N/A	P2-138 will replace existing O&M buildings with new O&M Complex.
Aging Elevators – All elevators need to be rehabilitated and modernized.	N/A	As the building elevators age and are less reliable over time, projects are being created to address modernization and upgrades as needed. One such project is SC20-02, which will address the OOBS elevators.
Aging HVAC Units – HVAC units have shorter RUL due to coastal environment.	N/A	When units are obsolete, corroded, and reach the end of their useful life, projects will be created to replace these units.

Current and Future Projects

Project No.	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
P2-138	O&M Complex at Plant No. 2	Operations Center & Maintenance Building															
SC22-02	HVAC Replacement for Plant No. 2 Centrifuge Building, Op Center, and Bitter Point PS	Operations Center															
SC20-02	Ocean Outfall Booster Station Elevator Rehabilitation	Ocean Outfall Booster Station															
X-037	Plant Water Pump Station and 12kV Distribution Center Demolition at Plant No. 2	12kV Distribution Center															
X-135	Digester P, Q , R, and S Replacement at Plant No. 2	Replace Power Building C															
X-095	SCE Substation and 12kV Service Center Demolition	12kV Service Center															
J-141	Public Address System Replacement	Plant 2 Plantwide															
P2-133	B/C Side Sedimentation Basin Rehabilitation at Plant No. 2	Replace Power Building D															

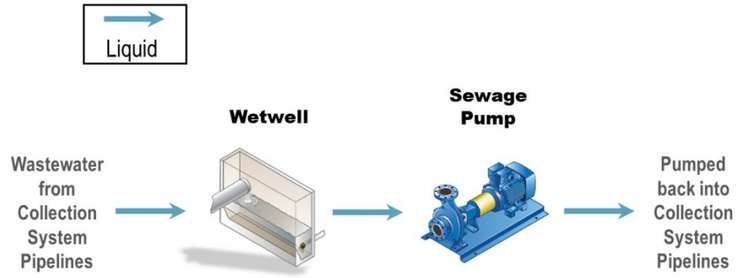
Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: CIP – Planning | CIP – Design | CIP – Construction | Maintenance Project

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – PUMP STATIONS

2.2.23 Collection System Pump Station and Force Main Asset Management Summaries

Process Schematic



	Major Assets – Quantities				
Pump Station	**Wet Wells**	**Pumps**	**Force Mains**	**Valves**	**Emergency Generator (X = Yes)**
15th Street	1	3	2	22	
A Street	1	3	2	19	
Bay Bridge	1	5	2	17	X
Bitter Point	1	5	2	23	X
College	1	3	2	18	
Crystal Cove	1	2	2	13	X
Edinger	1	2	1	8	
Lido	1	3	2	17	
MacArthur	1	2	2	8	
Main Street	2	10	3	38	X
Rocky Point	1	4	2	18	X
Slater	1	5	2	17	X
Seal Beach	2	8	2	24	
Westside	1	4	1	16	X
Yorba Linda	1	3	1	11	
Newport Force Mains	--	--	2	--	
Total	**17**	**62**	**30**	**269**	**-**

Major Assets Remaining Useful Life

Asset Type	15th Street	A Street	Bay Bridge	Bitter Point	College	Crystal Cove	Edinger	Lido	MacArthur	Main Street	Rocky Point	Slater	Seal Beach	Westside	Yorba Linda	Newport Force Mains
Civil - Piping																
Force Mains	3	3	5	2	4	4	5	4	1	5	3	5	1	5	5	2
Structural																
Pump Station	4	4	4	2	1	4	3	4	2	1	3	3	4	2	4	-
Wet Well	3	3	4	1	4	3	4	4	3	3	3	3	4	3	3	-
Mechanical																
Pumps	3	3	5	3	2	3	4	3	4	4	2	4	5	4	5	-
Valves	5	5	5	2	3	5	3	5	4	5	2	4	4	3	5	-
Ventilation System	3	3	4	4	3	3	3	4	4	3	5	3	4	3	3	-
Emergency Generator	-	-	3	1	-	3	-	-	-	2	2	3	-	3	-	-
Electrical																
MCC	2	2	4	1	1	3	5	4	5	4	1	2	5	1	5	-
VFD	5	5	5	5	4	-	-	5	5	5	5	5	2	5	-	-
Motors	3	3	4	2	2	3	3	4	4	3	2	3	5	3	4	-
Transformer	2	2	4	2	2	4	4	3	4	2	3	2	5	2	4	-
Instrumentation																
PLC	3	3	4	4	3	4	4	4	4	3	4	3	4	4	4	-
Flowmeter	3	3	1	3	2	1	5	2	-	4	3	4	5	3	4	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

RUL < 5 years **RUL 5–10 years** **RUL 11–15 years** **RUL 16–20 years** **RUL > 20 years**

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – PUMP STATIONS

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Flood Risk – OC San's new pump stations are designed to specifically consider and mitigate flood risks; however, some older pump stations don't meet the current standards. Especially, Edinger Pump Station is entirely below grade and located immediately adjacent to a flood control channel.	OC San follows protocols ahead of major storm events to be sure facilities are prepared and in good working condition. Facilities are monitored closely during storm events so that staff can respond to any unexpected event quickly.	Project 11-33 has started the design to replace and relocate the Edinger Pump Station to a different location with less flood risk and where critical infrastructure will be located above grade. Additionally, all new pump stations will consider flood elevations and locate critical electrical equipment accordingly.
Accelerated Corrosion – Corrosion is a common problem in sewage systems due to the presence of H_2S. This is exacerbated in locations where sewage becomes turbulent, which can include pump station wet wells. Additionally, in an effort to minimize odors throughout the community, some manholes in the collection system have been sealed to prevent gases from escaping, which accumulates more corrosive gases within the system.	Project 5-68 has added odor scrubbers to six key pump stations where the wet wells have experienced pressurization issues. These new scrubbers will allow the wet wells to vent, reducing the amount of sewer gas trapped in the system while also scrubbing the air so it will not be an odor issue for the surrounding community.	OC San routinely performs inspections on critical assets, including pump station wet wells. Recently, the MacArthur Pump Station wet well was assessed and was found to be in relatively good condition considering the age of the asset but will require some rehabilitation that will be completed under future Project 7-63. In the coming year, the Crystal Cove and Lido Pump Station wet wells are expected to be inspected, with an ongoing inspection plan following that.
Groundwater Intrusion – Groundwater has penetrated 15th Street, A Street, Bitter Point, and Rocky Point Pump Stations. Groundwater may gradually compromise the strength of reinforcement within the concrete structure walls over time.	Planning study XPS0065 will be launched to identify possible mitigation measures and long-term solutions to be incorporated into future pump station CIP projects.	Implement long-term solutions identified by planning study XPS0065.
Maintenance Access – In some cases, access to collections facilities is not ideal due to limited land or easement rights, other competing public uses, or outdated facilities, which don't meet modern safety standards. One example is the MacArthur Pump Station Force Main, which is difficult to access because redundancy was not incorporated when the pump station was designed. Another example is the Slater Pump Station wet wells, which are isolated by slide gates within 48-inch manholes that are difficult to access.	Capital project 7-68 added another force main to serve the MacArthur Pump Station. Project FRC-0017 will modify the wet well access at Slater Pump Station to provide a safer working environment for staff.	OC San continues to improve planned maintenance processes and inter-agency coordination that allow crews to minimize impacts on the community during necessary maintenance operations. Testing of modern automatic air/vacuum valves could facilitate automatic venting of the Newport Beach Force Main system and minimize impacts on traffic on Pacific Coast Highway. There is also continued effort to research emerging inspection technologies, which could make difficult inspections more easily achievable or cost effective.
Valve Operability and Reliability – Valves at the pump stations sometimes reach the end of their useful lives sooner than in other applications due to the harsh raw sewage application. These valves are critical to the operation of the collection system.	Projects FRC-0017 and FRC-0018 have been launched to replace valves at five pump stations.	Continue to monitor valve condition and RUL and launch Small Projects as necessary to replace valves that cannot wait for a larger rehabilitation/replacement project.
Force Main Operability and Reliability – Force mains are some of OC San's highest-risk assets but also some of the most challenging to assess. While these assets have been replaced and rehabilitated in a timely manner, there are many that have not received a detailed inspection since installation.	A force main inspection plan has been developed to assess all the force mains within the next 5 years with support from the existing Condition Assessment Program resources. The Slater Pump Station force main was inspected this year. The next planned assessments will occur at the College and 15th Street Pump Stations.	Continue to implement the force main inspection plan and continually reassess the timing and priority of inspections within the program. Future projects will also incorporate updated standards, which will look to add redundancy and improved access where feasible. There is also continued effort to research emerging inspection technologies, which could make difficult inspections more easily achievable or cost effective.
Outdated Bubbler Level System – At multiple pump stations (Bay Bridge, Crystal Cove, Edinger, MacArthur, Main Street, Slater, Seal Beach), the bubbler systems are outdated and do not meet OC San's latest bubbler system standard. They do not have redundancy or automatic blowdown control and are becoming increasingly unreliable.	Project FE23-03 has launched and is in the design phase to upgrade the level control systems at these pump stations to meet current OC San standards.	Adhere to OC San level control system design standards in all future pump station improvement projects.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – PUMP STATIONS

Current and Future Projects

Project No.	Location	Project Title	Impacted Facilities	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
FE19-01	Multiple	Portable Generator Connectors at Pump Stations	15th Street, A Street, Bay Bridge, Bitter Point, College, Crystal Cove, Edinger, MacArthur, Main Street, Rocky Point, Seal Beach, Slater, and Westside Pump Stations															
FE23-03	Multiple	Pump Station Bubbler Level Control System Upgrade	Seal Beach, Bay Bridge, Crystal Cove, Main Street, MacArthur, Slater, and Edinger Pump Stations															
PRN-01045	Multiple	Pump Station Roof Replacement	Westside, Bitter Point, Rocky Point, and Crystal Cove Pump Stations															
FRC-0018	Newport Beach	Valve Replacements at Lido, Crystal Cove, A Street, and 15th St. Pump Stations	15th Street, A Street, Lido, and Crystal Cove Pump Stations															
XPS0065	Newport Beach	Pump Station Groundwater Intrusion Study	15th Street, A Street, Bitter Point, and Rocky Point Pump Stations															
X-022	Newport Beach	15th Street Pump Station and Force Main Project	15th Street Pump Station															
X-041	Newport Beach	A Street Pump Station and Force Main Project	A Street Pump Station															
5-67	Newport Beach	Bay Bridge Pump Station Replacement	Bay Bridge Pump Station															
SC22-02	Newport Beach	HVAC Replacement for Plant No. 2 Centrifuge Building, Operations Building, and Bitter Point Pump Station	Bitter Point Pump Station															
X-025	Newport Beach	Bitter Point Pump Station Rehabilitation Project	Bitter Point Pump Station															
SC22-02	Newport Beach	HVAC Replacement for Plant 2 Centrifuge Building, Operations Building, and Bitter Point Pump Station	Bitter Point Pump Station															
FRC-0020	Costa Mesa	College Pump Station Wet Well Rehabilitation	College Pump Station															
X-040	Costa Mesa	College Pump Station Replacement and Force Main Rehabilitation	College Pump Station															
MPC-002	Newport Beach	Crystal Cove Pump Station Automatic Transfer Switch Replacement	Crystal Cove Pump Station															
5-66	Newport Beach	Crystal Cove Pump Station Upgrade and Rehabilitation Project	Crystal Cove Pump Station															
11-33	Huntington Beach	Edinger Pump Station Rehabilitation Project	Edinger Pump Station															
X-023	Newport Beach	Lido Pump Station Rehabilitation Project	Lido Pump Station															
PRN-01042	Newport Beach	Lido, Short of Short Street, Force Main Rehabilitation	Lido Pump Station															
7-63	Newport Beach	MacArthur Pump Station Rehabilitation Project	MacArthur Pump Station															
7-68	Newport Beach	MacArthur Force Main Improvements	MacArthur Pump Station															
7-65	Irvine	Gisler-Redhill Interceptor Rehabilitation	Main Street Pump Station															
7-64	Irvine	Main Street Pump Station Rehabilitation Project	Main Street Pump Station															
X-024	Newport Beach	Rocky Point Pump Station Rehabilitation Project	Rocky Point Pump Station															
PRN-01054	Newport Beach	HVAC Replacement at Rocky Point Pump Station	Rocky Point Pump Station															
FRC-0017	Huntington Beach	Valve Replacements and Wet Well Access Improvements at Slater Pump Station	Slater Pump Station															
11-34	Huntington Beach	Slater Pump Station Rehabilitation Project	Slater Pump Station															
3-67	Seal Beach	Seal Beach Pump Station Replacement	Seal Beach Pump Station															
PRN-01021	Seal Beach	Seal Beach Bridge Force Main Repair	Seal Beach Pump Station															
3-68	Seal Beach	Los Alamitos Sub-Trunk Extension and Westside Pump Station Abandonment	Westside Pump Station															
MPC-003	Fullerton	Decommission Yorba Linda Pump Station	Yorba Linda Pump Station															
2-73	Fullerton and Yorba Linda	Yorba Linda Pumping Station and Spur Odor Station Demolition	Yorba Linda Pump Station Yorba Linda Spur Odor Station															

Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – PUMP STATIONS

Force Main Summary and Inspection Plan

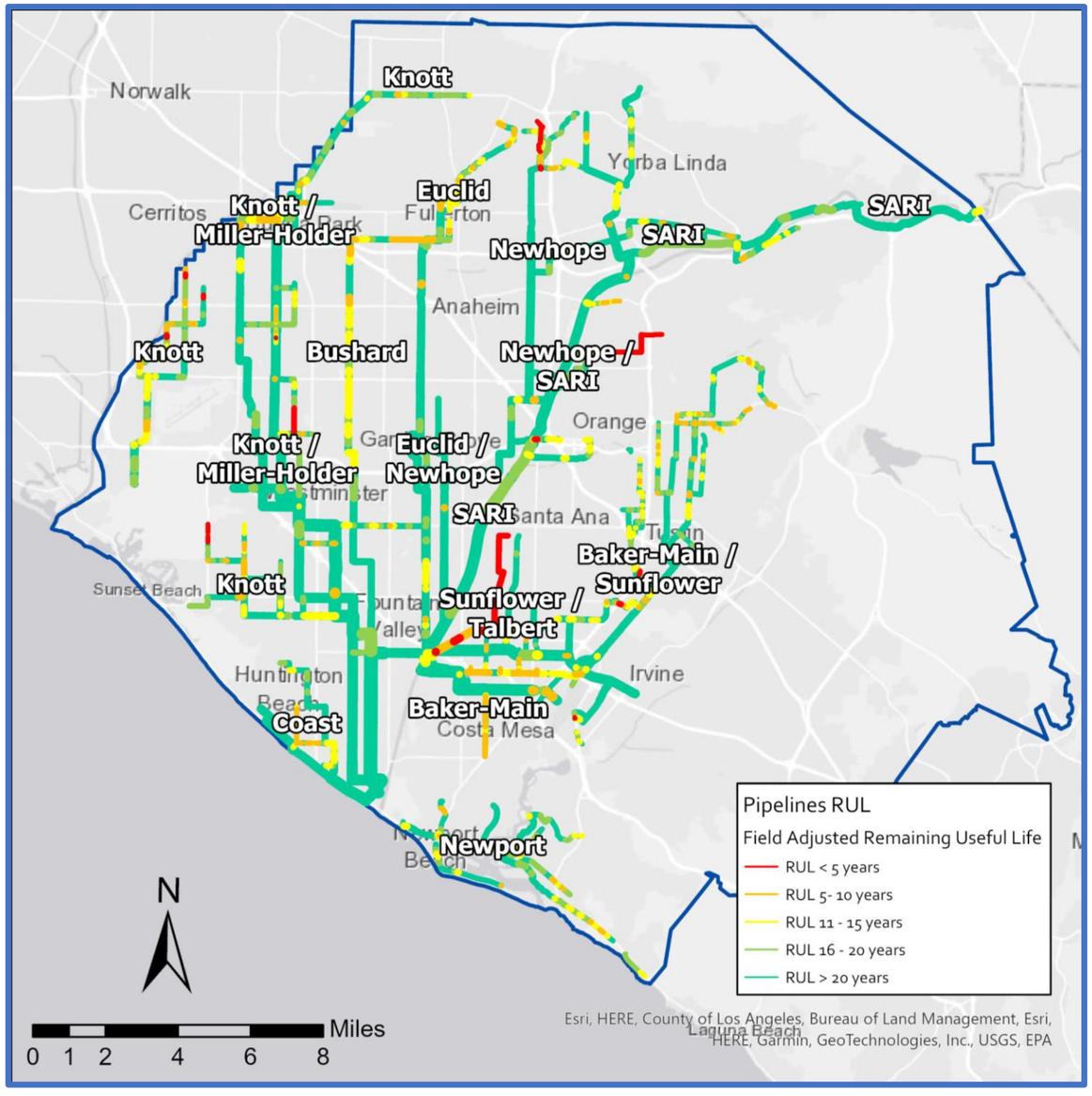
Pump Station Force Main	Built by Project (Year)	Size	Material	Cathodic Protection	RUL (years)	Previous Inspection	Planned Inspection	Notes
Newport Force Main System	5-29 (1989) 5-60 (2016)	30"–36"	Ductile iron with CIPP HDPE	No	15–20	None	2034	
Bitter Point (East)	5-58 (2012)	42"	HDPE		> 20	None	2029	Project X-025 will complete rehabilitation of Bitter Point Pump Station and replace or rehabilitate the force mains in 2041.
Bitter Point (West)	5-29 (1988) 5-29-R1 (2004)	36"	Ductile iron with HDPE slip liner	No	10–15	None	2029	
Lido (East, North of Short Street)	5-9 (1959) 5-41 (1992) FE15-10 (2016)	16"/24"	Ductile iron with CIPP HDPE	No	> 20	FE15-10 warranty CCTV 2020 CCTV 2022	2031	
Lido (West, North of Short Street)	5-26 (1968) 5-60 (2016)	16"/24"	DIP with CIPP HDPE	No	> 20	CCTV 2014, 2023	2031	
Lido (East/West, South of Short Street)	5-41-1 (1997) FRC-0019 (2022)	16"	Ductile iron	First pipe joint only	5–10	CCTV 2022–2023	2026	Project PRN-01042 will complete rehabilitation of the remaining unlined force main section.
Rocky Point	5-50 (2008)	12"	Ductile iron	No	10–15	None	2030	Project X-024 will complete rehabilitation of Rocky Point Pump Station and force mains in 2039.
Bay Bridge (North/South)	5-18R (1981)	24"	Ductile iron	No	< 5	None	2035	Project 5-67 will complete construction of the new force mains and pump station in 2029.
Bay Bridge (North/South under the bay)	5-12 (1965) 5-18R (1981)	24"/22"	Ductile iron with polyethylene lining	No	< 5	None	2035	
15th Street	5-51 (2004)	10"	Ductile iron	No	10–15	None	2026	Project X-022 will complete rehabilitation of 15th Street Pump Station and force mains in 2036.
A Street	5-52 (2004)	8"	Ductile iron	No	10–15	None	2027	Project X-041 will complete rehabilitation of A Street Pump Station and force mains in 2036.
Crystal Cove	5-36 (1995)	8"	Ductile iron	No	< 5	Follow up CCTV from pump station side completed in March 2024	2027	Crystal Cove force mains are over 2,000 feet in length. Project 5-66 will complete rehabilitation of Crystal Cove Pump Station in 2034.
MacArthur	7-68 (2025)	10”	HDPE		> 20	None	2035	Project 7-68 completed construction of the new dual force mains in 2025.
Main Street (Sunflower)	7-7 (1985)	30"	Vitrified clay		> 20	CCTV 2025	2028	
Main Street (Baker East)	14-1-2 (1991)	42"	Ductile iron	Yes	5–10	CCTV 2020	2028	Project 7-65 will complete the Baker Force Main rehabilitation in 2025. CCTV inspection will be conducted once the rehabilitation is complete.
Main Street (Baker West)	14-1-2 (1991)	42"	Ductile iron	Yes	< 5	None	2028	
College	7-23-1 (2003)	18"	Ductile iron	No	5–10	None	2026	Project X-040 will complete rehabilitation of College Pump Station and force mains in 2038.
Slater (North)	11-17-1 (1998)	36"	Ductile iron	First pipe joint only	5–10	None	2025	Project 11-34 will rehabilitate Slater Pump Station and force mains by 2033.
Slater (South)	11-10-3 (1981)	24"	Ductile iron	First pipe joint only	< 5	CCTV and UT 2015	2025	
Edinger	11-9 (1965)	18"	Cast iron		< 5	UT 2015, 2021, 2022, 2025	Follow-up UT 2026	Project 11-33, currently in design, will construct the new Edinger Pump Station and Force Main by 2029. Significant metal loss was seen in 2023 and prior assessments, but will be repaired in 2025.
Seal Beach	3-62 (2022)	36"	HDPE		> 20	None	2032	New force mains were constructed in 2022.
Westside	3-36R (1995)	20"	Ductile iron	No	< 5	2016	None	Westside Pump Station will be abandoned by project 3-68 by 2034. Force main access is limited and will be assessed on an as-needed basis.
Yorba Linda	2-16-2 (1975)	30"	Ductile iron	First pipe joint only	< 5	2014	None	The pump station will be decommissioned via MPC-003 ahead of CIP project 2-73, which will remove the pump station permanently by 2031.

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – ALL TRUNKLINES

2.2.24 Collection System Pipeline and Manhole Asset Management Summaries

System Overview - Pipelines



Collection System Pipeline and Manhole Remaining Useful Life

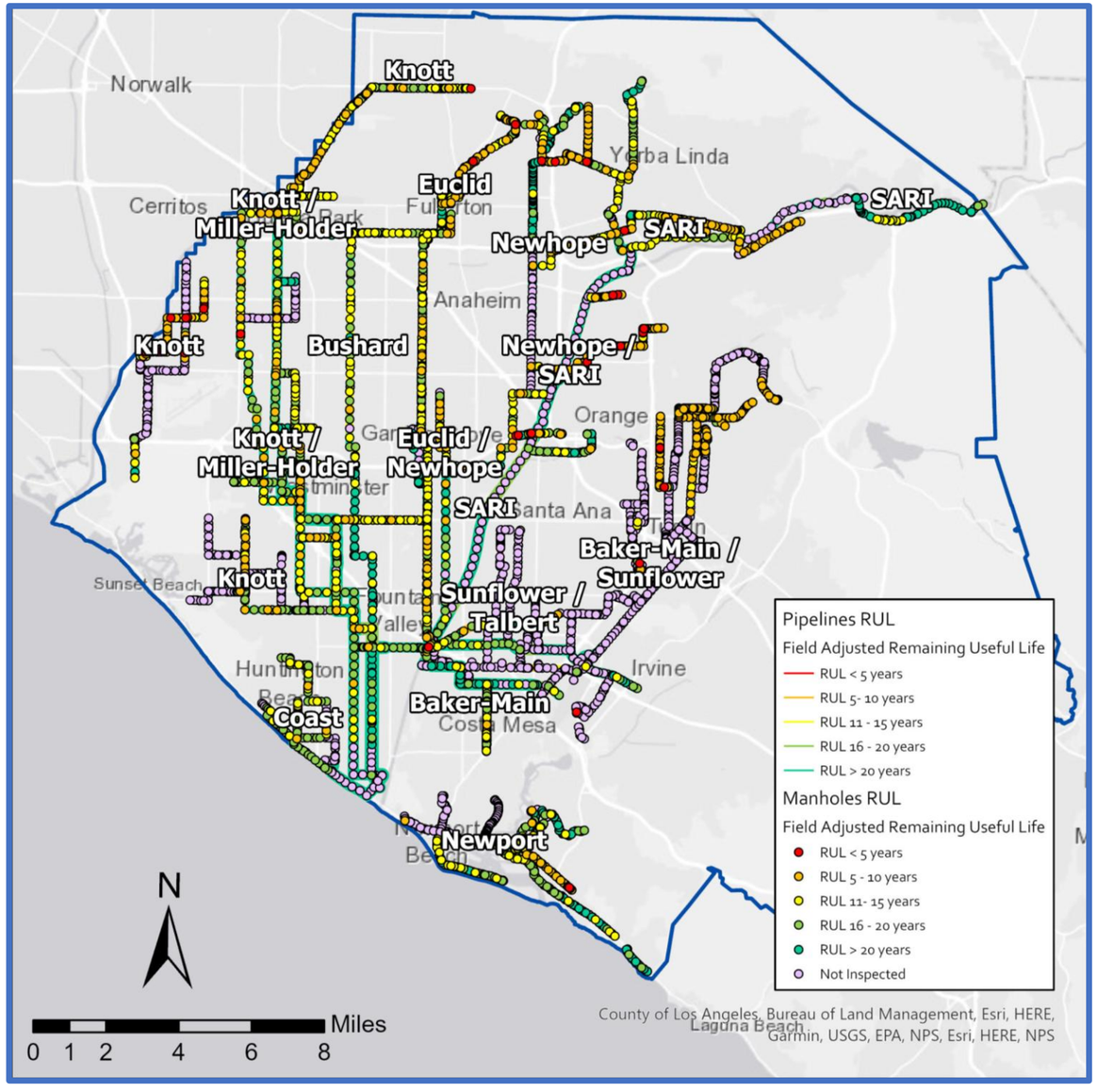
Trunklines	No. of Pipes with RUL Score of 4 or 5	Miles of Pipes with RUL Score of 4 or 5	Percentage of Pipes with RUL Score of 4 or 5 (by length)	No. of Manholes with RUL Score of 4 or 5	Percentage of Manhole with RUL Score of 4 or 5
Baker-Main	74	4.9	12%	—[a]	—[a]
Bushard	11	1.4	6%	3	1%
Coast	16	1.1	10%	3	2%
Euclid	13	0.7	2%	69	16%
Interplant[b]	0	0.0	0%	0	0%
Knott	37	2.6	4%	94	12%
Miller-Holder	22	1.6	5%	43	16%
Newhope	26	1.7	6%	82	23%
Newport	20	1.0	4%	30	8%
Santa Ana River Interceptor	66	3.0	6%	160	28%
Sunflower	15	0.5	1%	—[a]	—[a]
Talbert	77	5.9	70%	—[a]	—[a]
Total	**377**	**24.2**	**7%**	**484**	**11%**

Please see the comprehensive Acronyms and Abbreviations list for definitions.

[a] Only trunklines with greater than 50% manhole inspections completed are included in this table and in the Asset Management System Summaries.

[b] Interplant Trunkline in this table refers only to IPE assets. Interplant Trunkline assets are included with Knott Trunkline in its Asset Management System Summary.

System Overview - Manholes



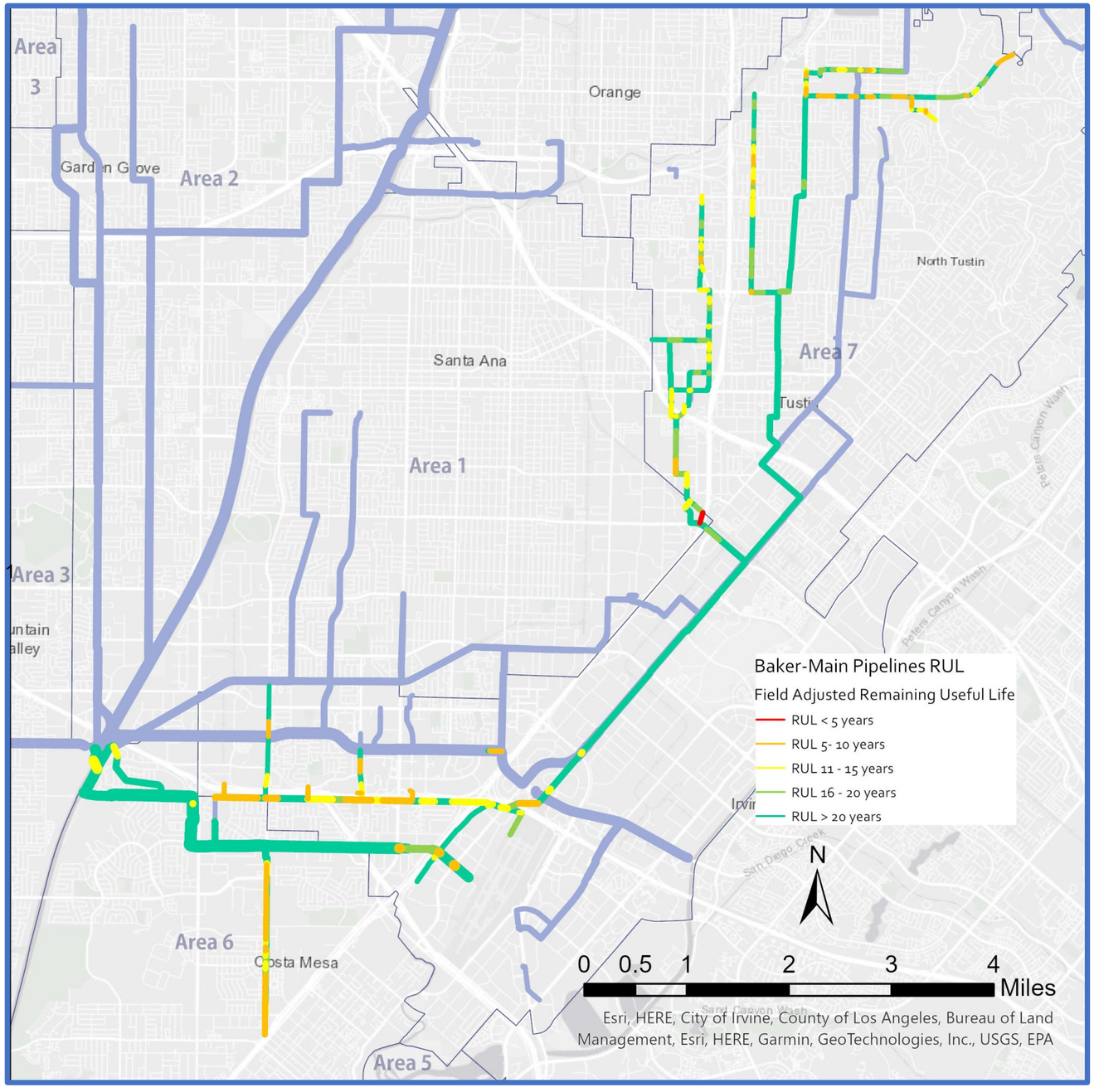
ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – ALL TRUNKLINES

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Cleaning of Inverted Siphons and Large-Diameter Pipelines – Large-diameter pipes (> 42 inches) are not cleaned within OC San's routine cleaning program, and CCTV footage does not identify sediment or debris below the waterline. This poses the potential risk of debris buildup, which can negatively impact normal sewer operation and downstream facilities if suddenly released. OC San has historically completed sonar inspections for large-diameter inverted siphons and gravity sewers longer than 5 miles. Sediment reports and hydraulic modeling data were used to confirm the theoretical cleansing state of each pipeline segment inspected.	OC San has an active procurement to create a new blanket contract for cleaning and sonar inspection of inverted siphons and large diameter pipelines. The work includes pre-cleaning and post-cleaning sonar inspections to validate the effectiveness of each cleaning. Notice to proceed (NTP) is expected to be issued in early 2026.	OC San is developing an ongoing large-diameter cleaning program, and the list of recommended large-diameter inverted siphons and gravity sewers to regularly clean will be finalized in the future. Additionally, some large-diameter inverted siphons and gravity sewers may be significantly larger than required for current and future capacity needs and are not self-cleansing. In the future, OC San staff will evaluate which assets are good candidates for sliplining and will recommend adding them to upcoming CIP projects or the creation of new projects. OC San staff will further validate recommended sliplining projects as part of the work for the 2028 Collections Capacity Study.
Condition Assessment of Gravity Pipelines – The current calendar-based CCTV program inspects pipelines every 5 years. For assets with 10 years or less RUL, inspections every 5 years may not be frequent enough to properly track asset deterioration rates.	It is recommended that the frequency of monitoring of pipelines with RUL scores of 4 or 5 be increased from every 5 years to a higher frequency (that is, every 2.5 years).	OC San staff recommend exploring the optimization of condition assessment resources for gravity pipeline assets such that condition assessment frequencies are closely tied to RUL and likelihood of failure and balanced given available resources.
Condition Assessment of Inverted Siphons – Inverted siphons are regularly cleaned but are not inspected because they are typically inaccessible using CCTV equipment. Without this inspection data, it is difficult to accurately know the current condition and RUL of these assets. OC San canceled its initial procurement in 2024 for inverted siphon condition assessment and removed incidental repairs entirely from the project scope due to the low number of bidders and uncompetitive pricing.	OC San grouped inverted siphons into planning studies based on risk, location, asset characteristics, and the total rough order of magnitude cost for each grouping. The first study, PS25-01, includes the assessment of seven inverted siphons in the cities of Anaheim, Newport Beach, and Orange. The goals of this study also include evaluating the remaining useful life of each inverted siphon, recommending capital improvements, and identifying the best practices for assessment and rehabilitation of inverted siphons. PS25-01 was launched in 2025, NTP is expected to be issued in mid-2026, and the study is expected to be completed by early 2028.	Recommendations and lessons learned from PS25-01 will inform the remainder of the inverted siphon Condition Assessment Program development. Given the potential complexity (bypassing and/or temporary plugging, traffic control, etc.) for inverted siphon inspections, variety in inspection methods that may be required, and different asset priorities, the Condition Assessment Program is currently phased into five additional planning studies. It is anticipated this effort will span over multiple years.
Groundwater Infiltration – CCTV identified areas experiencing significant groundwater infiltration in the Baker-Main, Bushard, Euclid, Knott, Miller-Holder, Newport, SARI, Sunflower, and Talbert trunkline systems. Specifically, significant groundwater infiltration is most prominent in the I-405 corridor in Costa Mesa, throughout the western regional trunklines of the Knott trunkline in Cypress, Los Alamitos, etc.; Jamboree Road and the Balboa Peninsula in Newport Beach; and various locations in Anaheim, Buena Park, Fountain Valley, Huntington Beach, Irvine, Garden Grove, Orange, Santa Ana, and Westminster.	Areas with significant groundwater infiltration that are co-located with fractures or tuberculation are not suitable for chemical grouting and therefore have been identified as high-priority point repairs; refer to individual trunkline key issue tables for more details. Areas with groundwater infiltration that do not have any other defects are lower priority.	Projects 1-23, 2-78, 3-60, 3-64C, 5-69, 7-65, 11-35, X-085, X-129, X-130, X-134, and X2-79 will address most areas with significant groundwater infiltration.
Manhole Access – OC San staff have identified specific locations where manholes are difficult to access for maintenance. Current issues exist with manholes in some OC San easement areas and along the Santa Ana River, an easement area on California Department of Transportation property near I-5 and State Route 91, an easement area encroached upon by residences near the Wintersburg Channel in Huntington Beach, Crystal Cove, the southern portion of the Santa Ana River, Orange Park Acres, and North Tustin.	OC San staff will track and prioritize access issues to address key concerns. High-priority access improvements will continue to be recommended as Small Projects or additions to an existing CIP project.	Lower-priority access improvements will be recommended within the scope of future CIP projects where feasible.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – BAKER-MAIN TRUNKLINE

System Overview - Baker-Main Pipelines



Major Assets and Condition Information - Baker-Main Pipelines

Asset Type	Total Length (miles)	No. of Pipes	Average Age (years)	No. of Pipes with RUL Score of 5	No. of Pipes with RUL Score of 4
Vitrified Clay					
≤ 18" Ø	18.8	337	58	1	44
> 18" Ø	15.9	245	43	1	24
Reinforced Concrete					
15" Ø	0.004	1	32	-	1
> 42" Ø	4.9	50	32	-	3
Ductile Iron					
24" - 42" Ø	0.50	3	32	-	-
Polyvinyl Chloride					
10"–21" Ø	0.04	2	23	-	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – BAKER-MAIN TRUNKLINE

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Missing and Undersized Air Jumpers – One out of 10 inverted siphon/reduction locations in the Baker-Main Trunkline system do not have air jumpers. Two out of 10 inverted siphon/reduction locations in the Baker-Main Trunkline system have air jumpers that do not provide adequate air flow capacity and therefore are undersized.	N/A	Project X-129 includes constructing a new air jumper. Project X-078 includes replacing existing air jumpers with upsized air jumpers or constructing multiple air jumpers in the same location to provide the required air flow capacity.
Pipeline Defects – CCTV identified several areas with significant fracturing of vitrified clay pipe (VCP) pipelines. The largest concentration of fractures is in the Fairview Trunkline. There are also areas of significant root intrusion in and around existing fractures. Some blockages in OC San sewer mains may have contributed to a local sanitary sewer overflow in Orange in 2021.	Root treatment work is planned to stop root growth and prevent further damage to the pipelines prior to construction of Project 7-69. Isolated defects elsewhere not included or near a CIP project have been identified as high-priority defects. OC San staff are in the process of determining whether some pipelines can be abandoned or otherwise grouped together for 7-pack task orders to rehabilitate and/or repair the pipelines.	Project 6-20 will rehabilitate the entire Fairview Trunkline to address pipeline fractures. Projects 7-65, 7-69, and X-129 will also address fracturing with rehabilitation work.
Uninspected Gravity Pipelines – One gravity sewer within Plant No. 1 has never been inspected in the Baker-Main Trunkline system. There is no condition data for this reach to determine field-adjusted RUL. The downstream manhole is currently inaccessible due to construction activities.	Inspection will be completed after construction activities are completed in the area via a CCTV work order in coordination with Plant No. 1 Operations.	N/A

Current and Future Projects

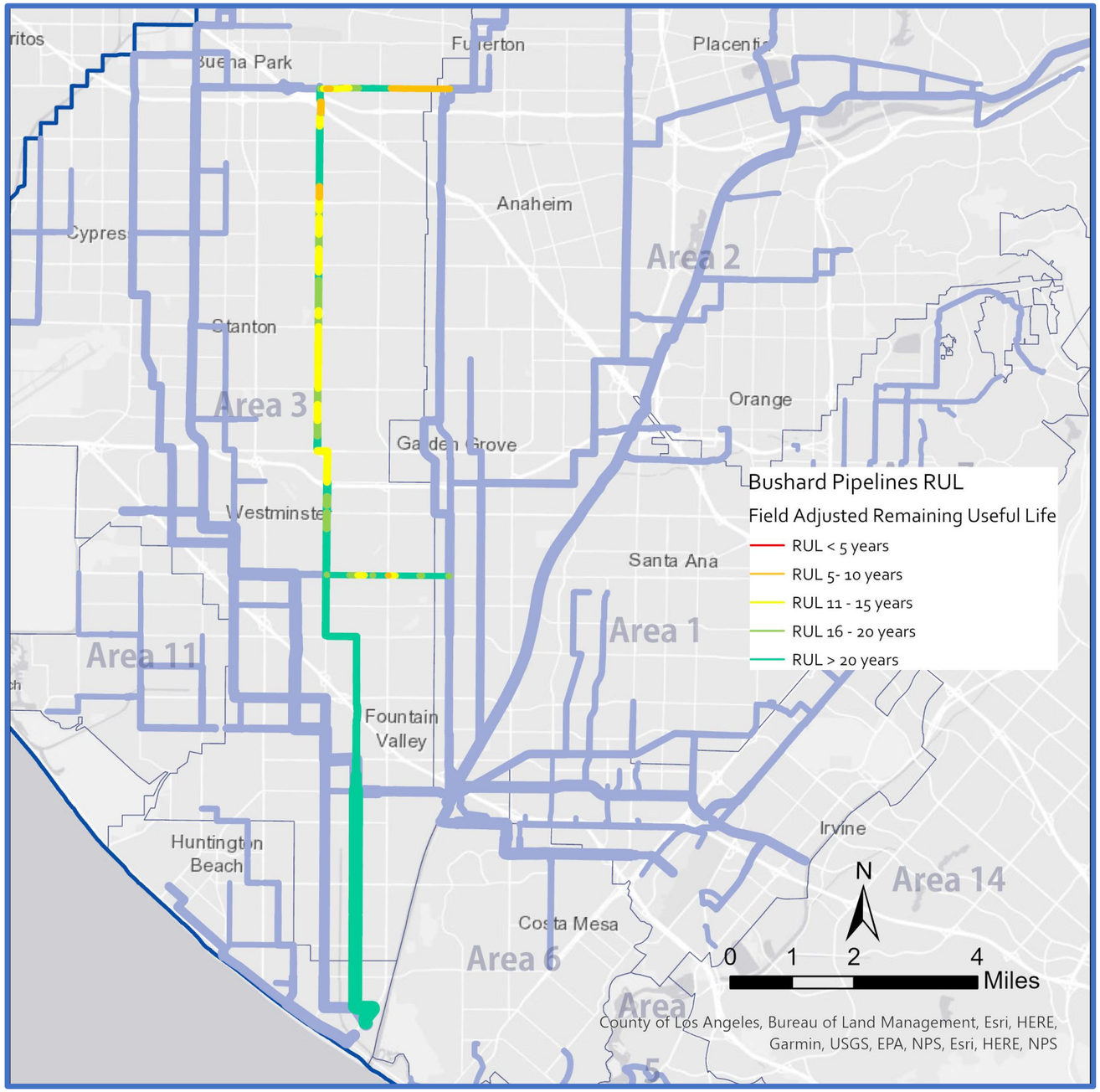
Project No.	Project Title	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
7-65	Gisler-Redhill Interceptor Rehabilitation															
6-20	Fairview Trunk Sewer Rehabilitation															
7-69	North Tustin-Orange Sewer Improvements															
X-129	South Coast Metro Sewer Rehabilitation															
X-078	Inverted Siphon and Air Jumper Improvements															

Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – BUSHARD TRUNKLINE

System Overview - Bushard Pipelines



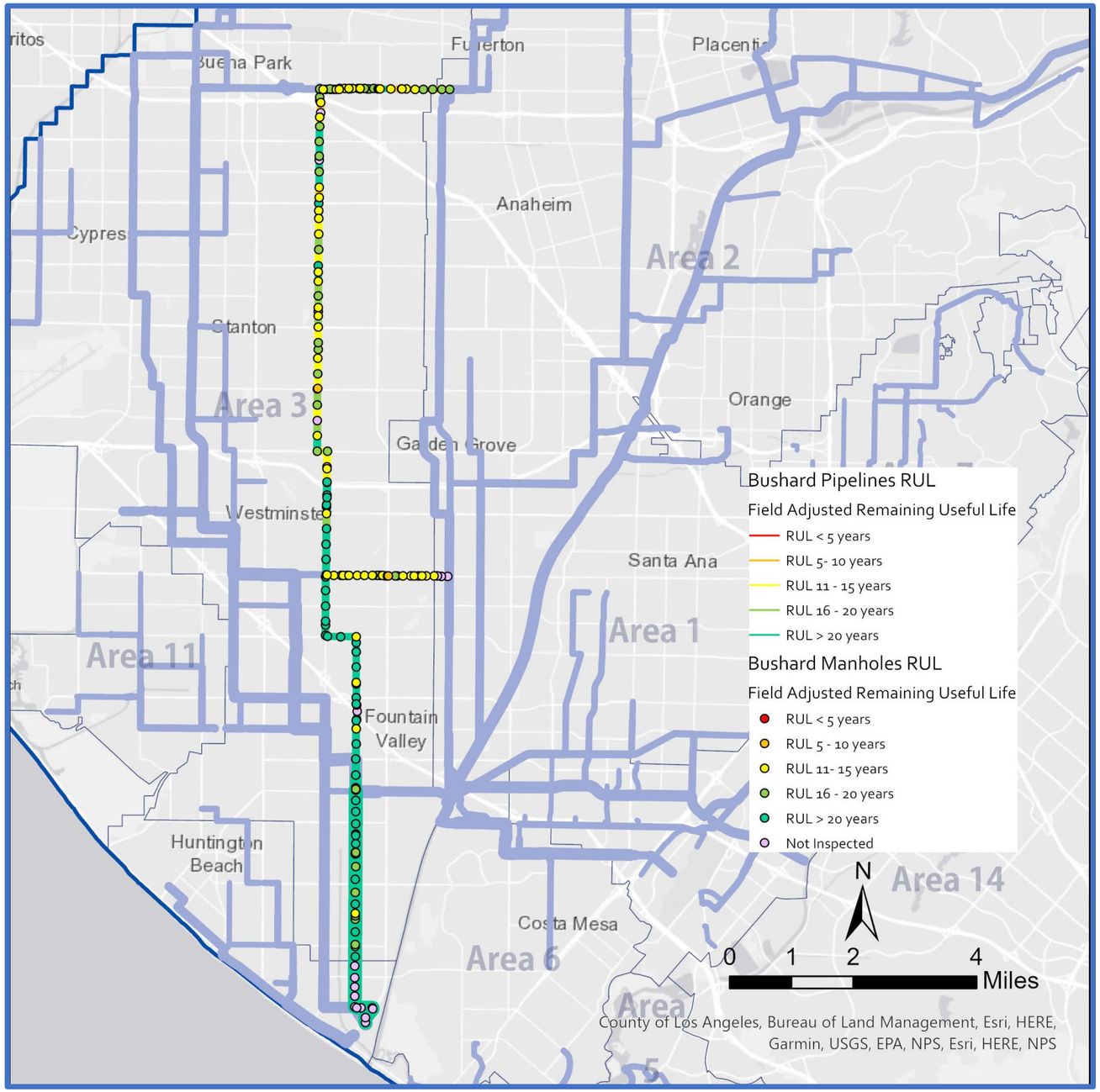
Major Assets and Condition Information - Bushard Pipelines

Asset Type	Total Length (miles)	No. of Pipes	Average Age (years)	No. of Pipes with RUL Score of 5	No. of Pipes with RUL Score of 4
Vitrified Clay					
≤ 18" Ø	0.03	3	41	-	-
> 18" Ø	8.7	97	58	-	10
Reinforced Concrete					
≤ 42" Ø	6.3	35	75	-	1
> 42" Ø	5.5	48	26	-	-
Fiberglass					
≤ 42" Ø	1.0	8	27	-	-
Polyvinyl Chloride					
≤ 18" Ø	0.15	6	21	-	-
> 18" Ø	0.08	2	23	-	-
High-Density Polyethylene					
22" Ø	0.06	2	27	-	-
Steel					
12"–26" Ø	0.06	4	16	-	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – BUSHARD TRUNKLINE

System Overview - Bushard Manholes



Major Assets and Condition Information - Bushard Manholes

Asset Type	No. of Manholes	Average Age (years)	No. of Manholes with RUL Score of 5	No. of Manholes with RUL Score of 4
Concrete				
≤ 48" Ø	35	66	-	-
> 48" Ø	167	40	-	3

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – BUSHARD TRUNKLINE

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Bushard Diversion Box – Project MP-307 restored valve functionality to the Bushard Diversion Box. However, the potential for ragging issues still exists in the structure.	N/A	Permanent improvements including a change in isolation valve type, etc. are included in Project X-096.
Improperly Abandoned Manhole Under I-5 – In 2017, CCTV discovered a partially abandoned manhole in the Magnolia Street sewer underneath the I-5 travel lanes. Subsequent investigations in 2022 confirmed the manhole structure had significant liner delamination and aggregate visible.	N/A	Project FRC-0014 will complete the abandonment of the manhole under I-5.
Manhole Defects – CCTV identified one manhole that has significant liner delamination.	N/A	Manhole is suitable for repair under the manhole repair and rehabilitation blanket contract.
Missing Air Jumpers – One out of eight inverted siphon/reduction locations in the Bushard Trunkline system does not have air jumpers.	N/A	Project X-130 includes constructing a new air jumper.
Pipeline Defects – CCTV identified an area with significant fracturing of VCP pipelines, primarily in Magnolia Street and Orangethorpe Avenue in the cities of Anaheim and Fullerton.	N/A	Projects X-085 and X2-79 will address all the major fractures by rehabilitating the pipelines.

Current and Future Projects

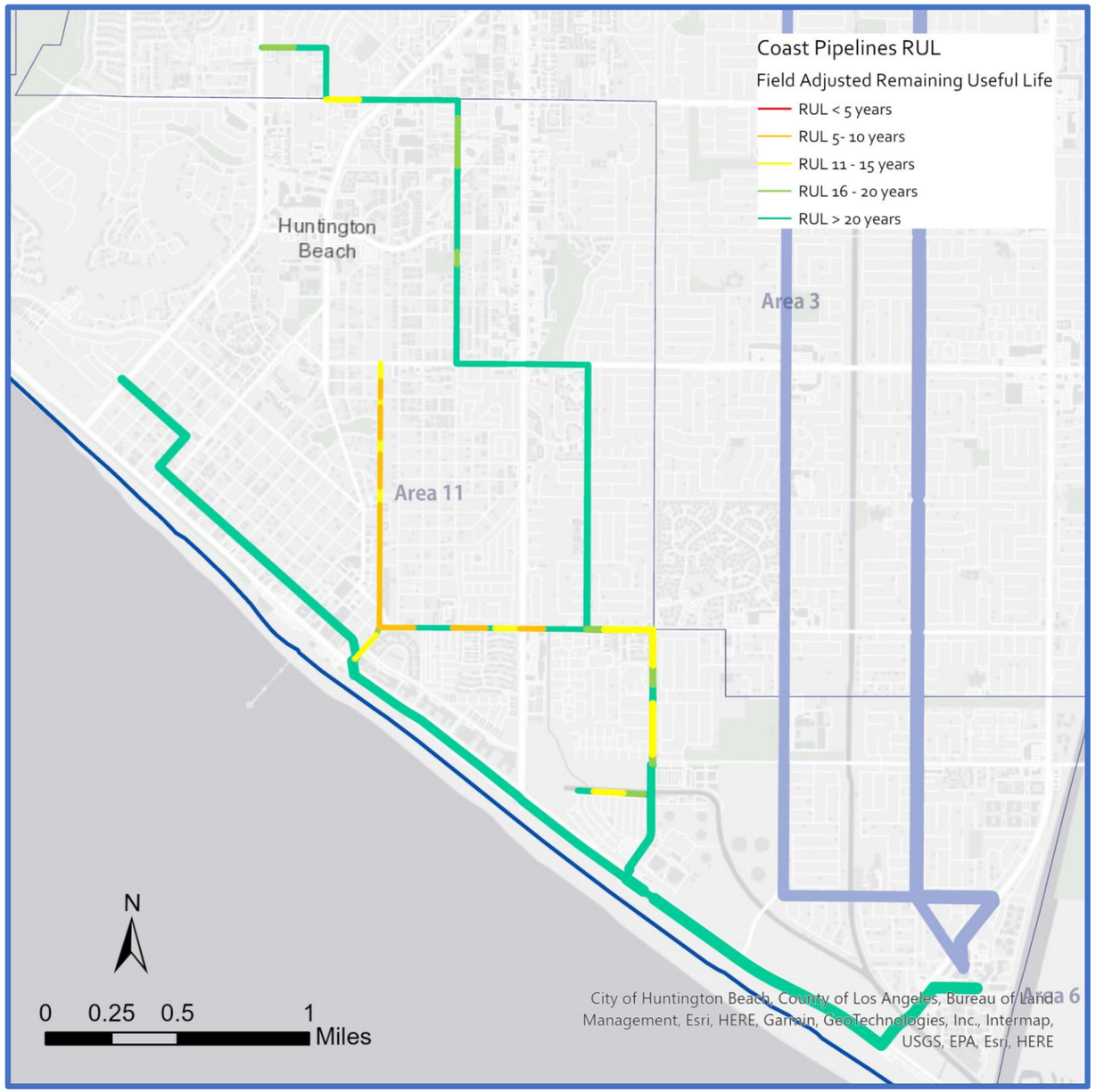
Project No.	Project Title	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
FRC-0014	Magnolia Sewer Manhole Abandonment at I-5															
X-096	Bushard Diversion Structure Improvements															
X-130	McFadden-Bolsa Sewer Rehabilitation															
X-085	Hoover-Western Sewer Rehabilitation															
X2-79	Fullerton-Brea Sewer Rehabilitation															

Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: CIP – Planning | CIP – Design | CIP – Construction | Maintenance Project

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – COAST TRUNKLINE

System Overview - Coast Pipelines



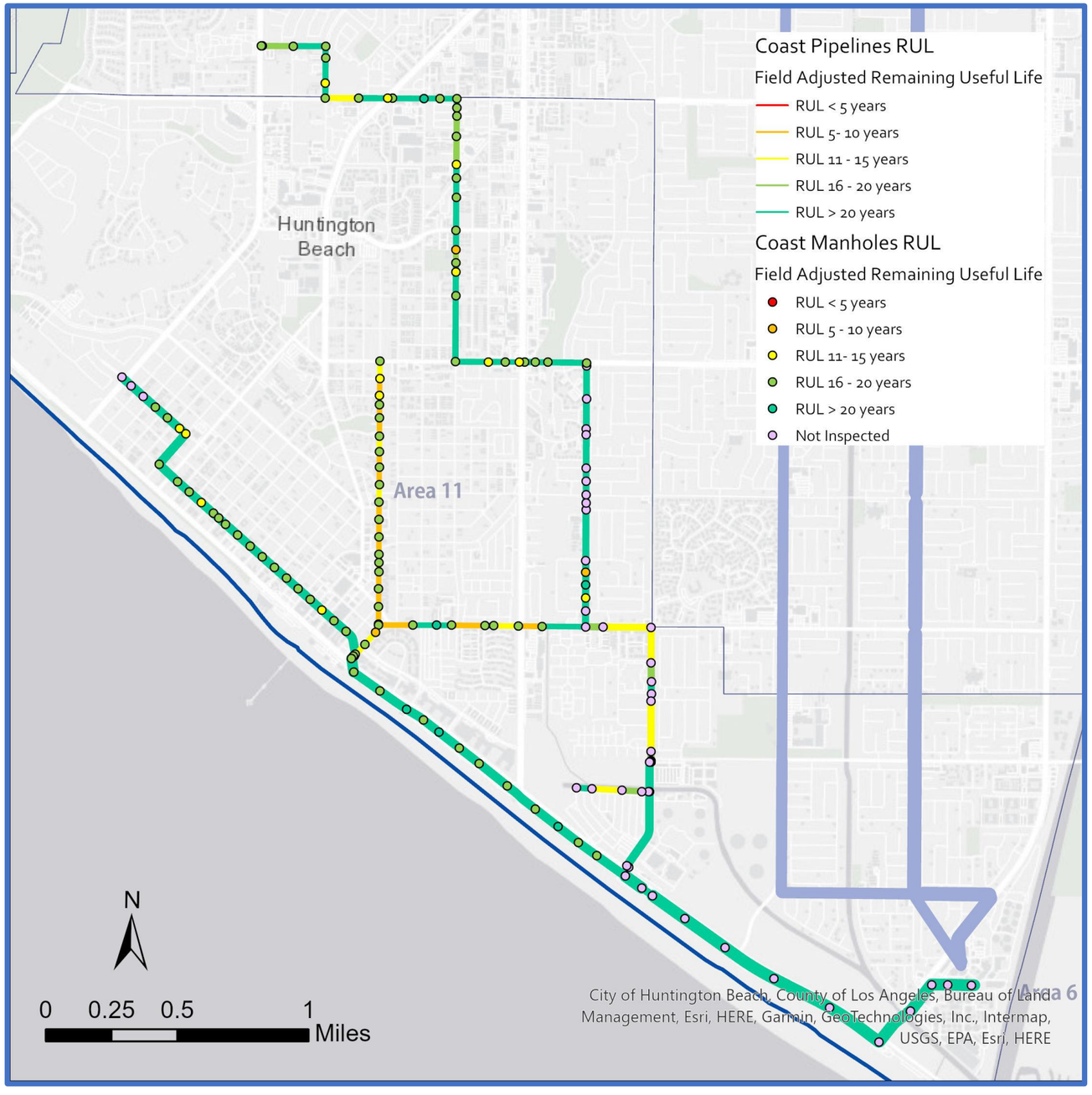
Major Assets and Condition Information - Coast Pipelines

Asset Type	Total Length (miles)	No. of Pipes	Average Age (years)	No. of Pipes with RUL Score of 5	No. of Pipes with RUL Score of 4
Vitrified Clay					
≤ 18” Ø	2.1	32	66	-	16
> 18” Ø	4.4	58	64	-	-
Reinforced Concrete					
> 42” Ø	5.0	57	41	-	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – COAST TRUNKLINE

System Overview - Coast Manholes



Major Assets and Condition Information - Coast Manholes

Asset Type	No. of Manholes	Average Age (years)	No. of Manholes with RUL Score of 5	No. of Manholes with RUL Score of 4
Concrete				
≤ 48" Ø	39	57	-	1
> 48" Ø	111	55	-	2

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – COAST TRUNKLINE

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Pipeline Defects – CCTV identified an area with significant fracturing of VCP pipelines, primarily in Lake Street and Atlanta Avenue. There are also areas of significant root intrusion in and around existing fractures.	Most pipelines in Project X-126 have root intrusion in and around existing fractures. Root treatment work is planned to stop root growth and prevent further damage to the pipelines prior to construction of Project X-126.	Project X-126 will address all the major fractures by rehabilitating the pipelines.
Uninspected Gravity Pipelines – Two gravity sewers within Plant No. 2 have never been inspected in the Coast Trunkline system. There is no condition data for these reaches to determine field-adjusted RUL. A CCTV inspection was attempted in 2024, and due to flow conditions, CCTV could not be completed. It is suspected heavy flow from the force mains from Bitter Point Pump Station may be the cause of the adverse flow conditions.	OC San staff plans to re-attempt the CCTV inspections in coordination with the operation of Bitter Point Pump Station.	N/A

Current and Future Projects

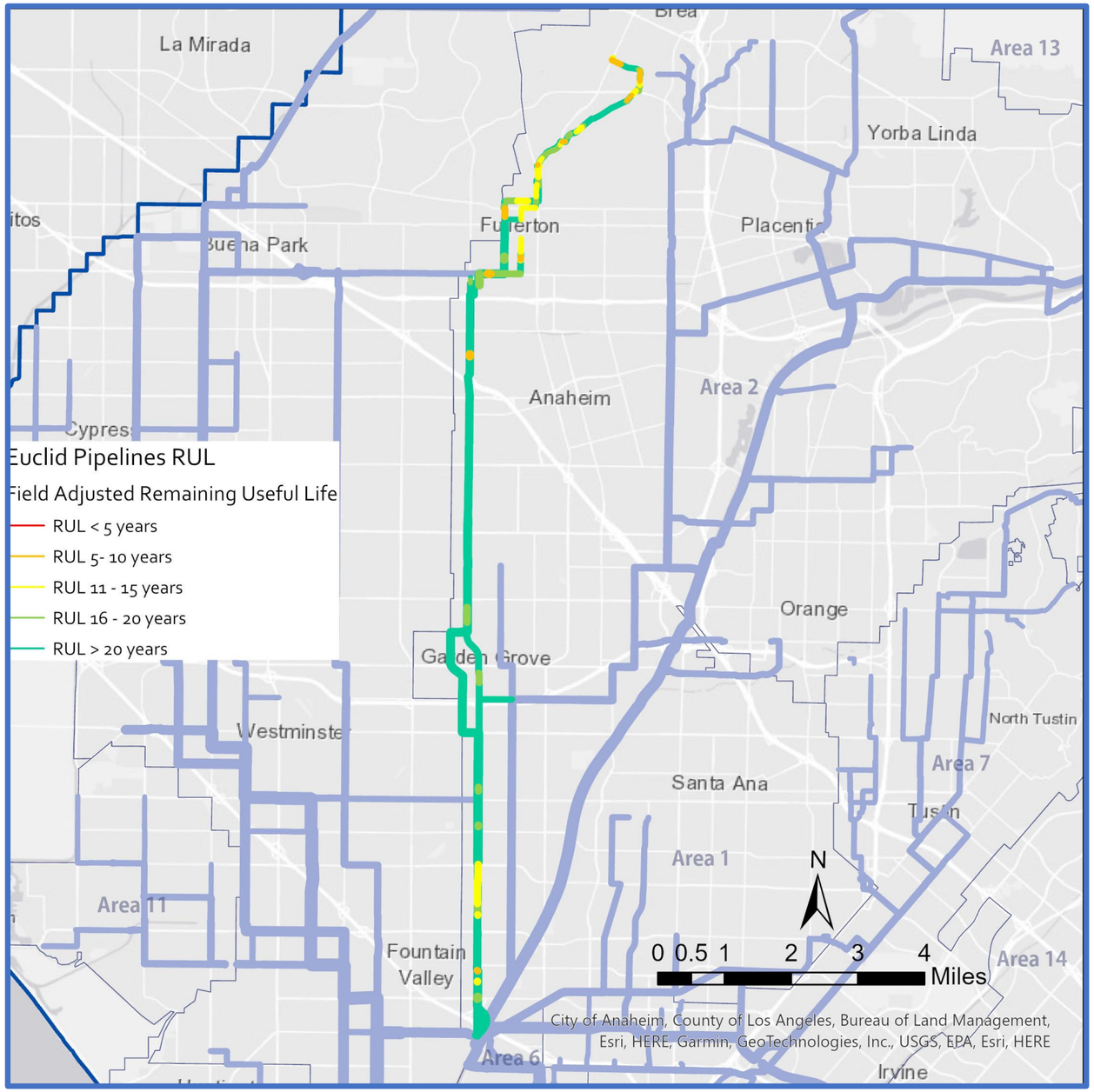
Project No.	Project Title	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
X-126	Lake-Atlanta Sewer Rehabilitation															

Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – EUCLID TRUNKLINE

System Overview - Euclid Pipelines



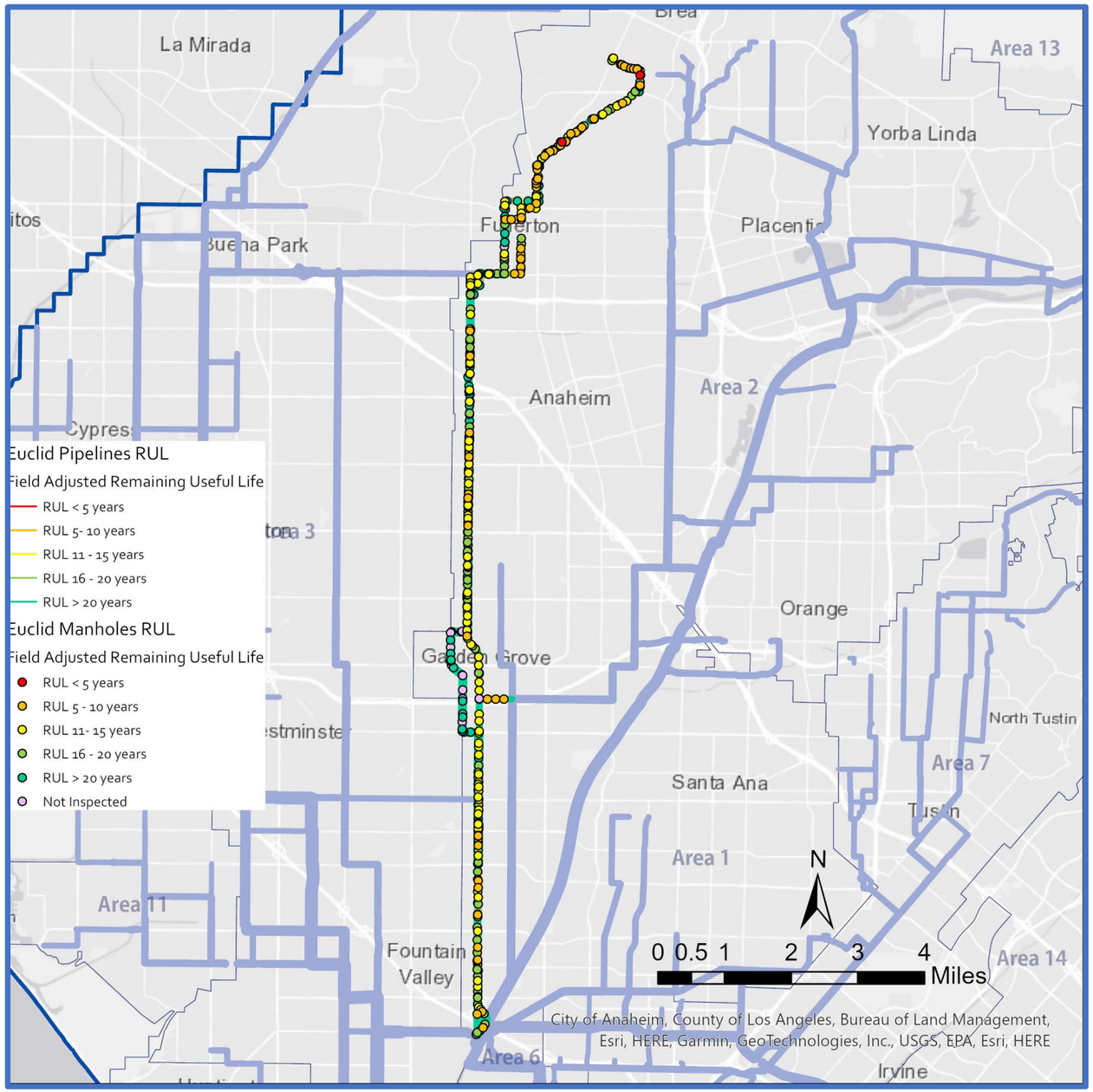
Major Assets and Condition Information - Euclid Pipelines

Asset Type	Total Length (miles)	No. of Pipes	Average Age (years)	No. of Pipes with RUL Score of 5	No. of Pipes with RUL Score of 4
Vitrified Clay					
≤ 18" Ø	4.4	79	69	-	5
> 18" Ø	16.0	203	51	-	6
Reinforced Concrete					
≤ 42" Ø	2.4	15	53	-	-
> 42" Ø	11.6	131	36	-	2
Polyvinyl Chloride					
≤ 18" Ø	0.05	5	26	-	-
> 18" Ø	0.10	7	16	-	-
Steel					
10" Ø	0.01	3	16	-	-
High-Density Polyethylene					
26" Ø	0.05	1	16	-	-

Please see the comprehensive Acronyms and Abbreviations list for definitions

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – EUCLID TRUNKLINE

System Overview - Euclid Manholes



Major Assets and Condition Information - Euclid Manholes

Asset Type	No. of Manholes	Average Age (years)	No. of Manholes with RUL Score of 5	No. of Manholes with RUL Score of 4
Concrete				
≤ 48" Ø	43	62	1	21
> 48" Ø	333	44	1	29
Brick				
≤ 48" Ø	48	65	-	17
> 48" Ø	2	57	-	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – EUCLID TRUNKLINE

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Manhole Defects – CCTV identified areas with significant liner delamination and some structures with exposed rebar throughout the Euclid Trunkline system, but especially in the vicinity of Coyote Hills and northern Fullerton.	Nearly all manholes in Projects X2-79 and X-078 may reach the end of their useful lives prior to construction starting. Therefore, these manholes need some rehabilitation work performed via the manhole repair and rehabilitation blanket contract to prevent failure prior to the start of Projects X2-79 and X-078.	Projects X2-79 and X-078 will address most of the liner delamination and exposed rebar by rehabilitating the manhole structures. Other manholes not included or near a CIP project are suitable for repair under the manhole repair and rehabilitation blanket contract.
Pipeline Defects – CCTV identified an area with significant fracturing of VCP pipelines in northern Fullerton. There is also one pipeline with root intrusion in and around existing fractures.	Root treatment work is planned to stop root growth and prevent further damage to the pipelines prior to construction of Project X2-79.	Project X2-79 will address all the major fractures by rehabilitating the pipelines.
Undersized Air Jumpers – Six out of 12 inverted siphon/reduction locations in the Euclid Trunkline system have air jumpers that do not provide adequate air flow capacity and therefore are undersized.	N/A	Projects X2-79 and X-078 include replacing existing air jumpers with upsized air jumpers or constructing multiple air jumpers in the same location to provide the required air flow capacity.

Current and Future Projects

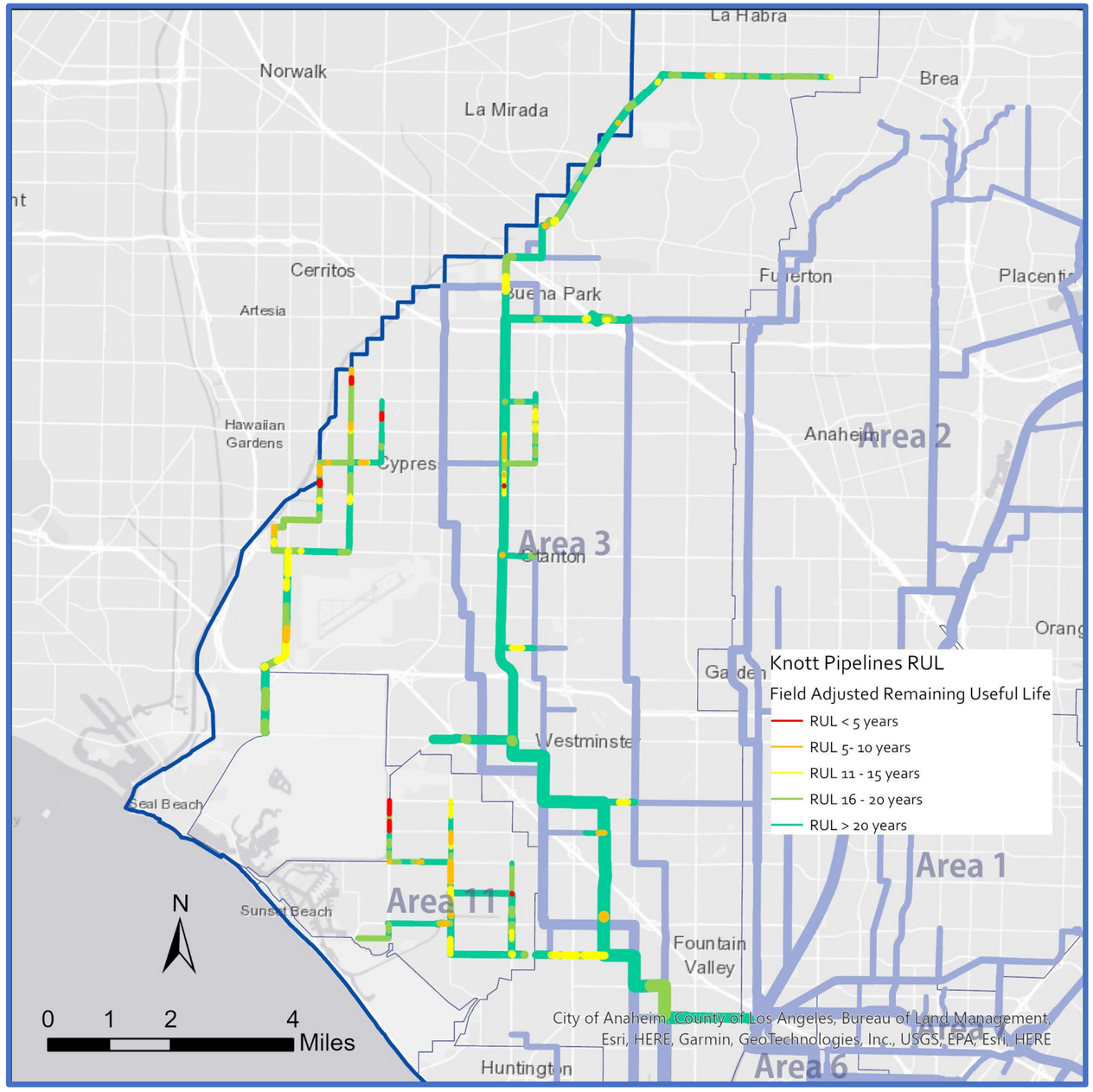
Project No.	Project Title	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
X2-79	Fullerton-Brea Sewer Rehabilitation															
X-078	Inverted Siphon and Air Jumper Improvements															

Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – KNOTT TRUNKLINE

System Overview - Knott Pipelines



Note: Map and data table include IPE pipelines and manholes.

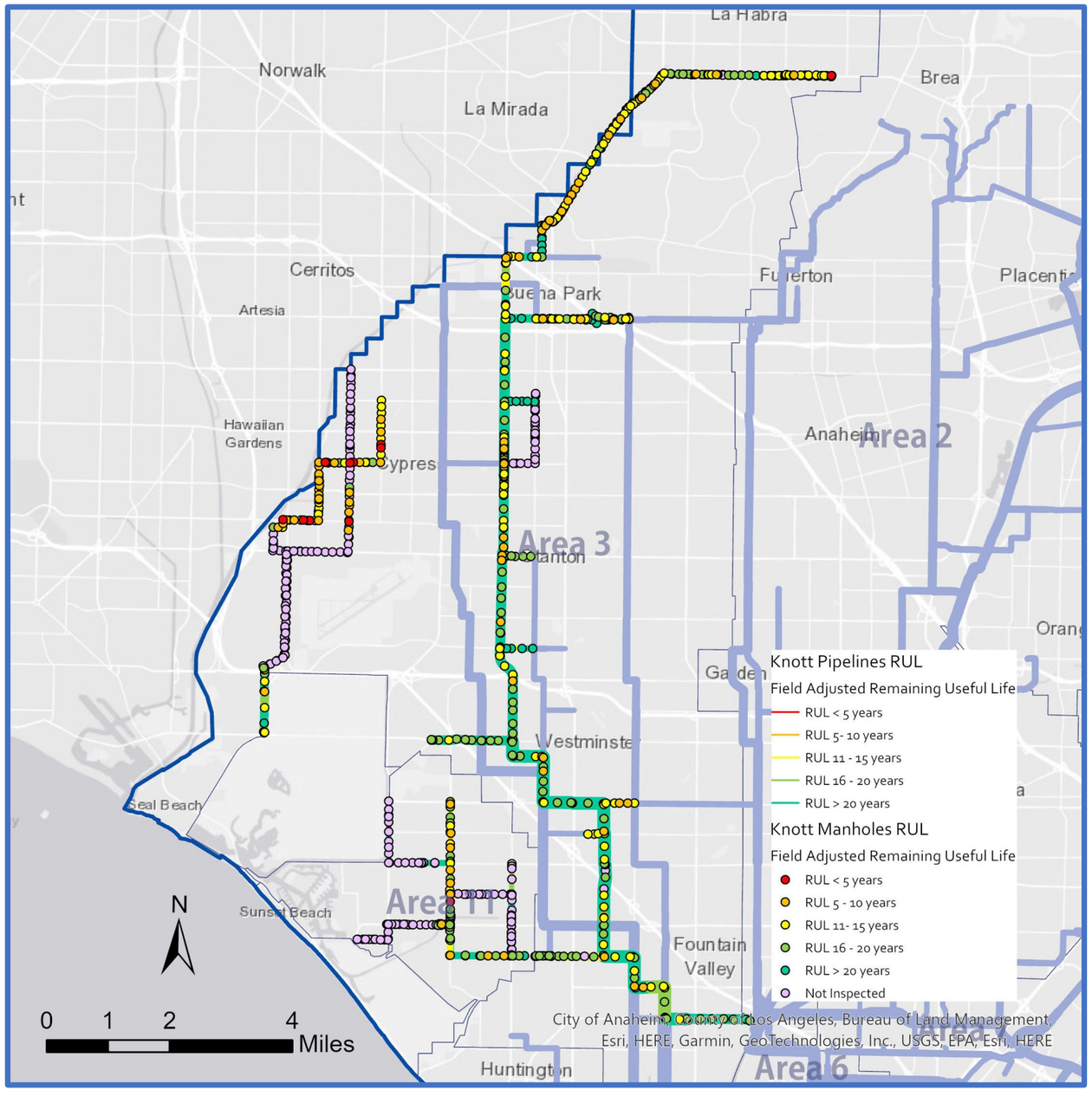
Major Assets and Condition Information - Knott Pipelines

Asset Type	Total Length (miles)	No. of Pipes	Average Age (years)	No. of Pipes with RUL Score of 5	No. of Pipes with RUL Score of 4
Vitrified Clay					
≤ 18" Ø	9.1	130	57	7	13
> 18" Ø	34.9	484	52	2	14
Reinforced Concrete					
≤ 42" Ø	4.7	58	31	-	-
> 42" Ø	17.2	138	49	-	1
Polyvinyl Chloride					
≤ 18" Ø	1.2	17	20	-	-
Fiberglass Reinforced Plastic					
≤ 42" Ø	0.07	2	17	-	-
> 42" Ø	1.1	8	19	-	-
High-Density Polyethylene					
18" Ø	0.01	2	12	-	-
> 18" Ø	0.03	3	16	-	-
Ductile Iron					
20" Ø	0.02	1	66	-	-
Steel					
4" Ø	0.02	1	16	-	-
Unknown					
18" Ø	0.01	2	67	-	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – KNOTT TRUNKLINE

System Overview - Knott Manholes



Major Assets and Condition Information - Knott Manholes

Asset Type	No. of Manholes	Average Age (years)	No. of Manholes with RUL Score of 5	No. of Manholes with RUL Score of 4
Concrete				
≤ 48" Ø	272	59	8	40
> 48" Ø	534	44	5	41

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – KNOTT TRUNKLINE

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Missing and Undersized Air Jumpers – Five out of 19 inverted siphon/reduction locations in the Knott Trunkline system do not have air jumpers. One out of 19 inverted siphon/reduction locations in the Knott Trunkline system has an air jumper that does not provide adequate air flow capacity and therefore is undersized.	N/A	Project X-061 includes constructing a new air jumper at two locations. Project X-078 includes replacing an existing air jumper with an upsized air jumper or constructing multiple air jumpers in the same location to provide the required air flow capacity. Three other locations do not require air jumpers due to lack of normal surcharge conditions at two locations and an infeasible location at the end of a force main.
Manhole Defects – CCTV identified areas with significant liner delamination and some structures with exposed rebar, primarily in Buena Park, Cypress, and Los Alamitos.	Eleven manholes included in Projects 11-35, X-061, X-085, and X2-79 may reach the end of their useful lives prior to construction starting. Therefore, these manholes need some rehabilitation work performed via the manhole repair and rehabilitation blanket contract to prevent failure prior to the start of Projects 11-35, X-061, X-085, and X2-79.	Projects 3-60, 3-64C, 11-35, X-061, X-085, X-130, and X2-79 will address most of the liner delamination and exposed rebar by rehabilitating the manhole structures. Other manholes are suitable for repair under the manhole repair and rehabilitation blanket contract.
Pipeline Defects – CCTV identified several areas with significant fracturing of VCP pipelines. Most fractures are concentrated in northern Huntington Beach, Cypress, and small-diameter sewers owned and operated by the City of Anaheim but maintained by OC San in the northern central area of the trunkline. There are also areas of significant root intrusion in and around existing fractures. A blockage due to roots occurred in one pipe segment in northern Huntington Beach in 2022. Lastly, one pipeline with fractures also has a very large, encrusted deposit from groundwater infiltration.	Root treatment work was completed to stop root growth and prevent further damage to the pipelines prior to the construction of Project 11-35. OC San staff plan to use the industrial cleaning blanket contract to remove the large deposit to prevent a flow obstruction prior to construction of Project X-130. Isolated defects elsewhere not included or near a CIP project have been identified as high-priority spot repairs. OC San staff are in the process of grouping point repairs together for 7-pack task orders.	Projects 3-60, 3-64C, 11-35, X-061, X-085, and X-130 will address most fractures by rehabilitating the pipelines. OC San staff will also coordinate with the City of Anaheim pertaining to operation and maintenance of the local small-diameter sewers OC San maintains for the City of Anaheim under an active agreement.
Uninspected Gravity Pipelines – Three gravity sewers have never been inspected in the Knott and Ellis Avenue Trunkline systems. There is no condition data for these reaches to determine field-adjusted RUL. A CCTV inspection was attempted in 2025 for a location upstream of the Steve Anderson Lift Station wet well. The CCTV contractor abandoned the inspection to prevent loss of the camera equipment to highly turbulent conditions, despite OC San staff lowering the wet well level as much as feasible.	OC San staff will review inspection technologies as alternatives to CCTV for the gravity sewer upstream of the Steve Anderson Lift Station wet well. There are no known access issues for the remaining two uninspected gravity sewers. Inspections will be completed via future CCTV PM work orders or separate CCTV work orders.	N/A

Current and Future Projects

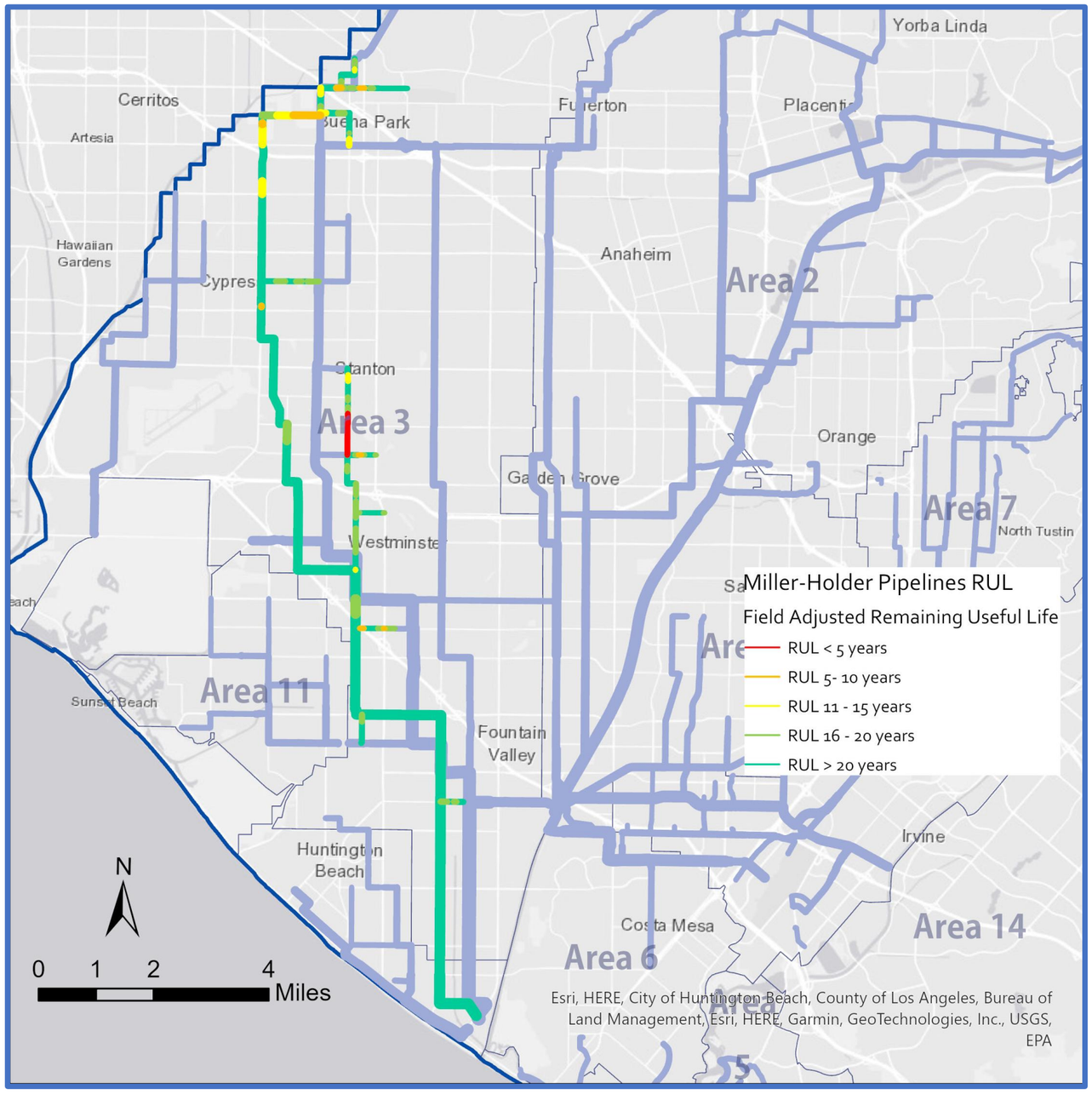
Project No.	Project Title	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
3-64C	Cypress Trunk Sewer Rehabilitation - West															
3-60	Knott-Miller Holder - Artesia Branch Rehabilitation															
11-35	North Huntington Beach Sewer Rehabilitation															
X-130	McFadden-Bolsa Sewer Rehabilitation															
X2-79	Fullerton-Brea Sewer Rehabilitation															
X-085	Hoover-Western Sewer Rehabilitation															
X-078	Inverted Siphon and Air Jumper Improvements															
X-061	Imperial Highway Trunk Sewer Rehabilitation															

Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – MILLER-HOLDER TRUNKLINE

System Overview - Miller-Holder Pipelines



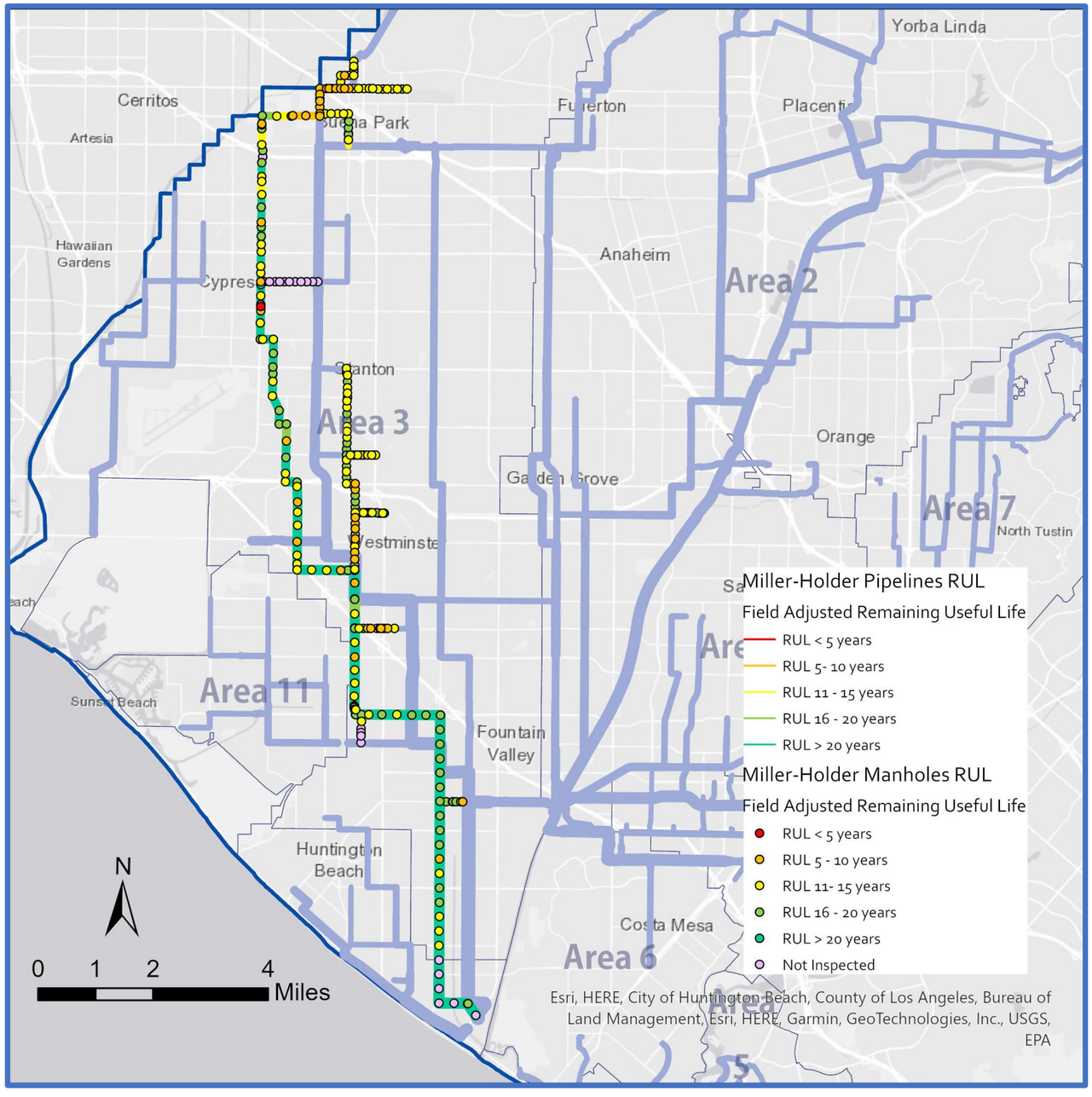
Major Assets and Condition Information - Miller-Holder Pipelines

Asset Type	Total Length (miles)	No. of Pipes	Average Age (years)	No. of Pipes with RUL Score of 5	No. of Pipes with RUL Score of 4
Vitrified Clay					
≤ 18" Ø	2.9	50	65	-	4
> 18" Ø	9.4	114	63	9	5
Reinforced Concrete					
> 42" Ø	19.3	101	68	-	1
Ductile Iron					
≤ 18" Ø	0.07	5	43	3	-
Polyvinyl Chloride					
24" Ø	0.02	1	23	-	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – MILLER-HOLDER TRUNKLINE

System Overview - Miller-Holder Manholes



Major Assets and Condition Information - Miller-Holder Manholes

Asset Type	No. of Manholes	Average Age (years)	No. of Manholes with RUL Score of 5	No. of Manholes with RUL Score of 4
Concrete				
≤ 48" Ø	68	66	-	5
> 48" Ø	197	64	1	37

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – MILLER-HOLDER TRUNKLINE

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Capacity – The Collections Capacity Evaluation Study completed in 2019 conducted a detailed capacity analysis to identify the location of capacity deficiencies during dry and PWWFs. During existing PWWFs, capacity issues were identified in a portion of the Hoover-Western Sub-Trunk. However, Project PS20-02 did not confirm hydraulic analysis results justified the need for a capital improvement project and recommended more flow monitoring for further hydraulic analysis.	Additional flow monitoring and hydraulic analysis are recommended to be included in the upcoming Collections Capacity Study Master Plan Update.	Project X-085 includes upsizing a portion of the Hoover-Western Sub-Trunk to address existing capacity issues.
Manhole Defects – CCTV identified areas with significant liner delamination and some structures with exposed rebar, primarily in Buena Park and Westminster.	N/A	Projects 3-60, X-078, and X-130 will address most of the liner delamination and exposed rebar by rehabilitating the manhole structures. Other manholes are suitable for repair under the manhole repair and rehabilitation blanket contract.
Missing Air Jumpers – Two out of five inverted siphon/reduction locations in the Miller-Holder Trunkline system do not have air jumpers.	N/A	Projects 3-60 and X-078 both include constructing a new air jumper at each location.
Pipeline Defects – CCTV identified several areas with significant fracturing of VCP pipelines. Most fractures are concentrated in Buena Park and Westminster.	N/A	Projects 3-60, X-085, and X-130 will address all the fractures by rehabilitating the pipelines.

Current and Future Projects

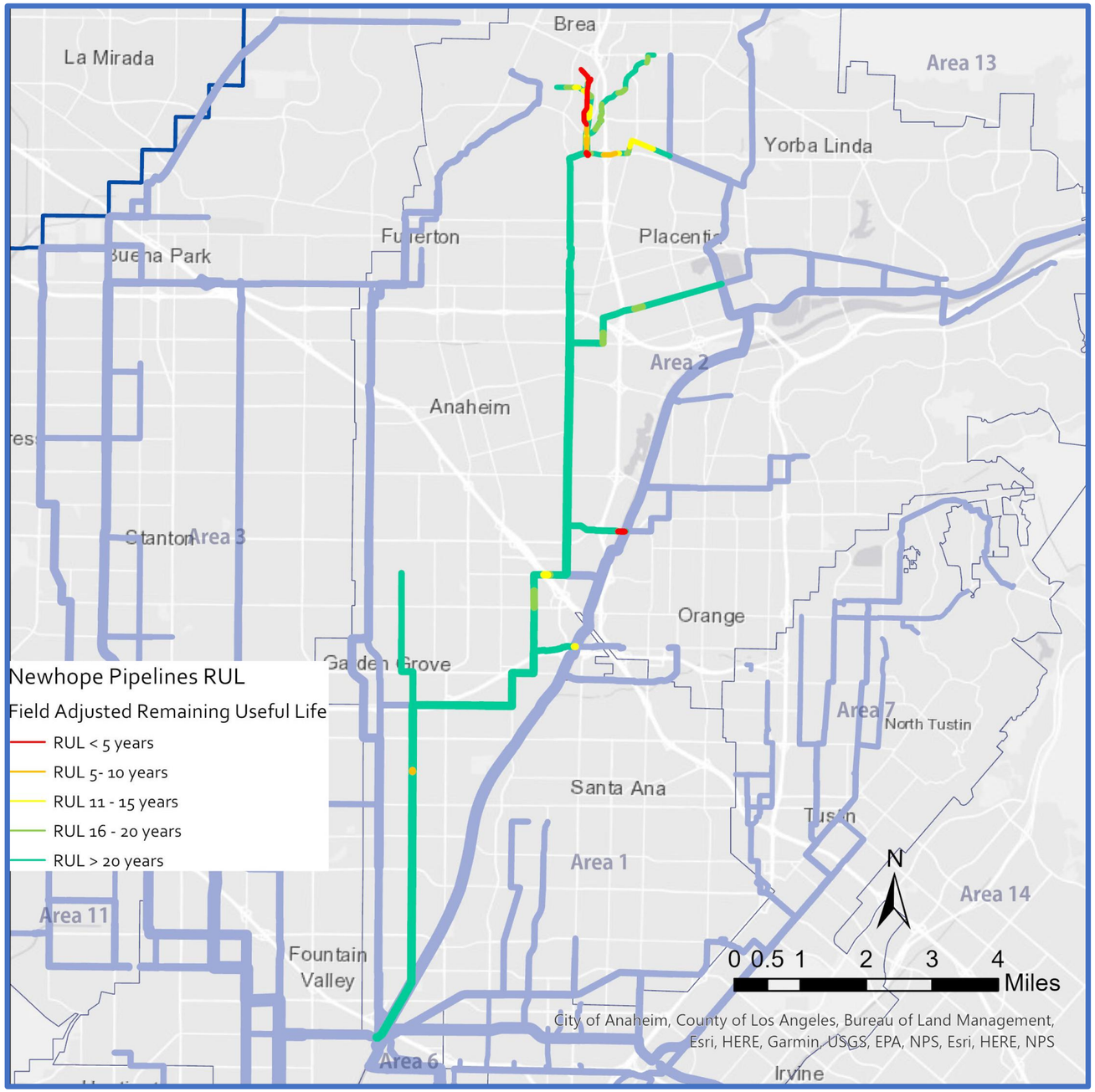
Project No.	Project Title	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
3-60	Knott-Miller Holder-Artesia Branch Rehabilitation															
X-130	McFadden-Bolsa Sewer Rehabilitation															
X-085	Hoover-Western Sewer Rehabilitation															
X-078	Inverted Siphon and Air Jumper Improvements															

Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – NEWHOPE TRUNKLINE

System Overview - Newhope Pipelines



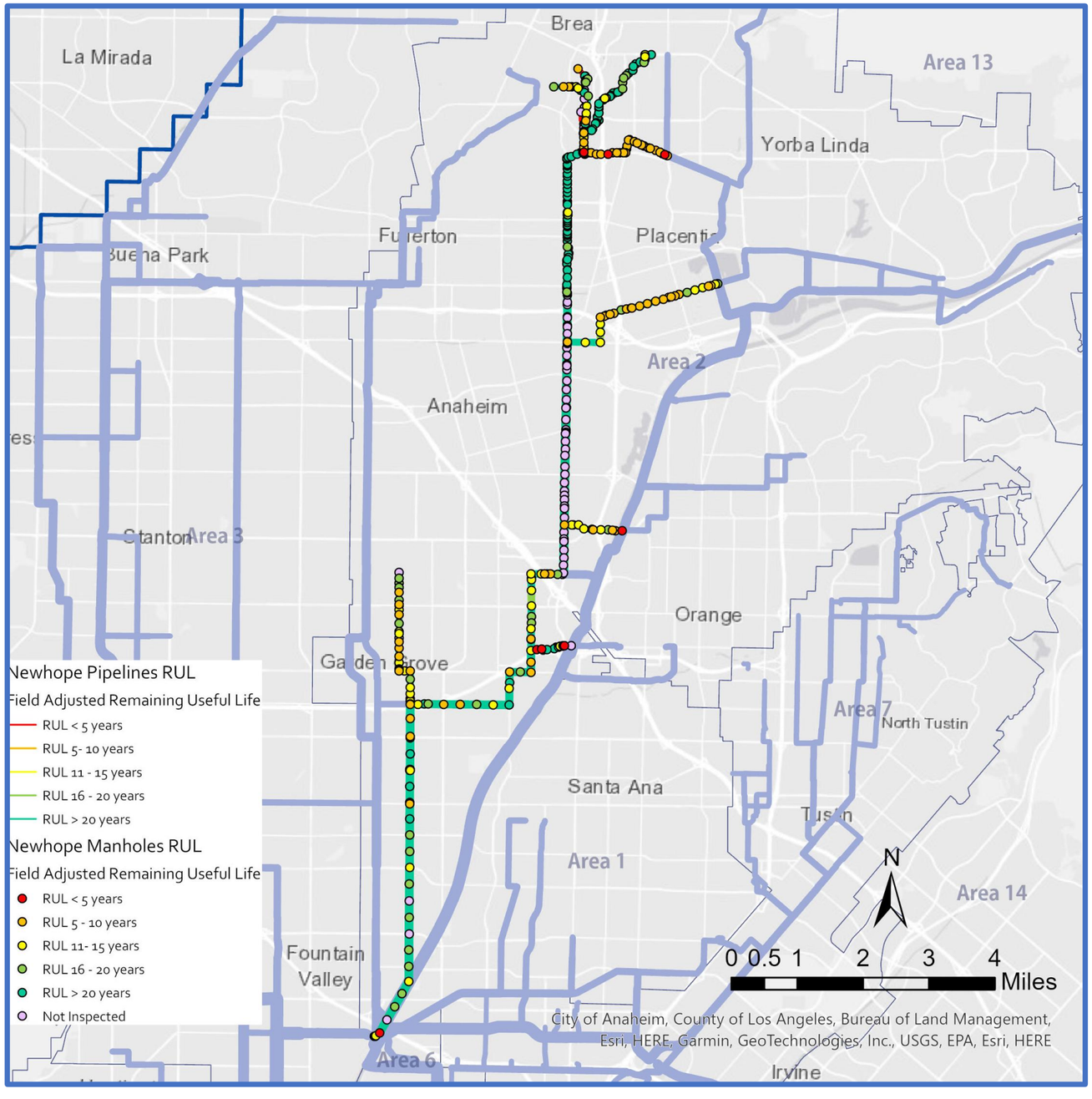
Major Assets and Condition Information - Newhope Pipelines

Asset Type	Total Length (miles)	No. of Pipes	Average Age (years)	No. of Pipes with RUL Score of 5	No. of Pipes with RUL Score of 4
Vitrified Clay					
≤ 18” Ø	3.1	61	51	2	6
> 18” Ø	11.3	168	46	1	3
Reinforced Concrete					
> 42” Ø	7.9	42	65	-	-
Fiberglass Reinforced Plastic					
≤ 42” Ø	0.02	1	7	-	-
> 42” Ø	4.5	50	7	-	-
Ductile Iron					
≤ 18” Ø	0.93	18	30	-	1
> 18” Ø	0.38	7	45	4	-
Cast Iron					
12” Ø	0.91	7	66	7	-
Steel					
12” Ø	0.07	6	16	-	-
Polyvinyl Chloride					
≤ 18” Ø	0.03	2	31	1	-
> 18” Ø	0.01	3	21	1	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – NEWHOPE TRUNKLINE

System Overview - Newhope Manholes



Major Assets and Condition Information - Newhope Manholes

Asset Type	No. of Manholes	Average Age (years)	No. of Manholes with RUL Score of 5	No. of Manholes with RUL Score of 4
Concrete				
≤ 48" Ø	53	63	1	21
> 48" Ø	304	40	7	53

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – NEWHOPE TRUNKLINE

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Broken Siphon – In 2020, CCTV discovered the Olive Sub-Trunk siphon has a hole in the pipeline. In addition, CCTV showed corrosion issues in upstream manholes due to an ineffective air jumper.	N/A	Project FE20-08 will replace a portion of the Olive Sub-Trunk siphon, rehabilitate other portions, reconstruct the air jumper, and restore the siphon into service.
Manhole Defects – CCTV identified several areas with significant liner delamination and some structures with exposed rebar located in Anaheim, Fullerton, Garden Grove, Orange, Placentia, and Santa Ana. There are also three isolated manholes in the southern reaches of the Newhope Trunkline system with severe liner detachment, surface aggregate missing, and visible reinforcement.	20 manholes between Projects 2-73 and 2-78 may reach the end of their useful lives prior to construction starting. Therefore, these manholes need some rehabilitation work performed via the manhole repair and rehabilitation blanket contract to prevent failure prior to the start of Projects 2-73 and 2-78.	Projects FE20-08, FE21-08, 2-73, and 2-78 will address most of the liner delamination and exposed rebar by rehabilitating the manhole structures. Other manholes are suitable for repair under the manhole repair and rehabilitation blanket contract.
Pipeline Fracturing – CCTV identified several areas with significant fracturing of VCP pipelines. Most fractures are concentrated in Fullerton.	N/A	Project 2-73 will address all the fractures by rehabilitating or abandoning the pipelines.
Pipeline Tuberculation – CCTV identified a few ductile iron pipelines in Craig Regional Park with no lining or significant delamination and widespread tuberculation. The last CCTV inspections for these assets were completed in 2013.	New CCTV inspections are needed for suspected unlined ductile iron pipelines. CCTV inspection frequency will be increased for all ductile iron pipe with polyethylene linings. A polyethylene lining system is not typical and not recommended for ductile iron pipe gravity sewers.	Project 2-73 will address all the delamination and tuberculation by rehabilitating the pipelines.
Uninspected Gravity Pipelines – Nine gravity sewers have never been inspected in the Newhope Trunkline system. There is no condition data for these reaches to determine field-adjusted RUL. This includes several cast-iron pipelines in a temporarily out-of-service pipeline in Craig Regional Park that are largely inaccessible.	N/A	All nine gravity sewers, including the temporarily out-of-service cast iron pipelines in Craig Regional Park, are proposed to be abandoned as part of Project 2-73.

Current and Future Projects

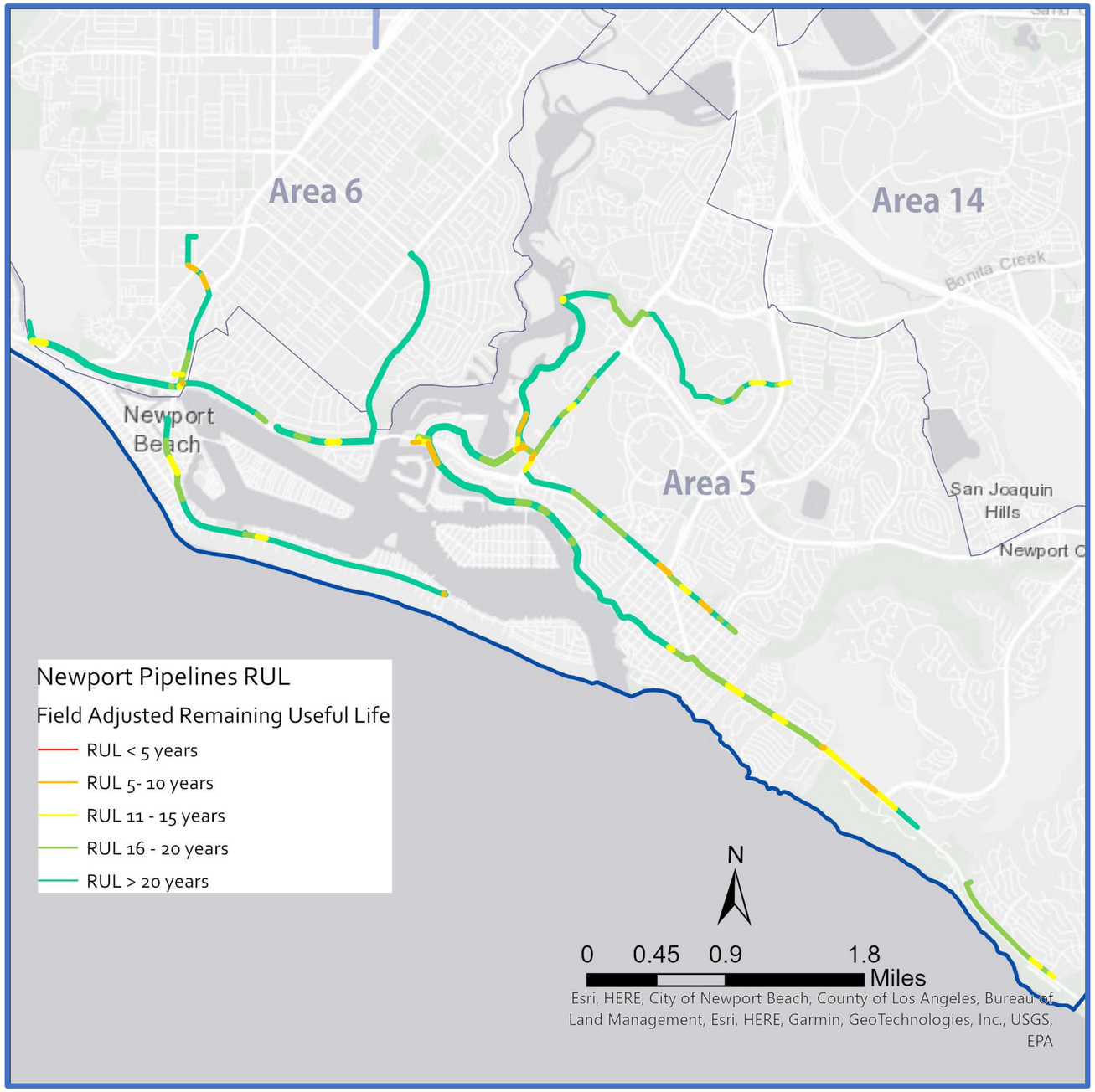
Project No.	Project Title	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
FE20-08	Olive Sub-Trunk Siphon Rehabilitation at Santa Ana River															
FE21-08	Newhope-Placentia Sewer Manhole Replacements															
2-73	Fullerton-Placentia Sewer Facilities Demolition and Rehabilitation															
2-78	Atwood-Santa Ana Canyon Sewer Rehabilitation															

Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – NEWPORT TRUNKLINE

System Overview - Newport Pipelines



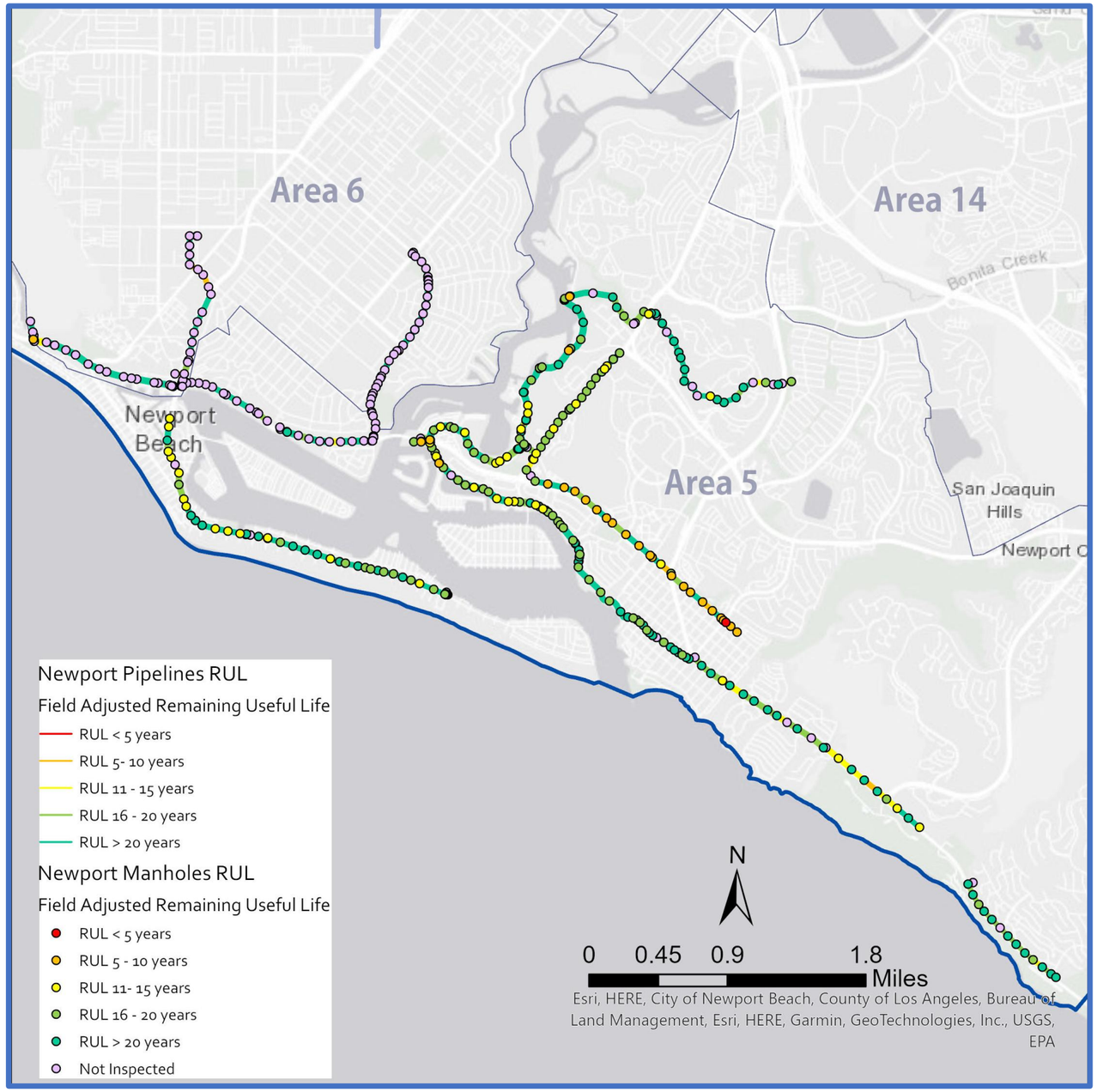
Major Assets and Condition Information - Newport Pipelines

Asset Type	Total Length (miles)	No. of Pipes	Average Age (years)	No. of Pipes with RUL Score of 5	No. of Pipes with RUL Score of 4
Vitrified Clay					
≤ 18” Ø	5.7	113	53	-	12
> 18” Ø	8.2	176	40	-	6
Ductile Iron					
≤ 18” Ø	1.3	18	32	-	1
> 18” Ø	2.6	35	36	-	1
Polyvinyl Chloride					
≤ 18” Ø	0.13	3	12	-	-
> 18” Ø	2.6	36	25	-	-
High-Density Polyethylene					
≤ 18” Ø	0.13	2	33	-	-
> 18” Ø	0.66	14	31	-	-
Cast Iron					
≤ 18” Ø	0.12	2	50	-	-
Reinforced Concrete					
48” Ø	0.02	1	13	-	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – NEWPORT TRUNKLINE

System Overview - Newport Manholes



Major Assets and Condition Information - Newport Manholes

Asset Type	No. of Manholes	Average Age (years)	No. of Manholes with RUL Score of 5	No. of Manholes with RUL Score of 4
Concrete				
≤ 48" Ø	98	71	1	18
> 48" Ø	297	31	-	11
Fiberglass Reinforced Plastic				
≤ 48" Ø	2	18	-	-
> 48" Ø	2	21	-	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – NEWPORT TRUNKLINE

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Manhole Defects – CCTV identified several areas with significant liner delamination and some structures with exposed rebar concentrated in East Coast Highway and Fifth Avenue.	One manhole in Project 5-69 may reach the end of its useful life prior to construction starting. Manhole coring work and lidar scanning is in progress to perform further analysis and confirm the RUL of the manhole.	Project 5-69 will address most of the liner delamination and exposed rebar by rehabilitating the manhole structures. Other manholes are suitable for repair under the manhole repair and rehabilitation repair blanket contracts.
Missing and Undersized Air Jumpers – One out of two inverted siphon locations in the Newport Trunkline system do not have air jumpers. The second inverted siphon location in the Newport Trunkline system has air jumpers that do not provide adequate air flow capacity and are therefore undersized.	Both inverted siphon locations in the Newport Trunkline system will be inspected under Project PS25-01.	Project 5-69 includes the construction of new sewer to replace the inverted siphon. Project X-078 includes replacing existing air jumpers with upsized air jumpers or constructing multiple air jumpers in the same location to provide the required air flow capacity.
Pipeline Fracturing – CCTV identified several areas with significant fracturing of VCP pipelines. The fractures are scattered throughout the Newport Trunkline system.	Root treatment work is planned to stop root growth and prevent further damage to the pipelines prior to construction of Project 5-69. Isolated defects elsewhere not included or near a CIP project have been identified as high-priority point repairs. OC San staff are in the process of grouping spot repairs together for 7-pack task orders.	Project 5-69 will address the fractures by rehabilitating the pipelines.
Pipeline Tuberculation – CCTV identified ductile iron pipes in East Coast Highway with significant liner delamination and tuberculation.	CCTV inspection frequency will be increased for all ductile iron pipe with polyethylene linings. A polyethylene lining system is not typical and not recommended for ductile iron pipe gravity sewers.	Project 5-69 will address the liner delamination and tuberculation by rehabilitating the pipelines.
Uninspected Gravity Pipelines – Four gravity sewers have never been inspected in the Newport Trunkline system. There is no condition data for these reaches to determine field-adjusted RUL. For one gravity sewer within Plant No. 2, a CCTV inspection was attempted in 2024 but could not be completed due to flow conditions. It is suspected that heavy flow from the force mains from Bitter Point Pump Station may be the cause of the adverse flow conditions. One gravity sewer in Back Bay Drive is constantly accumulating debris and must be inspected immediately after cleaning. Another gravity sewer upstream of Bitter Point Pump Station is normally surcharged by the pump station's wet well downstream. The last gravity sewer has no known access issues.	OC San staff plans to re-attempt two of the CCTV inspections in coordination with the operation of Bitter Point Pump Station. Additionally, OC San staff plans to re-attempt the Back Bay Drive sewer inspection immediately after a future cleaning. Inspections will be completed via future CCTV PM work orders or separate CCTV work orders.	N/A

Current and Future Projects

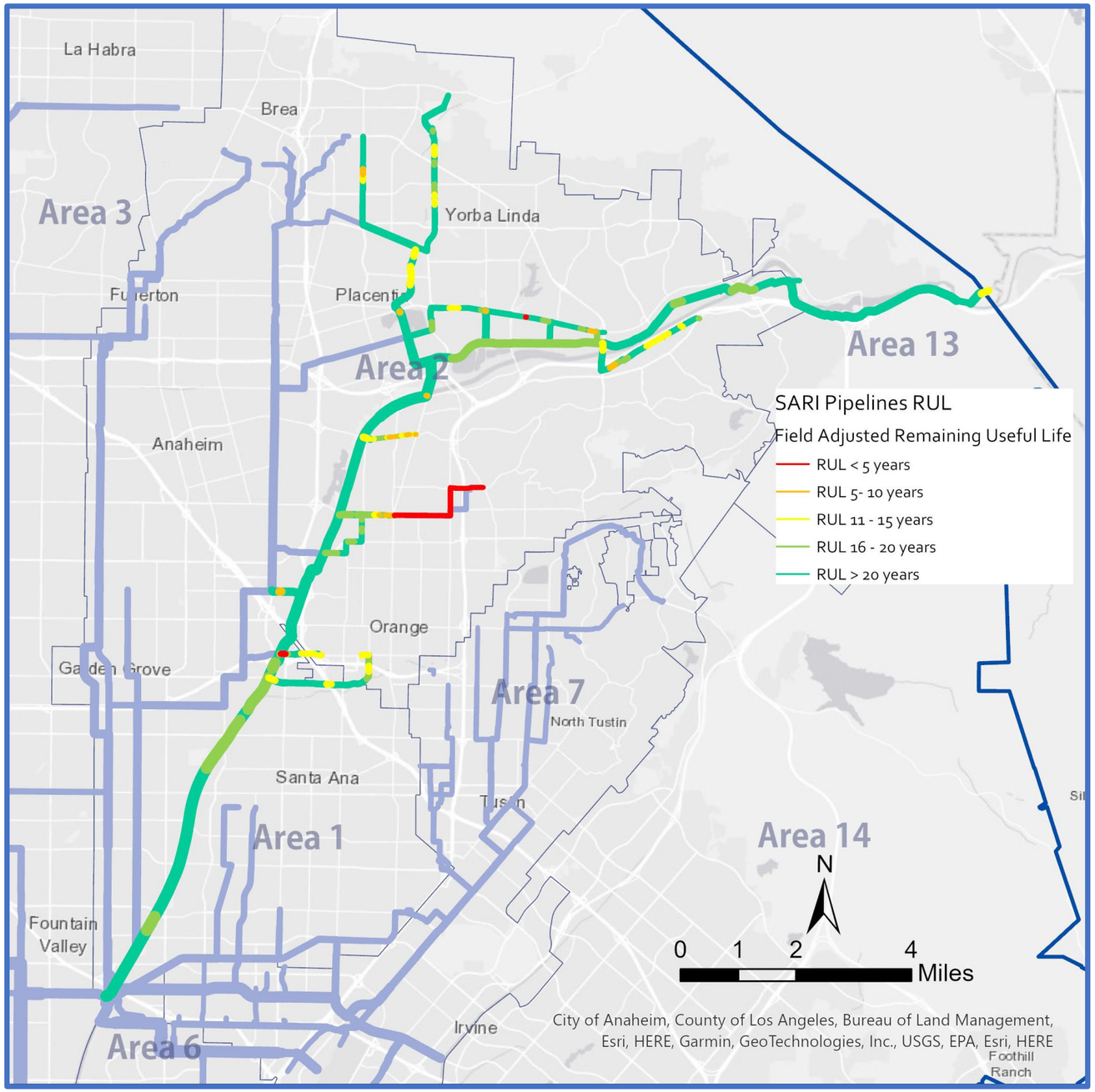
Project No.	Project Title	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
PS25-01	Siphon Assessments in Anaheim, Newport Beach, and Orange															
5-69	East Coast Highway Sewer Rehabilitation															
X-078	Inverted Siphon and Air Jumper Improvements															

Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – SARI TRUNKLINE

System Overview - SARI Pipelines



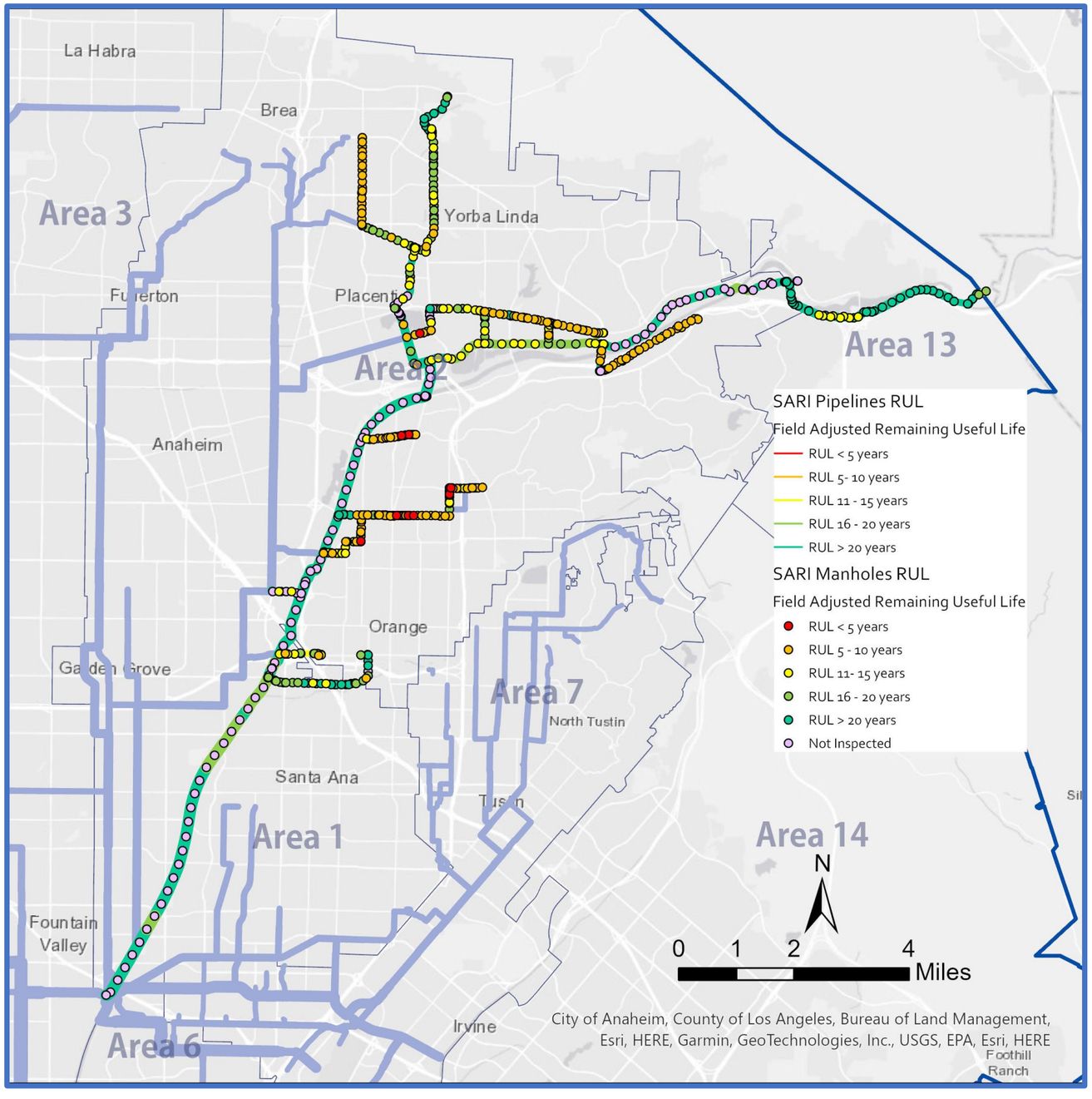
Major Assets and Condition Information - SARI Pipelines

Asset Type	Total Length (miles)	No. of Pipes	Average Age (years)	No. of Pipes with RUL Score of 5	No. of Pipes with RUL Score of 4
Vitrified Clay					
≤ 18" Ø	5.0	113	60	43	11
> 18" Ø	17.4	266	46	-	7
Reinforced Concrete					
42" Ø	1.5	19	42	-	-
> 42" Ø	20.5	119	49	-	1
Fiberglass Reinforced Plastic					
≤ 42" Ø	0.29	2	16	-	-
> 42" Ø	3.6	39	14	-	-
High-Density Polyethylene					
≤ 18" Ø	0.54	4	11	-	-
> 18" Ø	0.74	3	14	-	-
Ductile Iron					
> 18" Ø	0.80	10	38	2	2
Steel					
30" Ø	0.03	2	14	-	-
Polyvinyl Chloride					
12" Ø	0.01	1	9	-	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – SARI TRUNKLINE

System Overview - SARI Manholes



Major Assets and Condition Information - SARI Manholes

Asset Type	No. of Manholes	Average Age (years)	No. of Manholes with RUL Score of 5	No. of Manholes with RUL Score of 4
Concrete				
≤ 48" Ø	128	64	8	81
> 48" Ø	393	44	1	70
Fiberglass Reinforced Plastic				
> 48" Ø	49	14	-	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – SARI TRUNKLINE

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Capacity – The Collections Capacity Evaluation Study completed in 2019 conducted a detailed capacity analysis to identify the location of capacity deficiencies during dry and PWWFs. During existing PWWFs, capacity issues were identified in the Taft Branch.	N/A	Project 2-49 will address existing wet weather capacity issues in the Taft Branch.
Manhole Defects – CCTV identified widespread areas with significant liner delamination and some structures with exposed rebar. The defects are primarily concentrated in Anaheim, Orange, and Placentia.	Some manholes in Projects 2-78 and X-134 may reach the end of their useful lives prior to construction starting. Therefore, these manholes need some rehabilitation work performed via the manhole repair and rehabilitation blanket contract to prevent failure prior to the start of Projects 2-78 and X-134.	Projects 2-49, 2-73, 2-78, and X-134 will address most of the liner delamination and exposed rebar by rehabilitating the manhole structures. Other manholes are suitable for repair under the manhole repair and rehabilitation and manhole frame and cover repair blanket contracts.
Missing and Undersized Air Jumpers – Four out of 13 inverted siphon/reduction locations in the SARI Trunkline system do not have air jumpers. Two out of 13 inverted siphon/reduction locations in the SARI Trunkline system have air jumpers that do not provide adequate air flow capacity and are therefore undersized.	One location is a dual-barrel inverted siphon underneath the Santa Ana River channel with no nearby bridges that could be used for typical air jumper construction. Existing maintenance needs and issues with deep air jumper systems with condensate pumps are significant. There are also no residences nearby the upstream and downstream manholes. Therefore, OC San staff recommend performing additional monitoring and testing if there is sufficient H_2S and air pressure to warrant constructing an air jumper of any type.	Projects 2-78 and X-134 include constructing a new air jumper at three locations. Projects 2-78 and X-078 include replacing existing air jumpers with upsized air jumpers or constructing multiple air jumpers in the same location to provide the required air flow capacity.
Pipeline Defects – CCTV identified several areas with significant fracturing of VCP pipelines. Most fractures are concentrated in Anaheim and Orange.	N/A	Projects 2-73, 2-78, and X-134 will address fracturing issues by rehabilitating the pipelines.
Unlined Ductile Iron Pipe – There are four pipeline assets that according to record information are unlined ductile iron pipe and have significantly surpassed their theoretical RUL based on installation date. The inverted siphon barrels have never been inspected.	Two gravity pipes were re-inspected and confirmed to be unlined ductile iron pipe in poor but not severe condition. Inverted siphon barrels are to be inspected under Project PS25-01. Continued monitoring of the gravity pipes is recommended until the inverted siphon barrels are also inspected.	Ductile iron pipelines with less than 10 years of RUL will be grouped into either 7-pack task orders or a new Small Project.
Uninspected Gravity Pipelines – One gravity sewer in the SARI Trunkline system has never been inspected. There is no condition data for this reach to determine field-adjusted RUL. This gravity sewer has a tight horizontal curve that may not allow for CCTV inspection and is blocked by a diversion board.	OC San staff to discuss CCTV inspection approach with pipeline CCTV contractor.	N/A

Current and Future Projects

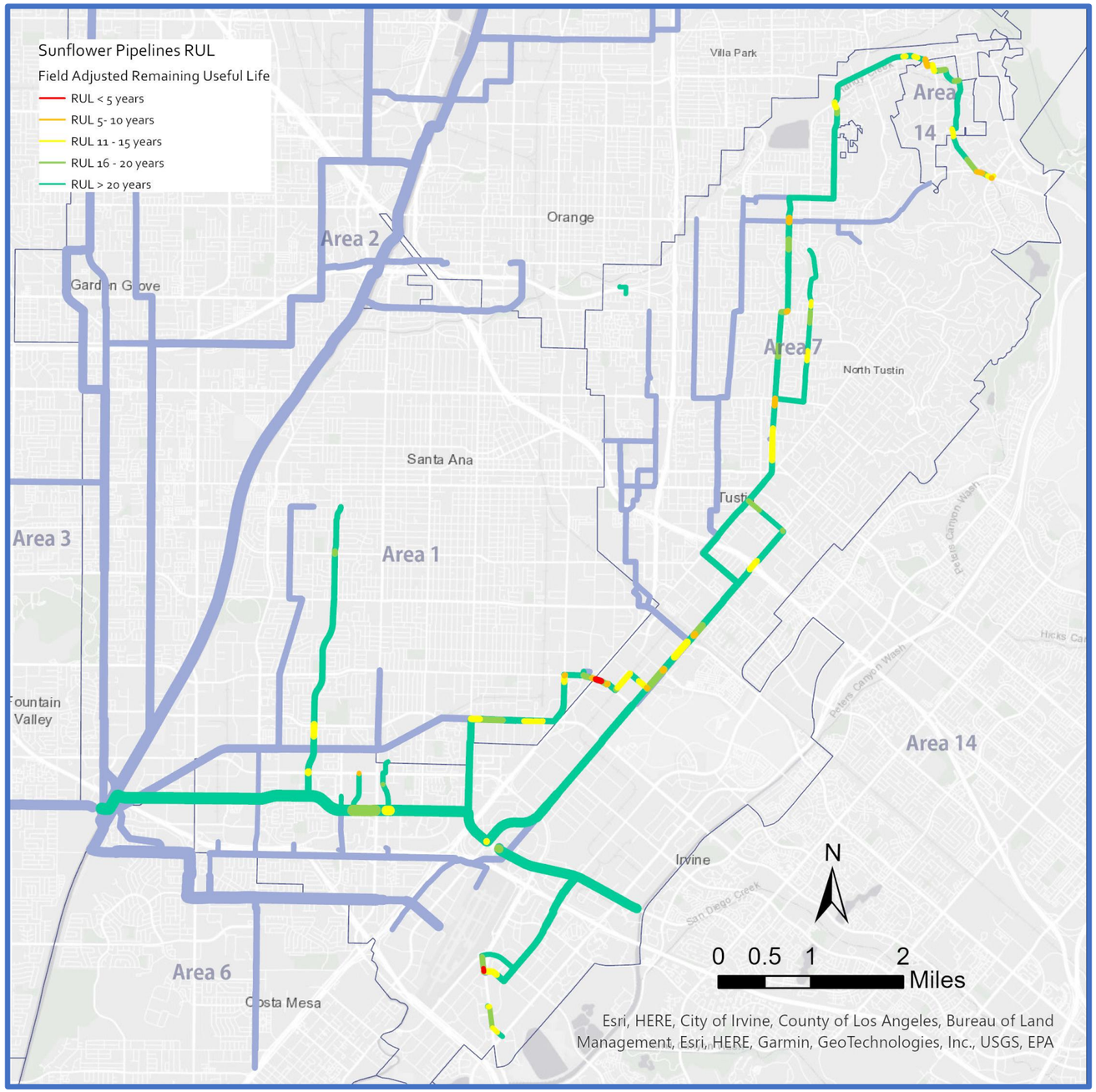
Project No.	Project Title	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
2-49	Taft Branch Improvements															
PS25-01	Siphon Assessments in Anaheim, Newport Beach, and Orange															
2-73	Fullerton-Placentia Sewer Facilities Demolition and Rehabilitation															
X-134	Olive-Taft Sewer Rehabilitation															
2-78	Atwood-Santa Ana Canyon Sewer Rehabilitation															
X-078	Inverted Siphon and Air Jumper Improvements															

Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – SUNFLOWER TRUNKLINE

System Overview - Sunflower Pipelines



Major Assets and Condition Information - Sunflower Pipelines

Asset Type	Total Length (miles)	No. of Pipes	Average Age (years)	No. of Pipes with RUL Score of 5	No. of Pipes with RUL Score of 4
Vitrified Clay					
≤ 18" Ø	7.2	149	49	-	5
> 18" Ø	17.9	259	51	-	8
Reinforced Concrete					
42" Ø	1.3	9	54	-	-
> 42" Ø	7.5	68	48	-	-
Ductile Iron					
20" – 24" Ø	0.64	13	31	1	-
Reinforced Plastic Mortar					
15" Ø	0.11	3	54	-	-
Polyvinyl Chloride					
30" Ø	0.05	3	17	-	-
Asbestos Cement					
10" Ø	0.04	1	61	1	-
Unknown					
18" Ø	0.01	1	8	-	-

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – SUNFLOWER TRUNKLINE

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Missing and Undersized Air Jumpers – Two out of 11 inverted siphon/reduction locations in the Sunflower Trunkline system do not have air jumpers. Four out of 11 inverted siphon/reduction locations in the Sunflower Trunkline system have air jumpers that do not provide adequate air flow capacity and are therefore undersized.	N/A	Project X-129 includes constructing a new air jumper at one location, but the second location does not require an air jumper due to lack of normal surcharged conditions. Project X-078 includes replacing existing air jumpers with upsized air jumpers or constructing multiple air jumpers in the same location to provide the required air flow capacity.
Pipeline Defects – CCTV identified several areas with significant fracturing of VCP pipelines. Most fractures are concentrated in Orange and Santa Ana with others located in Newport Beach and Tustin.	Root treatment work is planned to stop root growth and prevent further damage to the pipelines prior to construction of Project X-066.	Projects FRC-0007, 7-69, X-066, and X-129 will address fractures by rehabilitating the pipelines.
Uninspected Gravity Pipelines – One gravity sewer in the Sunflower Trunkline system has never been inspected. There is no condition data for this reach to determine field-adjusted RUL.	N/A	This gravity sewer is proposed to be abandoned-in-place as part of Project 7-68 (see Collection System - Pump Station Summary for project information).

Current and Future Projects

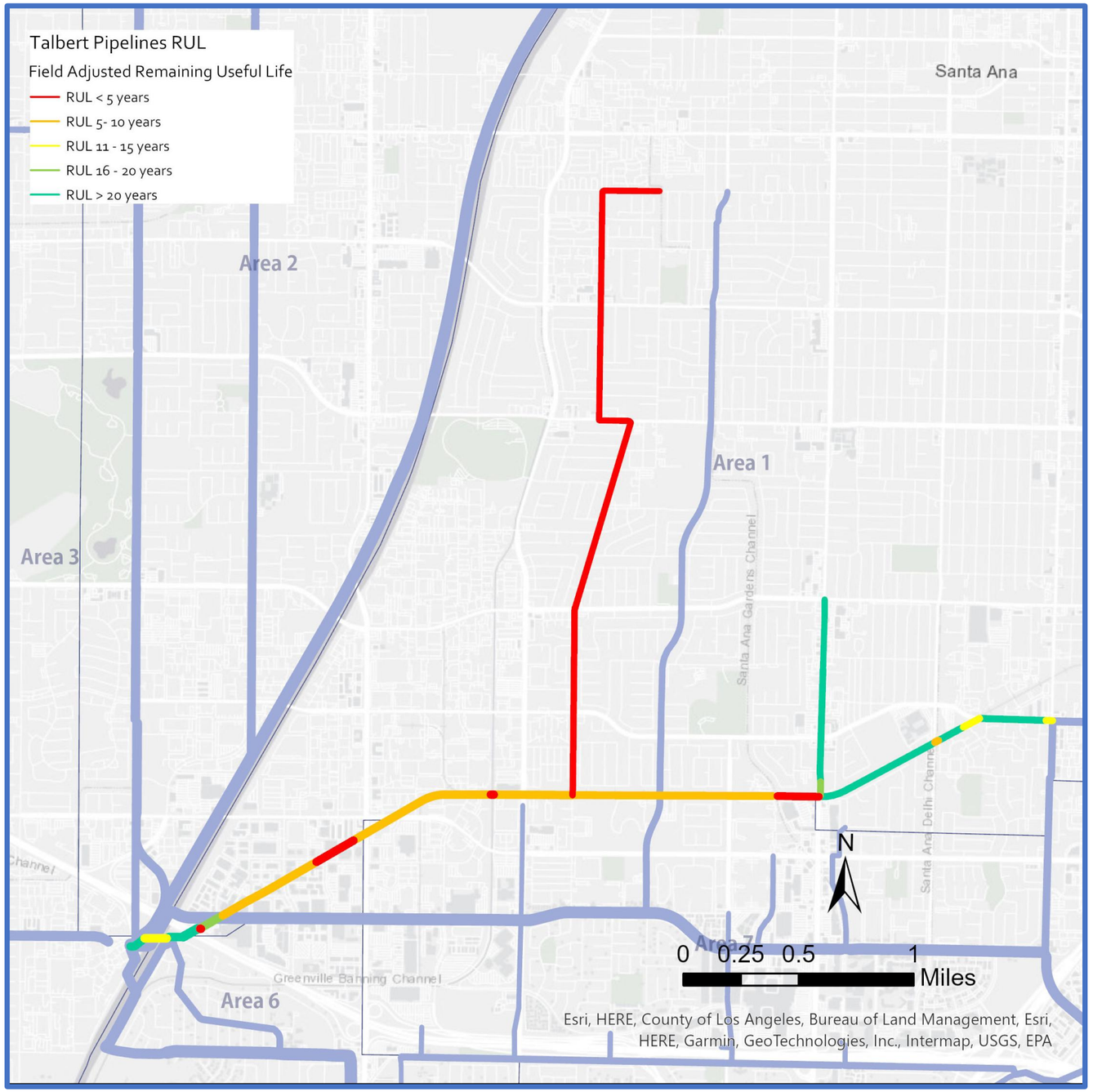
Project No.	Project Title	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
FE18-13	Redhill Relief Sewer Relocation at SR-55															
FRC-0007	Redhill Relief Sewer Liner Repair at SR-55															
7-69	North Tustin-Orange Sewer Rehabilitation															
X-129	South Coast Metro Sewer Rehabilitation															
X-066	Orange Park Acres Sewer Rehabilitation															
X-078	Inverted Siphon and Air Jumper Improvements															

Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – TALBERT TRUNKLINE

System Overview - Talbert Pipelines



Major Assets and Condition Information - Talbert Pipelines

Asset Type	Total Length (miles)	No. of Pipes	Average Age (years)	No. of Pipes with RUL Score of 5	No. of Pipes with RUL Score of 4
Vitrified Clay					
≤ 18" Ø	0.13	6	50	2	1
> 18" Ø	5.0	70	72	40	4
Reinforced Concrete					
42" Ø	1.1	10	57	1	9
> 42" Ø	2.1	29	55	3	17

Please see the comprehensive Acronyms and Abbreviations list for definitions.

ASSET MANAGEMENT SUMMARY – COLLECTION SYSTEM – TALBERT TRUNKLINE

Key Issues

Key Issues	Short-Term Actions and Recommendations	Long-Term Actions and Recommendations
Capacity – The Collections Capacity Evaluation Study completed in 2019 conducted a detailed capacity analysis to identify the location of capacity deficiencies during dry and PWWFs. During existing PWWFs, capacity issues were identified in the entire Greenville Trunkline. Project PS20-02 also confirmed hydraulic analysis results justified the need for a capital improvement project.	N/A	The entire Greenville Trunkline is proposed to be transferred to the City of Santa Ana and will no longer be an OC San asset.
Missing Air Jumpers – Five out of six inverted siphon locations in the Talbert Trunkline system do not have air jumpers.	N/A	Projects 1-23 and X-129 include constructing new air jumpers at three locations. The two remaining locations are included in the assets proposed to be transferred to the City of Santa Ana and will no longer be OC San assets.
Pipeline Fracturing – CCTV identified one VCP pipeline segment with significant fracturing.	N/A	Project X-129 will rehabilitate the fractured pipeline segment.
Reinforced Concrete Pipe Corrosion Damage – Most of the reinforced concrete pipe pipeline of the Talbert Trunkline between I-405 and Bristol Street has moderate to severe surface aggregate loss in areas not rehabilitated by past Project 1-17.	N/A	Project 1-23 will rehabilitate the pipeline segments with moderate to severe surface aggregate loss.

Current and Future Projects

Project No.	Project Title	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
1-23	Santa Ana Trunk Sewer Rehabilitation															
X-129	South Coast Metro Sewer Rehabilitation															

Please see the comprehensive Acronyms and Abbreviations list for definitions.

Types of Project Legend: **CIP – Planning** **CIP – Design** **CIP – Construction** **Maintenance Project**

3 Program Monitoring and Improvements

3.1 Program Monitoring

OC San has metrics to monitor and evaluate the Asset Management Program progress and realized benefits. The metrics have been chosen to directly relate to the Asset Management Program key objectives as follows:

- Take a proactive approach to repair, rehabilitate, and replace assets.
- Ensure assets are reliable and operating when needed.
- Minimize unplanned outages and equipment downtime.
- Manage risks associated with asset or service impairment through asset performance optimization.
- Develop cost-effective management strategies for the long term.
- Strive to implement world-class asset management strategies through continual improvement in OC San's asset management practices.

The following metrics and maintenance key performance indicators (KPIs) were chosen to demonstrate the effectiveness of the Asset Management Program and establish a baseline by which to gauge future performance:

- ***Proactive maintenance percent*** is the percent of PM as a total of all maintenance activities and demonstrates the effectiveness of the maintenance program (proactive versus reactive). The percent of PM includes both predictive and PM of the assets.
- ***Break-in percent*** illustrates the amount of emergency work (or reactive work) as a percent of total work in the process area. The break-in percent metric will give OC San personnel a better understanding of unplanned outages and the causes of equipment downtime. In Maximo®, the EAM system, this is described as a Level 50 priority. This is also described as break-in work that is deemed "emergency" or "extremely urgent" by staff.
- ***Maintenance costs and labor hours*** are presented by process area to illustrate the total resources devoted to maintaining the process areas. The methods used to calculate each metric are included in Appendix E. As the maintenance program moves toward a more proactive state, these proportionate costs and labor hours should decline over time.
- ***Collections level of service results*** for sanitary sewer overflow (SSO) per 100 miles of sewer, odor complaints in the collection system, and the CCTV inspection program demonstrate the effectiveness of the combined efforts of Collections Maintenance, the Regional Odor and Corrosion Control System (ROCCS) program, and the Gravity Collections Condition Assessment Program as they pertain to asset management.

The metric data were sourced from Maximo® from fiscal year databases for FY 2020–2021 through FY 2024–2025 and are included in Appendix E for reference.

3.2 Program Metrics

3.2.1 Proactive Maintenance Percent

The *proactive maintenance percent* is the proportion of PM tasks compared to the total amount of maintenance performed. An increase in proactive maintenance percent represents a shift from a reactive to a proactive maintenance program. Table 3-1 and Table 3-2 provide the annual average of the proactive maintenance percent for both Reclamation Plant No. 1 and Reclamation Plant No. 2 for the past 5 years to illustrate recent trends and changes. For data from earlier years, refer to previous annual AMPs. For PM goals, OC San typically aims for a higher proportion of maintenance activities to be preventive rather than corrective, often targeting around 70 to 80% preventive and 20 to 30% corrective, as these ratios tend to

optimize efficiency and cost effectiveness. OC San emphasizes a strong focus on PM to minimize unplanned corrective actions.

Many of the process areas at both plants were at or below 60%, indicating that improvement in this area is likely over time as proactive maintenance programs are optimized and older facilities are replaced.

Table 3-1. Proactive Maintenance Percent for Reclamation Plant No. 1

Process Area	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25
Preliminary	39%	25%	41%	20%	18%
Primary	32%	40%	37%	46%	29%
Interplant	82%	59%	34%	17%	35%
Activated Sludge	64%	56%	58%	50%	44%
Trickling Filters	53%	47%	46%	46%	28%
Digesters	46%	47%	42%	37%	23%
Solids Handling Facilities	42%	44%	60%	46%	35%
Central Power Generation	62%	62%	53%	57%	51%
Electrical Distribution	65%	77%	77%	80%	70%
Utilities	30%	26%	32%	20%	25%

Table 3-2. Proactive Maintenance Percent for Reclamation Plant No. 2

Process Area	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25
Preliminary	59%	55%	38%	36%	29%
Primary	35%	38%	36%	30%	26%
Activated Sludge	53%	50%	48%	43%	30%
Trickling Filters	57%	61%	49%	61%	62%
Effluent Disposal	35%	59%	39%	37%	25%
Digesters	55%	51%	47%	41%	33%
Solids Handling Facilities	53%	41%	49%	51%	35%
Central Power Generation	50%	67%	48%	48%	45%
Electrical Distribution	74%	75%	69%	64%	59%
Utilities	44%	43%	45%	35%	39%

At Plants No. 1 and No. 2, the proactive maintenance percent for the solids handling facility is showing an increasing trend over the past 5 years, demonstrating the effectiveness of the maintenance program. The proactive maintenance percent for preliminary treatment at Plant No. 1 is in the lower range because Project P1-105, Headworks Rehabilitation, is in construction. Corrective maintenance of high-rate mixing pumps at Plant 1 digesters increased in FY 2024-2025 compared to the previous fiscal year. Major service at the thickening centrifuge spare unit and Dewatering Centrifuge 2 replacement were among the noteworthy tasks at the solids handling facility. Activated Sludge Facility No. 1 is another aging facility at Plant No. 1 that had a higher percentage of corrective maintenance last year. At Plant 2, digesters, solids handling, and Activated Sludge facilities received an increased number of corrective maintenance activities.

Overall, the pump stations have proactive maintenance percentages over 50% as shown in Table 3-3. Decreases in percentages are indicative of emergency work that was required and will be reflected in the break-in percentage illustrated later in this chapter. A Street and Westside and Yorba Linda Pump Stations had a 25% decline in PM work last year. The main

issues at pump stations were recurring electrical and instrumentation problems resulting in the significant reduction in PM work.

Table 3-3. Proactive Maintenance Percent for Pump Stations

Pump Station	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25
A Street	85%	67%	60%	72%	47%
15th Street	85%	85%	84%	62%	73%
Lido	42%	72%	50%	38%	59%
Bay Bridge	34%	45%	37%	56%	45%
Rocky Point	84%	76%	69%	51%	47%
Bitter Point	76%	84%	74%	69%	62%
Seal Beach	65%	50%	61%	38%	25%
Westside	74%	80%	64%	73%	48%
Edinger	79%	74%	44%	69%	63%
Slater	86%	73%	78%	59%	60%
College	69%	86%	72%	64%	42%
Crystal Cove	91%	80%	90%	55%	69%
Yorba Linda	92%	99%	80%	82%	55%
Main Street	66%	76%	74%	69%	51%
MacArthur	88%	83%	61%	71%	50%

Table 3-4 demonstrates average percent of proactive work orders for the process areas at each plant (not including the interplant, effluent disposal, electrical, and utilities) and the pump stations. The data shows a slight decreasing trend in the annual average proactive work for both plants and pump stations.

Table 3-4. Annual Average Proactive Work for Process Areas

Proactive Work	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25
Plant No. 1	47%	53%	45%	43%	33%
Plant No. 2	49%	52%	45%	44%	37%
Pump Stations	74%	75%	67%	62%	53%

3.2.2 Break-in Percent

Break-in percent illustrates the amount of emergency work (or reactive work) as a percent of total maintenance work hours in the process area. Typically, the break-in percent metric should track closely with the inverse of the proactive maintenance percent because one is a measure of the proactive maintenance program and the other is a measure of unplanned outages or a reactive maintenance response (service requests with priority 40 and 50 levels). Success in break-in percentage is measured as a consistent downward trend over time. for Plant No. 1 are shown in Table 3-5 and break-in percentages for Plant No. 2 are shown in Table 3-6.

The Plant No. 1 Preliminary Treatment Area had a high break-in percent and a decrease in proactive maintenance due to Project P1-105 construction and equipment shutdown demands. Last year, the break-in percentage peaked at 37% in the Interplant area due to vandalism in the area south of Plant No. 1.

The Primary Treatment Area has shown relative stability in break-ins. Although there was a slight increase in FY 2024–2025 due to mechanical issues at basins in addition to a reclaimed line break and repairs and the aging odor control facility, the trend is generally stable. Utility break-ins also stayed above 30%, with the majority of issues associated with plant water and

reclaimed water line repairs. The remaining areas at Plant No. 1 have shown stable trends with overall numbers below 30%.

At Plant No. 2, the data shows an increase in break-in percent in areas with current construction projects and the need for shutdowns and tie-ins, including J-117B. All process areas had break-in percentages within the acceptable range of below 30% at Plant No. 2, with the Solids Handling and Effluent Disposal areas showing improving trends.

Table 3-5. Break-in Percent for Reclamation Plant No. 1

Process Area	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25
Preliminary	24%	43%	29%	55%	42%
Primary	23%	28%	38%	25%	27%
Interplant	7%	0%	61%	26%	37%
Activated Sludge	11%	8%	9%	15%	12%
Trickling Filters	18%	36%	21%	26%	24%
Digesters	27%	19%	24%	17%	20%
Solids Handling Facilities	24%	20%	16%	27%	22%
Central Power Generation	14%	23%	25%	20%	25%
Electrical Distribution	10%	6%	7%	13%	12%
Utilities	26%	21%	24%	36%	31%

Table 3-6. Break-in Percent for Reclamation Plant No. 2

Process Area	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25
Preliminary	11%	17%	25%	22%	24%
Primary	23%	26%	25%	22%	21%
Activated Sludge	10%	12%	16%	18%	29%
Trickling Filters	19%	22%	27%	13%	20%
Digesters	13%	12%	11%	26%	22%
Solids Handling Facilities	21%	26%	26%	28%	16%
Central Power Generation	20%	13%	9%	23%	25%
Electrical Distribution	14%	6%	15%	18%	18%
Utilities	15%	29%	16%	13%	16%
Effluent Disposal	15%	17%	24%	28%	13%

The pump station break-in percent is shown in Table 3-7. Lido, Seal Beach, Edinger, and College had the most break-ins during the last year mainly due to electrical, instrumentation, and alarm issues. Many aging pump stations, such as Bay Bridge, Edinger, and Slater, also had a high break-in percent that reflects their RUL and age. Bay Bridge and Edinger Pump Stations have replacement projects that are in progress, while Slater Pump Station rehabilitation is scheduled to start in a few years. The Seal Beach Pump Station Replacement Project is currently under construction and is demonstrating lower proactive maintenance activity and a higher break-in percentage. On average, 75% of the pump stations had a break-in percentage of less than 30%.

Table 3-7. Break-in Percent for Pump Stations

Pump Station	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25
A Street	6%	7%	31%	18%	29%
15th Street	6%	12%	11%	22%	19%
Lido	35%	24%	44%	38%	38%
Bay Bridge	31%	38%	31%	23%	27%
Rocky Point	7%	13%	19%	46%	29%
Bitter Point	14%	11%	25%	19%	22%
Seal Beach	20%	36%	25%	28%	40%
Westside	3%	14%	18%	16%	18%
Edinger	0%	22%	53%	27%	40%
Slater	3%	16%	13%	25%	23%
College	11%	12%	24%	35%	38%
Crystal Cove	6%	1%	4%	9%	9%
Yorba Linda	10%	0%	5%	19%	10%
Main Street	4%	1%	12%	21%	22%
MacArthur	11%	1%	18%	23%	19%

Table 3-8 shows an average break-in percentage for Plant Nos. 1 and 2 and the pump stations. On average, Plant No. 1 and pump stations had a higher break-in percentage than Plant No 2. This year's break-in percentages have remained consistent with last year's.

Table 3-8. Annual Average of Break-in Percentages for OC San Facilities

Process Area	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25
Plant No. 1	18%	21%	25%	26%	25%
Plant No. 2	16%	18%	19%	21%	20%
Pump Stations	11%	14%	22%	25%	25%

The trend in emergency call-back work for electrical and mechanical assets is shown on Figure 3-1 and Figure 3-2, respectively, and reflects the demand older assets can have on maintaining the reliability of a facility.

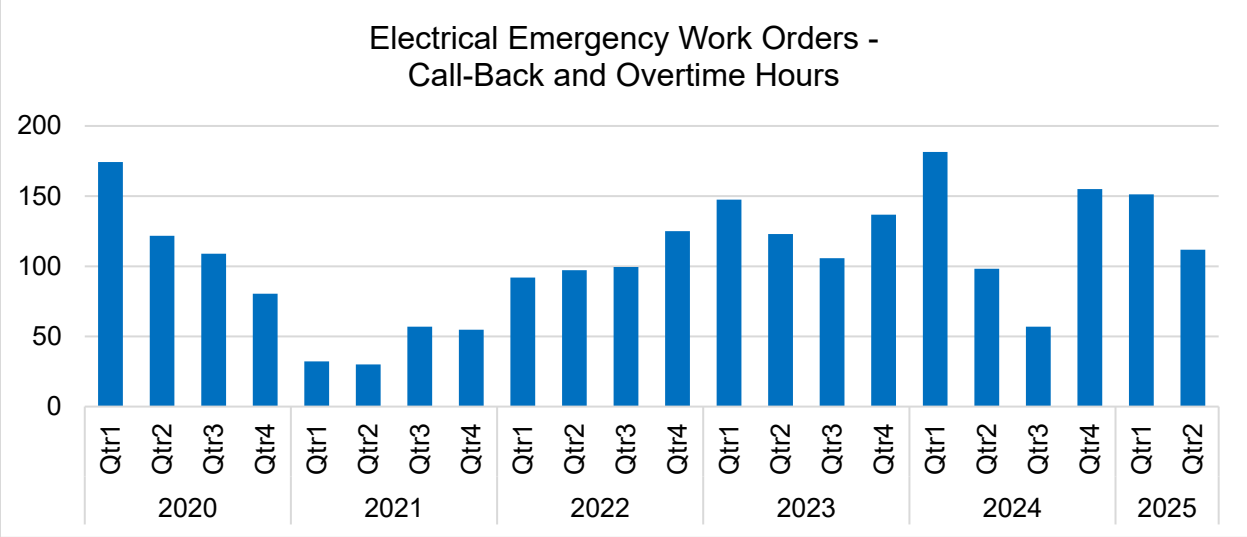


Figure 3-1. Electrical Emergency Work Orders

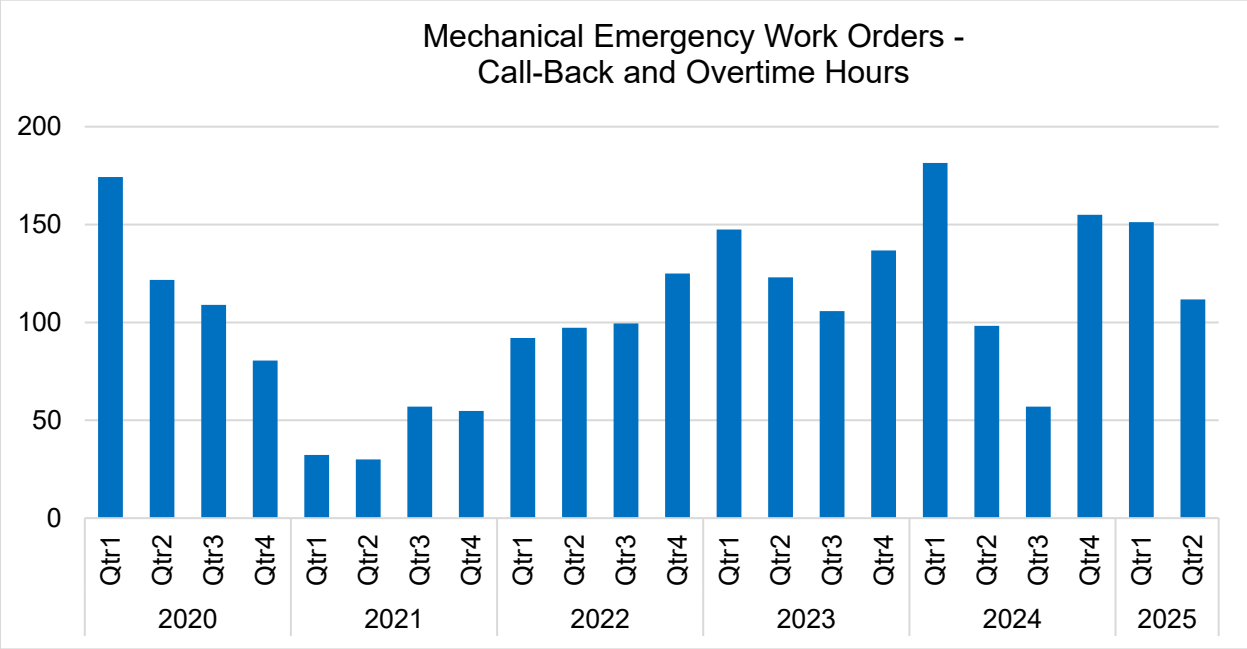


Figure 3-2. Mechanical Emergency Work Orders

The number of electrical “emergency” work orders and associated hours increased primarily due to electrical outages at the pump stations. The mechanical emergency work increased primarily due to Plant No. 1 headworks and primary treatment mechanical failures. Two major emergency works at Plant No. 1 were the issues associated with Power Building 2 12kV switchgear and headworks MSP-2 repairs. In FY 2024-2025, on average, about 50% of emergency mechanical call backs were to support issues at Plant No. 1, mainly at the solids handling facility to support centrifuges and the cake pump. Plant No. 2 also had the highest number of break-ins at the solids handling facility. Electrical break-in and emergency work is expected to trend down as more electrical projects are implemented to replace or upgrade aging assets (e.g., P1-105, FR1-0018).

3.2.3 Maintenance Costs and Labor Hours

OC San uses the *maintenance costs and labor hours* over time as trend indicators to indicate the number of resources devoted to reliably maintaining the process areas. Figure 3-3 shows maintenance costs (materials and services) per fiscal year, broken down by process area at Plant No. 1. Solids handling and digesters are consistently high-cost areas. Dewatering Centrifuge No. 3 bearing replacement, major service for the thickening centrifuge spare unit, and repairing digester mixing pumps were among the costliest maintenance activities.

The data indicate that there was a large increase in maintenance costs at the Plant No. 1 Primary Treatment Area in FY 2024–2025. Repair of Clarifier 8 and 28 chains and flights and Sedimentation Basin 16/18 sludge pump no. 1 were among the costliest maintenance activities.

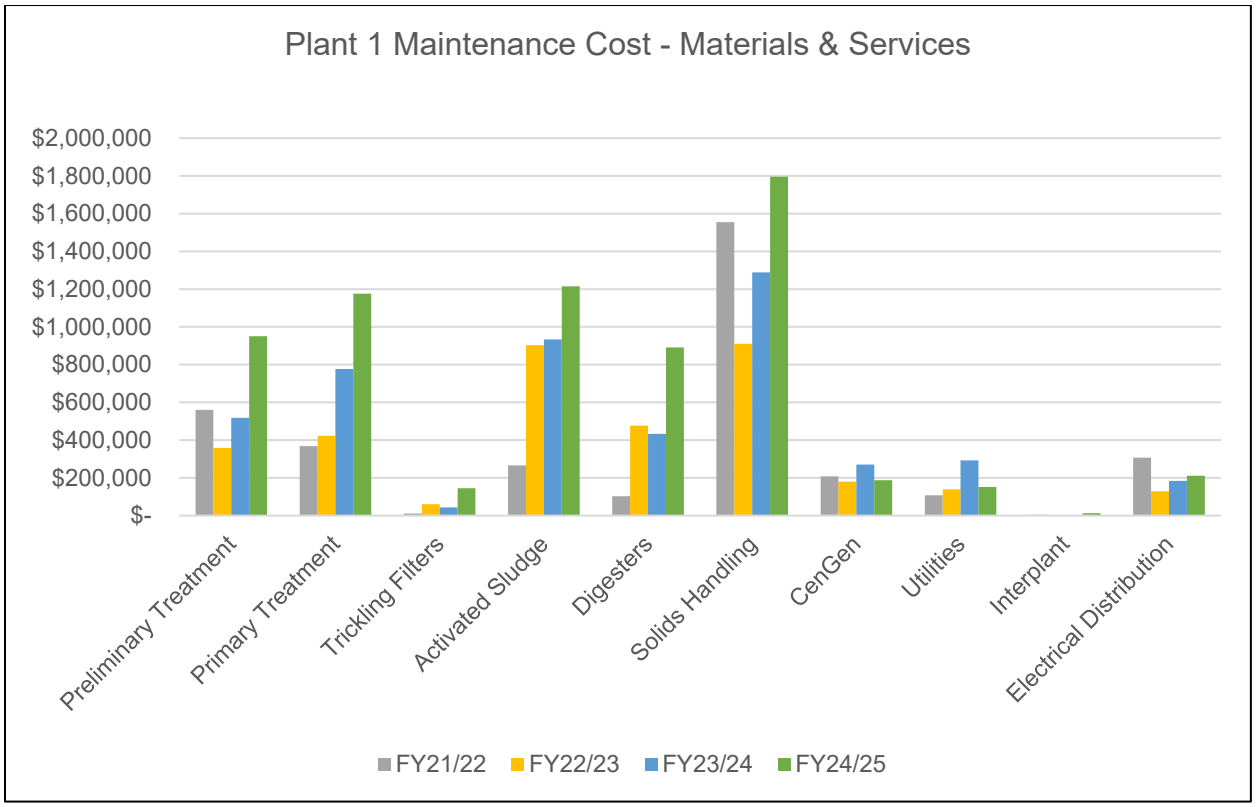


Figure 3-3. Graph of Maintenance Costs (Materials and Services) at Plant No. 1

Figure 3-4 shows Maintenance labor hours by fiscal year, broken down by process area at Plant No. 1. The labor hours are high at the Plant No. 1 secondary facility because of the older equipment at AS1, which is scheduled for rehabilitation under Project P1-140. The labor hours are also high at the solids handling facility because the thickening and dewatering process has more complex equipment that requires more staff to operate and maintain. In FY 2024–2025, Final Clarifier 18 chain and flight repair, Sunflower Pump 2 bearing replacement and Biotower No. 10 fan repair were among the most labor-intensive activities at Plant No. 1. Overall, the labor hour graph follows the same trend as material and services.

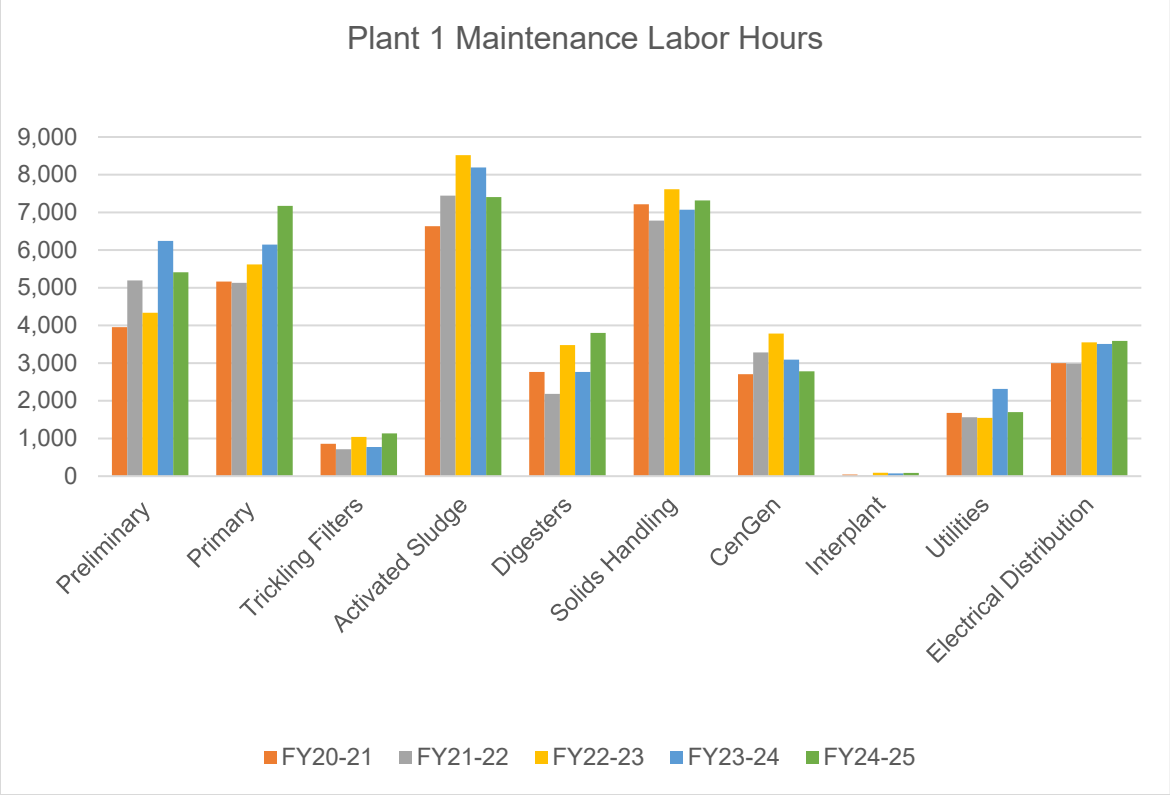


Figure 3-4. Graph of Maintenance Labor Hours at Plant No. 1

Figure 3-5 and Figure 3-6 present the maintenance costs (materials and services) and labor hours per fiscal year, broken down by process area at Plant No. 2. Maintenance costs at Plant No. 2 were significantly higher in FY 2024–2025 for the trickling filters, primarily due to the replacement of all the three (Trickling Filters A through C) center mast assemblies, which cost around $2.75 million in service charges. West RAS Pump 3 was also damaged last year from excessive vibration, and it was repaired in May 2025 with significant material costs and service charges.

In the activated sludge treatment area, Final Clarifier C flight repairs, Gas Compressor #2 service, Bar Screen #4 electrical issue repair, and Activated Sludge Reactors G and H oxygen supply valve replacement were among the most labor-intensive maintenance activities.

At the trickling filter area, labor hours remain relatively low compared to other areas, which indicates a less labor-intensive process with fewer mechanical components.

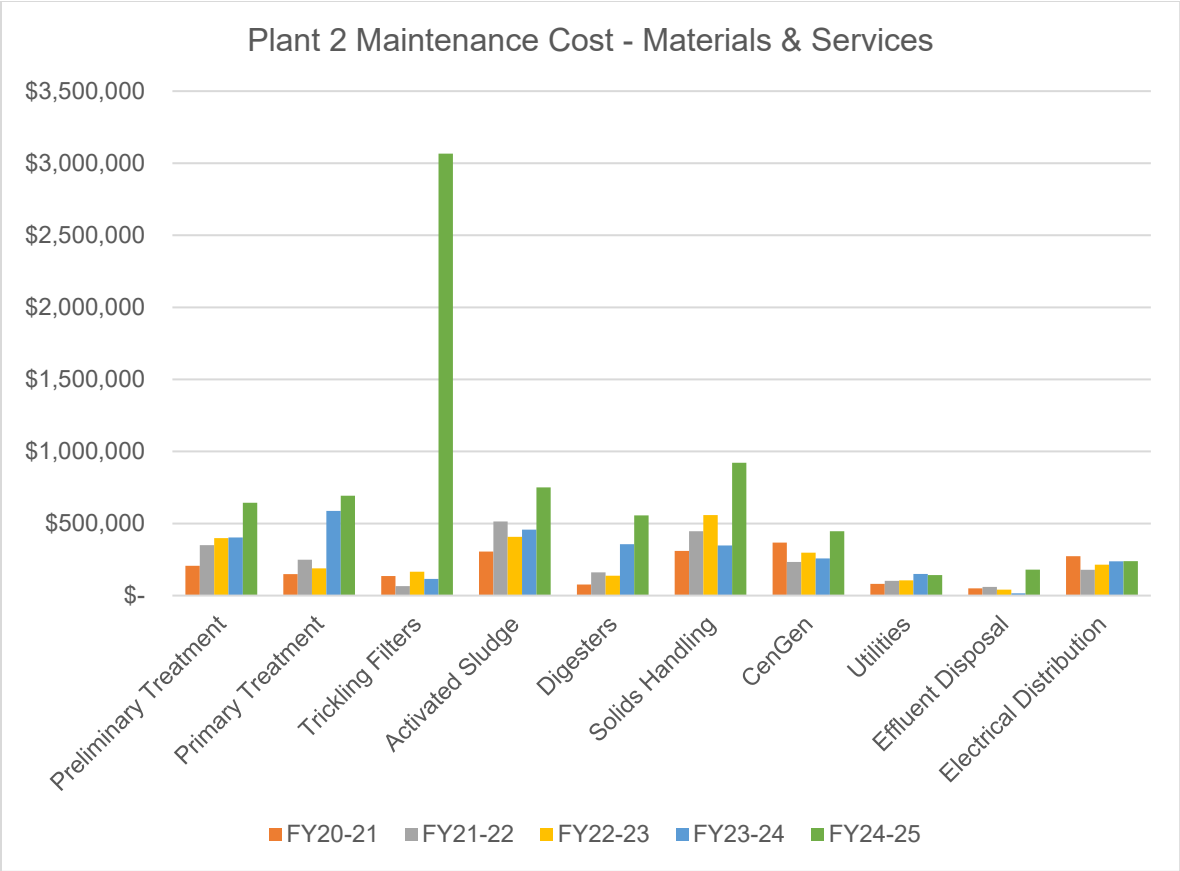


Figure 3-5. Graph of Maintenance Costs (Materials and Services) at Plant No. 2

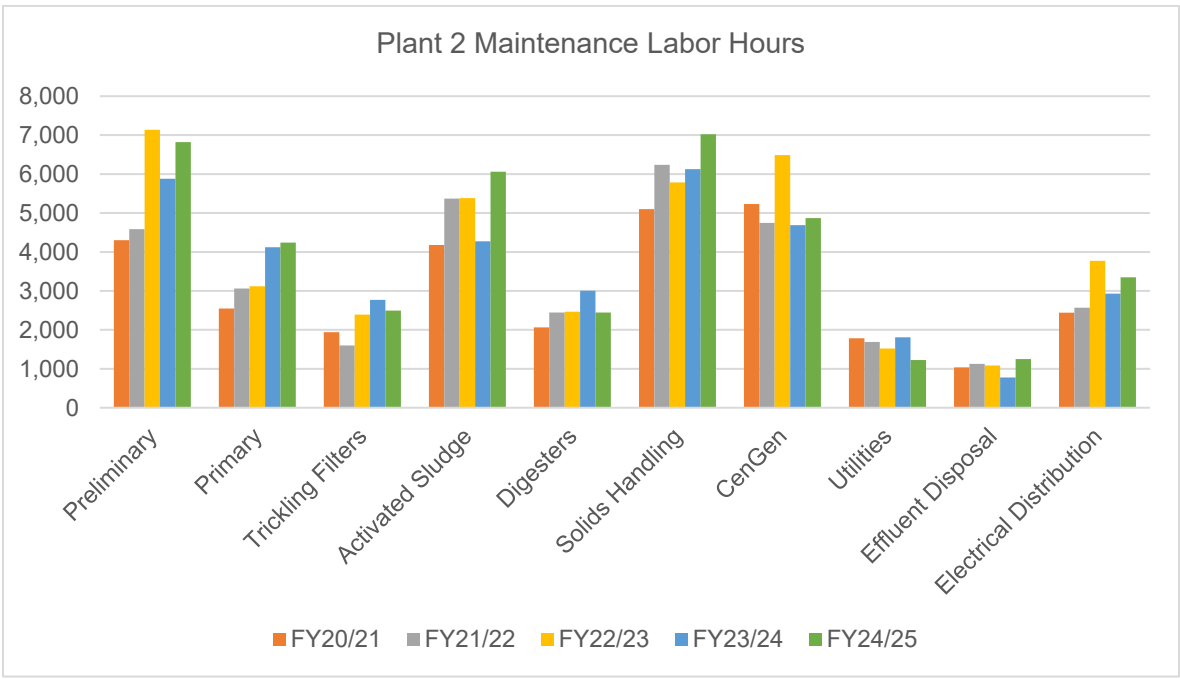


Figure 3-6. Graph of Maintenance Labor Hours at Plant No. 2

Maintenance labor hours and costs for the pump stations are included in Figure 3-7 and Figure 3-8. Significant increases in labor and material costs occurred at the Bay Bridge, Bitter Point, and A Street Pump Stations. At Bay Bridge, MSP-2 was repaired, resulting more than $102,000 in total repair cost (materials and services). In addition, MSP-4 was replaced, with more than $25,000 in material costs. Currently, Project 5-67, Bay Bridge Pump Station Replacement, is under construction to replace the existing pump station, which is one of OC San's oldest pump stations. The new PLC rack installation at Bitter Point was the costliest Work Order in FY 2024–25, totaling $71,000. The pump station also shows high labor hours associated with MSP-5 repairs (Figure 3-8).

At the A Street Pump Station, MSP-1 was removed and sent to the rebuild shop for repair, which resulted in a substantial rise in maintenance costs. Figure 3-8 shows an increase in labor hours at the Slater Pump Station compared to last year, attributed to the MSP-2 VFD failure and repair.

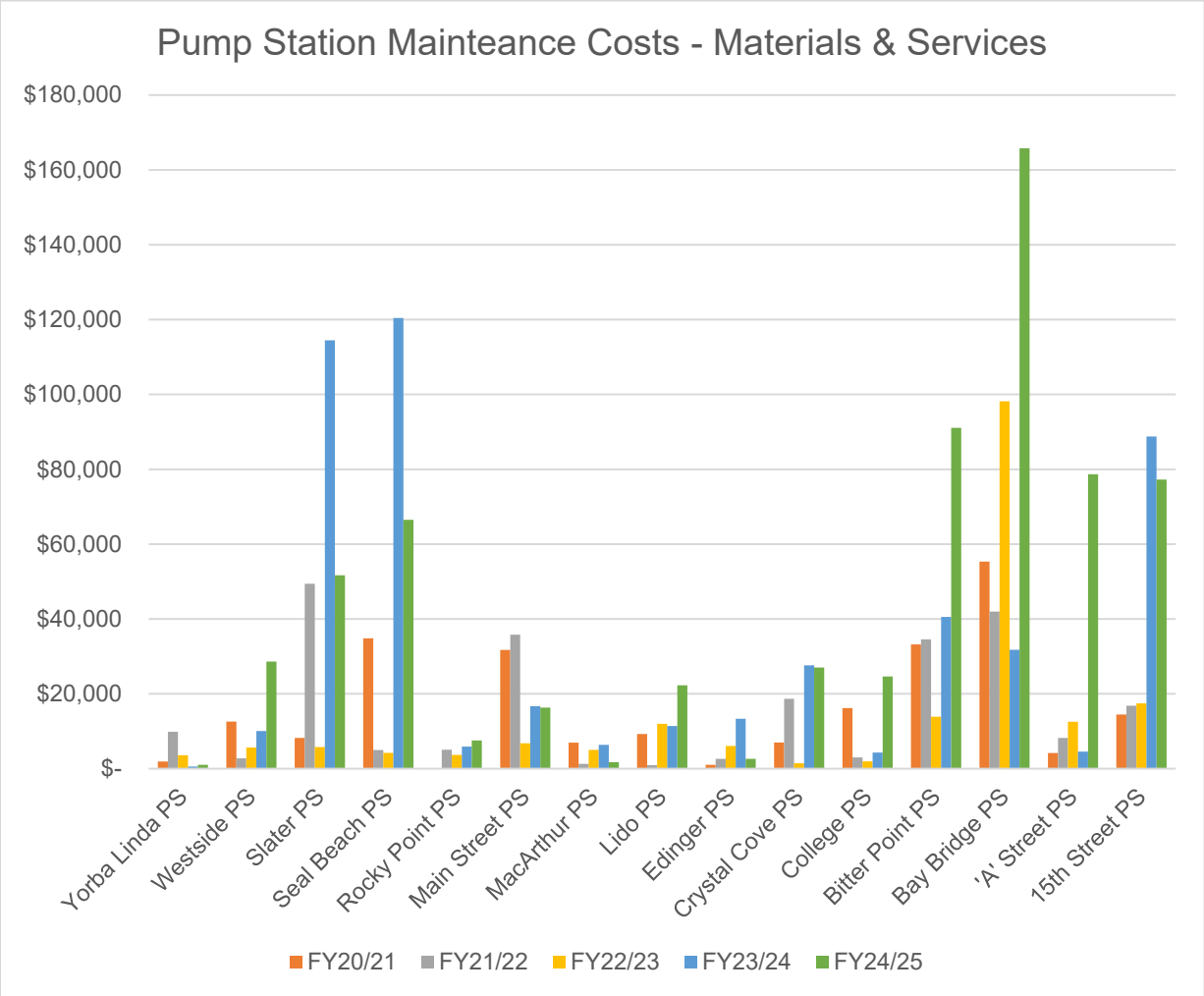


Figure 3-7. Graph of Pump Station Maintenance Costs (Materials and Services)

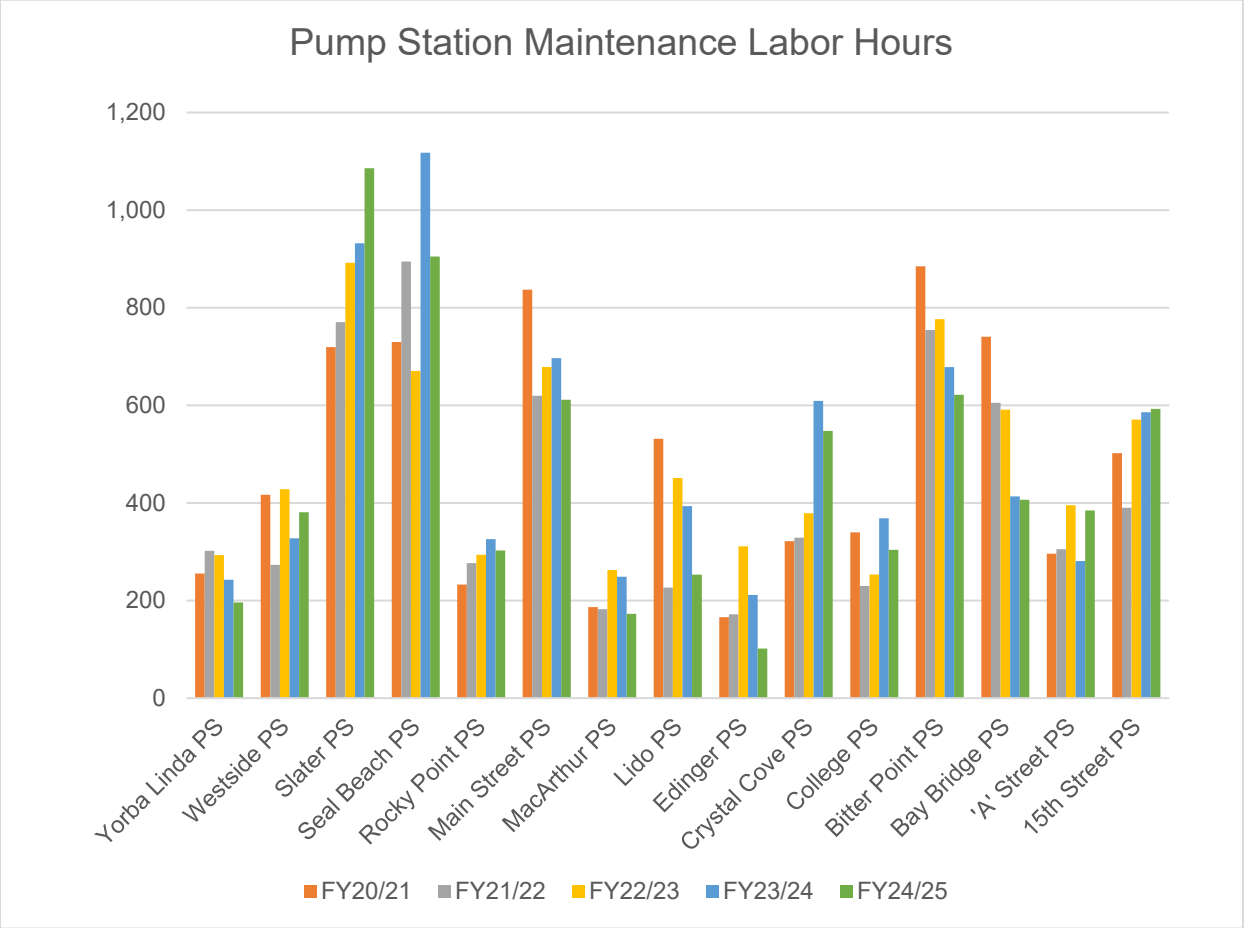


Figure 3-8. Graph of Pump Station Maintenance Labor Hours

3.2.4 Collections Level of Service Results

OC San monitors several levels of service goals pertaining to the collection system as a whole, but a select subset are relevant to the activities, goals, and effectiveness of asset management. This subset of *collections level of service* targets and results for the last 5 fiscal years are presented in Table 3-9. The level of service goals for SSO and odor complaints were achieved in FY 2024–2025, but the level of service goals for CCTV inspections were not achieved due to unforeseen challenges as explained below.

SSO events are primarily caused by debris accumulation from daily wastewater flows as well as root intrusion. Regular maintenance activities of Collections to clean sewers and the CCTV program serve to identify potential SSOs and prevent them from occurring. Also refer to Section 3.4.2.1 for details on the root control blanket contract for further PM efforts. In FY 2024–2025, there were zero reported SSOs in the collection system.

Nuisance odors are actively managed by the ROCCS program through regular chemical dosing and caustic dumps at key locations, H_2S monitoring, etc. The number of odor complaints are monitored to determine the effectiveness of chemical dosing, flow diversions, and other methods to mitigate nuisance odors and prevent resulting corrosion damage to OC San's Collection assets. Given the precision and effectiveness of the ROCCS program, the number of odor complaints has been below the level of service target for the past 5 fiscal years.

The condition of assets in the collection system are monitored via the CCTV program, which inspects all gravity sewer and manhole assets every 5 years. OC San manages three CCTV

contractors that provide inspection media and report to OC San with asset details as well as defects discovered per National Association of Sewer Service Companies (NASSCO) standards. Since the unexpected departure of its primary pipeline and manhole CCTV contractor in 2024, OC San has restored the full capacity of its pipeline CCTV program and met the level of service goal for CCTV pipeline inspections for FY 2024–2025. OC San could not meet the level of service goal for manhole CCTV inspections for FY 2024–2025, but the procurement for a new primary manhole CCTV contractor was completed in 2025. Therefore, OC San is ramping up manhole CCTV inspections to meet the level of service goal for FY 2025–2026 and beyond.

In November 2020, OC San started conducting routine inspections of the collection system manholes. OC San has been collating all manhole CCTV inspection data into the Asset Management Program Info360 Asset software for further evaluation and to continue building a comprehensive database of CCTV inspection data. Now that about 2,806 (64%) of OC San's manholes have been inspected since the start of the manhole CCTV program, OC San can more accurately define future gravity sewer projects for manhole rehabilitation and replacement.

Table 3-9. Collections Level of Service Results

Description	Level of Service Target	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25
SSO per 100 miles	< 2.1	1.3	0.3	0.3	0	0
Number of Odor Complaints	12	7	4	11	10	9
Miles of Pipeline CCTV Inspections	70	60	71.9	69.1	38.4	71.1
Number of Manhole CCTV Inspections	880	465	813	948	373	246

3.3 Maintenance Planning

OC San uses Maximo® as the computerized maintenance management system. All maintenance-related activities are stored in Maximo®. In short, the information in Maximo® makes up OC San's Maintenance Plan. Maintenance planning primarily consists of PM and PdM work orders. Currently, OC San proactively maintains over 66,000 assets stored in Maximo®. This includes non-process-related assets such as HVAC equipment, lighting, mobile equipment, etc. For the assets associated with process and treatment, there are typically approximately 7,400 active PM work orders, and on average, 285 of those PM work orders are related to PdM activities. A current summary and breakdown of the PMs and PdMs are shown on Figure 3-9.

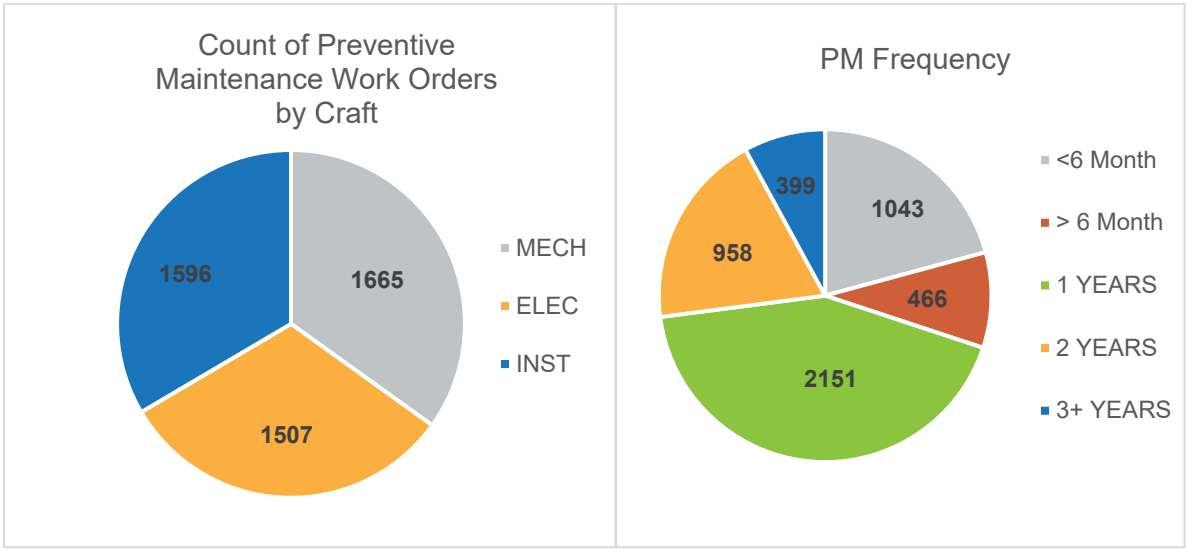


Figure 3-9. PM Workorder Breakdown by Both Craft and Frequency

3.3.1 Projected Maintenance Costs

The projected maintenance costs for the next fiscal year are shown in Table 3-10. This accounts for materials and services only but is inclusive of both reclamation plants and the collection system. For historical maintenance expenditures, please refer to Chapter 4.

Table 3-10. Projected Maintenance Costs Next Fiscal Year

	FY 2024–2025
Projected Maintenance Costs	$23.07 million

3.4 Asset Management Program Accomplishments

Another way to measure Asset Management Program performance and effectiveness is by exploring the accomplishments. The accomplishments identified in the following sections are important because they focus on both long-term planning and accomplishments that helped extend the useful life of critical assets, increase reliability, and reduce corrective maintenance and break-ins, allowing OC San to meet the key objectives of the program.

3.4.1 Condition Assessment Program

Condition assessments are a key component of the Asset Management Program because they provide vital information with respect to the condition and life expectancy of critical plant and collections process structures and equipment. Condition assessments are planned in advance and often conducted during scheduled maintenance activities. The Asset Management Team completed approximately 38 different condition assessments during the last fiscal year, spending nearly $1.1 million using an outside consultant and contractor. Figure 3-10 provides annual expenditures on the two condition assessment contracts for the last 5 fiscal years. The overall expenditures show an increasing trend, illustrating Asset Management's dedication to knowing the current condition of OC San's major assets and performing incidental repairs following inspections to increase asset life and reliability.

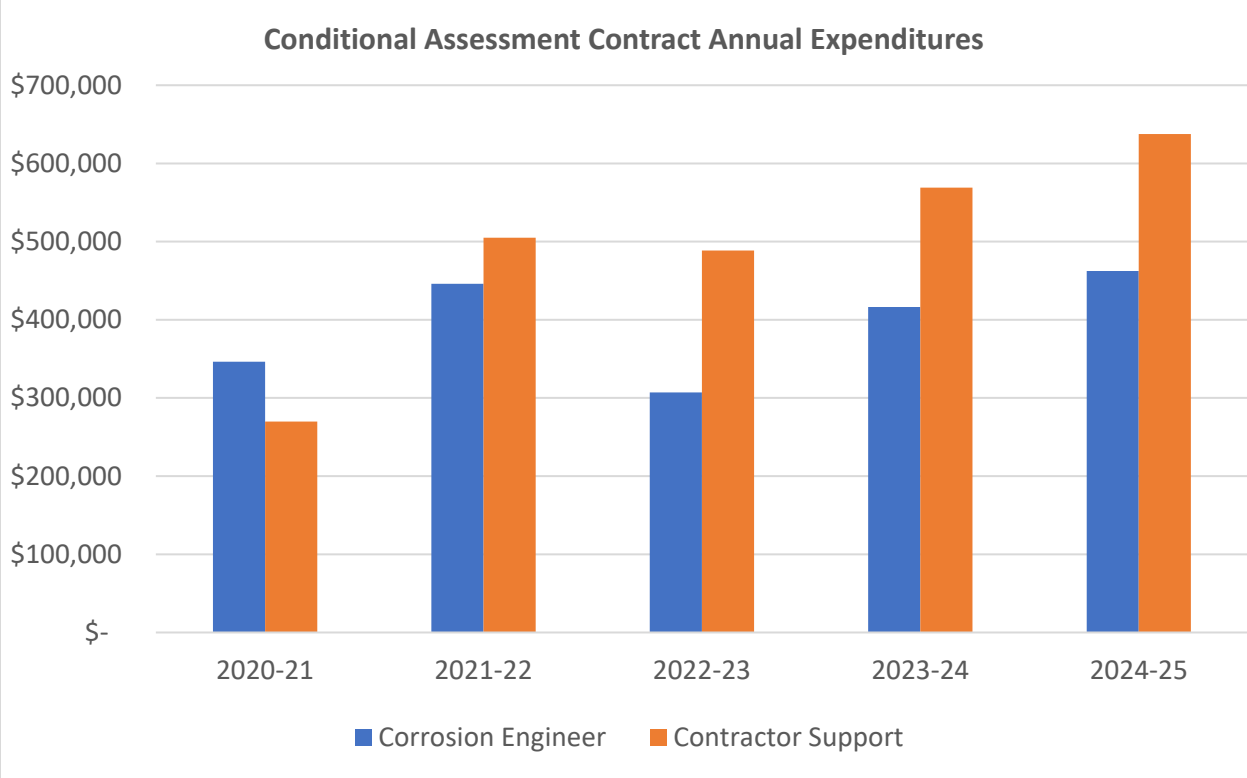


Figure 3-10. Condition Assessment Contract Expenditures

Condition assessments identify deficiencies and the general condition of the assets, but more importantly provide recommendations for repairs or replacement and general timing of rehabilitation/replacement projects. Some condition assessments included incidental repairs following the assessment by the contractor that extended the useful life of the facility. The following are some critical condition assessments completed in the last fiscal year:

- A condition assessment was completed on the West Primary Effluent Pipe at Plant No. 1 to investigate the high level at the effluent channel and effluent launder weirs submergence during plant peak flow. Failed pipe joint liners were found throughout the entire length of the 108-inch pipe. In a few locations, groundwater was observed to be seeping in through the joint, indicating that the joints have failed at these locations. The pipe was returned to service to alleviate the additional flow being diverted to Plant No. 2 and to bring AS2 back online. However, an expedited repair project is being developed to repair the failed joints, and a future capital project will be developed to fully rehabilitate both primary effluent pipes.
- Condition assessments were completed on the Primary Clarifiers J, K, L, M, N, O, P, and Q at Plant No. 2 to assess the condition of structural and mechanical components. Primary Clarifiers H and I will be assessed by fall 2025 for the completion of condition assessments of all B and C side primary clarifiers. These assessments included draining and cleaning of both basins and confined space entry to obtain photographs, take measurements, and collect other assessment data. The assessment identified deficiencies in the clarifiers and provided recommendations on timing to address the issues in the short-term or long-term. Additionally, the OEM of the circular drives provided visual and audible assessments at each primary clarifier with recommended actions to maintain operability. Asset Management also coordinated the effort with support from Maintenance Reliability to obtain drive oil samples for lab analysis. The results provided additional condition data and additional recommendations for drive maintenance.

- Condition assessments on anaerobic digesters were completed during the scheduled maintenance cleaning cycle to evaluate and extend the life of the assets when deficiencies are discovered. The condition assessment included confined space entry, corrosion assessment, sludge line cleaning and CCTV, concrete core sampling, and incidental repairs. This year, two digesters were cleaned and assessed, including Digesters 11 and 12 at Plant No. 1. Incidental repairs were completed by the condition assessment contractor and Maintenance staff. Gas balance lines and digested sludge conveyance lines at Plants No. 1 and 2 were also cleaned and assessed to help identify and plan any necessary future rehabilitation projects.
- Condition assessments on DAFT A and D at Plant No. 2 were completed during a scheduled project and maintenance shutdown. Severe corrosion was found on the moving mechanisms. The corroded mechanisms were fully coated through contracts with the on-call coating contractor, managed under the Asset Management Team. This approach avoided the need for equipment replacement, resulting in significant cost savings. The team plans to complete work on DAFT B and C next year.
- Condition assessments of Trickling Filter Clarifiers B and D at Plant No. 2 were completed following planned preventive maintenance work. Broken parts and structural damage were identified on the clarifier mechanisms and walkways. The damage was repaired through Maintenance Projects with support from the on-call structural engineer. Following the clarifier assessments, the downstream RSS Pump Station B was also assessed to evaluate pump damage, plan overhauls, and prepare for spare pump procurement. The team will continue work to complete the remaining four clarifiers.
- A condition assessment of the dewatering odor control biofilters at Plant No. 2 was completed and found the media plugged and in need of replacement. A media replacement project has been prepared to restore proper system function.
- A condition assessment of the force mains at the Slater Pump Station, which was constructed in 1998, was conducted in August 2025 and found corrosion and coating failure from a visual inspection within the pipes, confirming the aging condition of the force mains. The pump station and force mains are set to be rehabilitated under Project 11-34, with construction to be completed in 2033.

3.4.2 Collection System Assets

OC San pump stations, force mains, and gravity sewer system are vital assets for conveying flow safely to the treatment plants. The Asset Management Program is continuously evaluating ways to improve the resiliency and reliability of the system while maintaining the level of service in all flow conditions. Some of the collection system initiatives and accomplishments are identified in the following sections.

3.4.2.1 Proactively Monitoring and Managing Operational and Defect Issues

In the gravity collection system, there are some severe operational and structural defects that are isolated from current and future projects. Examples of isolated and severe operational defects include heavy root intrusion, infiltration runners and gushers, and large calcified deposits. Root intrusion is the main cause of SSOs in many sanitary sewer systems, and heavy infiltration over long periods of time can compromise soil support outside of the sewer pipe throughout the pipe zone, leading to potential structural defects.

Similarly, infiltration can also lead to the development of large calcified deposits that may block flows and prevent debris from passing downstream. Examples of isolated and severe structural defects include single or heavily clustered segments of broken pipe and holes with voids and/or soil visible. Broken pipe and holes indicate a higher likelihood of failure because they are precursors to structural deformation and eventual collapse. Rather than create only Small Projects to address current and future isolated and severe asset issues, cost-effective and proactive maintenance-based approaches are being evaluated as follows:

- **Root Control:** Blanket contract to strategically apply herbicide with a foaming agent into select sewers for root control on an annual basis. The active ingredient in the root control treatment kills roots in the sewer (without killing the plant they originate from) and prevents regrowth typically for 2 to 3 years.
- **Infiltration Control:** Group isolated and severe infiltration into individual work packages for execution by Maintenance on-call contractors. Utilize the industrial cleaning Maintenance contract to remove large calcified deposits as needed to prevent obstructions prior to rehabilitation. OC San is finalizing the scope of work packages and priority.
- **Isolated Structural Defect Repairs:** Group isolated and severe structural defects into individual work packages for execution by Maintenance on-call contractors. OC San is finalizing scope of work packages and priority.

Although the CCTV program inspects all collection assets every 5 years, there are limitations to the condition data that can be collected with CCTV equipment. Large-diameter sewers (greater than 42 inches in diameter) are not regularly cleaned, and OC San does not have sufficient knowledge on existing debris buildup because CCTV cannot capture debris below the waterline. Therefore, the risk for an SSO due to debris accumulation or a high debris and ragging event at the treatment plant headworks facilities could be higher than historical system performance would suggest. In response, OC San performed sonar inspections of over 5 miles of large-diameter sewers and inverted siphons to quantify debris and sediment and validated the cleansing state of sewers suspected to be non-cleansing; all sonar inspections were completed in June 2023.

For the next steps, OC San is starting a new procurement to create a new blanket contract for cleaning and sonar inspection of inverted siphons and large-diameter pipelines. The work includes pre-cleaning and post-cleaning sonar inspections to validate the effectiveness of each cleaning. NTP is expected to be issued in early 2026. Additionally, a draft large-diameter cleaning program for inverted siphons and gravity sewers was completed in early 2024. This list of recommended large-diameter inverted siphons and gravity sewers to regularly clean will be finalized in the future.

While many of these proactive activities increase current costs and potentially identify more defects, they result in better awareness of the true condition of OC San's system, which allows for a more planned approach to maintaining assets. This will foster a more cost-effective CIP program while also reducing the risk of failures from unknown conditions.

3.4.2.2 Improving Collections Asset Management Workflow with Info360 Asset

OC San contracted with Autodesk in 2023 to upgrade its asset management software for gravity sewers from Info Asset Planner to Info360 Asset (Info360). Autodesk imported available CCTV inspection data and geographic information system (GIS) datasets into Info360 Asset and created basic templates for risk modeling and decision trees. After the implementation project was completed in 2024, OC San imported video and images associated with each historical inspection to further centralize CCTV data.

With the risk modeling features, OC San updated its Likelihood of Failure (LoF) model to balance incidence and severity of defects found during inspections, as well as incorporate soil class spatial data. A new LoF to RUL model was also created in the software by updating the mathematical model to revise RUL grade boundaries and creating a decision tree in Info360. Additionally, using the additional GIS spatial data for major transportation corridors, public buildings, OC San facilities, stormwater infrastructure, waterways, and pipeline diameter, a draft Consequence of Failure model was created to enable risk modeling with the software. Lastly, a preliminary calibration was performed for gravity sewer assets by performing multiple risk model runs with different risk calculation methods, formulas, and weights applied.

In 2025, OC San began to use the results of Info360 LoF to RUL and risk models to update RUL scoring for gravity sewer assets with new inspections. The improved asset management workflow consists of the following steps:

- CCTV contractor uploads new NASSCO standard exchange database, videos, and images into Info360 Asset for review.
- PDF reports are provided separately via OneDrive. Since these reports contain the same information as the digital reports in Info360 Asset, they do not need to be imported.
- OC San reviews and approves submittals in Info360 Asset. Errors in submittals are returned to the CCTV contractor for correction prior to approval.
- OC San re-runs risk model and RUL decision tree model. The risk model results directly feed into the RUL decision tree.
- OC San exports RUL decision tree results and compares them with scoring in the Asset Registry. Any discrepancies in RUL scoring require additional engineering review to resolve.
- To prioritize projects with equivalent RULs, OC San exports risk model results and applies the corresponding risk scores to assets within projects. These scores are then used to prioritize and rank projects and to update the AMP.

3.4.2.3 Proactively Addressing Collection Pump Station Challenges

Pump station reliability is critical to conveying wastewater to the treatment plants when gravity flow is not an option. In the past, emergency break-in work has been required due to the failure of critical assets such as isolation valves at some of the pump stations. Project FRC-0017 is currently going out to bid and will be replacing various valves at Slater Pump Station. Project FRC-0018 is currently in design and will be replacing various valves at Lido, Crystal Cove, A Street, and 15th Street Pump Stations and replacing the wet well lining at A Street and 15th Street Pump Stations. The timing of these projects considers risk and criticality to prevent emergency work.

Pump station force mains are challenging to maintain and inspect since they operate under pressure and are located underground. The force mains typically have limited access and require significant supplemental services to perform a safe and effective condition assessment (i.e., isolation and dewatering, temporary modification of pump station operations, excavation for access, etc.). Consequently, the Asset Management Team has implemented a more robust program for force main inspections in which all force mains will be inspected on a predictable and recurring schedule. Please refer to the Force Main Summary and Inspection Plan in Chapter 2, Collection System Pump Station and Force Main Asset Management Summaries, for more information. In 2025, the Asset Management Team worked with Collections and contractors to plan and perform the inspection of force mains at Slater Pump Station. Force main inspections at 15th Street and College Pump Stations are planned for the upcoming 2026 year. The Asset Management Team will take lessons learned from the recent inspections to continue planning inspections at other locations, which may pose challenges that require unique or innovative inspection methods.

3.4.3 Treatment Plant Projects and Planning Studies

A major focus of the Asset Management Program is streamlining the replacement or repair of critical assets to extend RUL ahead of planned CIP projects. The Asset Management Team works in tandem with O&M to identify and create projects, provide construction bid documents, and manage project implementation of some Maintenance Projects. In addition, the Asset Management Team will take on important planning studies that look at ways to increase treatment reliability and safety and be a good steward of the environment. Here are some projects that were driven and led by the Asset Management and Maintenance Teams:

- Several of OC San's critical pumping systems are equipped with VFDs that have become obsolete and can no longer be maintained properly. The Asset Management Team is tracking all major VFDs and working on creating a VFD replacement program to streamline replacement. Currently, Projects FE19-08, FE24-11, FR1-0011, and MPC-004 are in construction, and future CIP projects will replace obsolete VFDs at various locations at Plant Nos. 1 and 2 and the pump stations.
- MP1-003, WSSPS Pump Replacement at Plant No. 1, currently in commissioning phase, replaced pump no. 5 with a chopper pump to alleviate ragging and grit issues that Maintenance has been facing at this pump station during the last few years. Once the pump is up and running, it will be tested and observed for 6 to 9 months. If deemed successful, the two remaining pumps will be replaced with chopper pumps as well via a separate project.
- Main Sewage Pump No. 4 (MSP-4) at Plant No. 1, originally installed in 1988, has been in operation for nearly 40 years and is approaching the end of its useful life. The pump is scheduled to be replaced by CIP Project P1-105, currently in construction, within the next couple of years. During the 2024 dry season, it was removed and reinstalled to facilitate ongoing construction work in the headworks area, including the rehabilitation of the intake and discharge piping. Following its reinstallation, the pump has experienced increased vibration and bearing issues, necessitating its replacement with an available warehouse spare. The pump replacement is currently in progress and is contingent upon the completion of the intake pipe flange repair under P1-105.
- Project PS22-02, On-site Oxygen Generation Feasibility Study at Plant No. 2, was completed in 2024 to evaluate whether an on-site oxygen generation system should be implemented to provide better oxygen supply reliability to meet the High-Purity Oxygen-Activated Sludge Plant demands in the next 20 years. Currently, OC San uses LOX delivery and storage, but there was a shortage of LOX during the pandemic and the cost of LOX is rising significantly. Based on the PS22-02 recommendations, P2-142 Oxygen Gas Generation Facility at Plant No. 2 was developed to install a safe and reliable on-site oxygen generation system.
- The A-Side Primary Clarifiers at Plant No. 2, originally constructed in the 1960s, are unreliable due to age and deterioration or failure of existing components such as the basin structure, geodesic dome, baffle components, and rotating mechanisms. Several Maintenance Projects were completed to address these issues and provide short-term reliability of the existing A-Side Primary Clarifiers until they are replaced by Project P2-98A, which is under construction with an estimated completion in 2027. Project FE23-09 will provide rehabilitation of corroded sections of the rotating mechanisms and feed well for Primary Clarifiers F and G. The design was fast tracked, and construction is in progress.
- The grit basins at Plant No. 2 have experienced multiple power and control cable failures that put the entire grit basin system at risk of becoming nonoperational. An urgent project, MP2-013, along with multiple work orders by Maintenance, were executed to have temporary cables installed above ground to bring the grit equipment back online. Project P2-141 has also been fast-tracked to replace the cables permanently.
- MP2-018 is currently in progress to provide needed repairs and replacement of parts on the spare main sewage pump and MSP-1. A future similar project will be initiated after the completion of MP2-018 for MSP-5 and MSP-6. MSP-7 is currently being repaired under a Maintenance work order.
- MP2-023 is currently in construction to replace the circular drive equipment for Primary Clarifier N at Plant No. 2. Maintenance reported abnormal noise produced by the drive previously, and Asset Management developed a scope to remove and replace the obsolete drive with input and support from the OEM.
- P1 and P2 Digester Gas Dryer Replacement Project, FE23-01, will replace the refrigerated digester gas drying systems at both plants to ensure that high-quality

compressed digester gas is delivered to the CenGen engines for reliable energy production. These dryers, located downstream of the digester gas compressors, are essential for lowering the dew point and removing moisture from the gas. As a critical part of the overall gas handling system, they play a key role in the reliable operation of both the Interplant gas pipeline and the engine systems. Construction of FE23-01 began in FY 2024–2025. Following the completion of FE23-01 construction and the design phase of J-124 Digester Gas Facilities Rehabilitation Project, the design of Project FE24-02 design will begin. Project FE24-02 will focus on the replacing the chilled water heat exchanger and moisture separator at Plant No. 1 as well as upgrading the instrumentation on the gas dryer skids and the digester gas headers at both plants. These upgrades are planned to take place after the successful completion of FE23-01 and J-124, ensuring proper sequencing and seamless integration of the new systems into plant operations and maintaining continuous, reliable performance.

- Plant No. 2 PEPS pumps are aging, and a previous wet well condition assessment identified corrosion in the pump discharge line. A maintenance project successfully completed an overhaul of Pump #4 in November 2022. MP2-0010 is in progress to overhaul the remaining three pumps. The overhaul of Pump #3, including discharge pipe replacement and additional repair work on Pump #4, was completed in 2025. The remaining work on Pumps #1 and #2 will be completed over the next 2 years.
- MP2-015, Centrifuge Dewatering Lubrication Ring Pump Replacement at Plant No. 2, was developed as a solution to replace the unreliable and hard-to-obtain pump parts, and the project has moved forward into the construction phase and skid replacement. This is a critical function that provides lubrication water to reduce pressure in the high-pressure biosolids cake conveyance pipe from the centrifuge dewatering process to the cake storage silos.
- Two Maintenance Projects were completed to coat the corroded DAFT A and D moving mechanisms at Plant No. 2.
- MP2-031, Trickling Filter Clarifier B Repair at Plant No. 2, was completed to address structural damage to the clarifier mechanism and included replacement of some broken parts found from the condition assessment.
- FE23-04 was completed to replace the truck loading scales at Plant No. 2. This critical project began as a maintenance effort to replace the severely corroded scales, which had reached the end of their useful life after 25 years in service.
- Central Generation Facility Planning: The internal combustion engines at Plant No. 1 and Plant No. 2 have accumulated significant operating hours and require major overhauls to ensure reliable performance over the next decade or longer. Project J-135B successfully completed comprehensive top-to-bottom overhauls of Engines No. 1 and No. 3 at Plant No. 1, as well as Engines No. 1 and No. 5 at Plant No. 2. The project will continue its work to complete the overhaul of Engine No. 4 at Plant No. 2. Following this, Project J-135C will begin and, over the next 4 years, will complete the overhaul of the remaining engine generator set at Plant No. 1 and the two remaining engine generator sets at Plant No. 2. According to Planning Study PS20-04, completed in 2023, OC San’s current engines can be reliably maintained for at least the next 10 years with these overhauls and proper ongoing maintenance.
- Energy and Digester Gas Master Plan (EMP): From 2022 to 2024, EMP PS21-04 evaluated options for energy production and digester gas management, considering emerging technologies, market trends, and permitting challenges. The study recommends continuing to operate the CenGen facilities and interplant pipeline until they reach the end of their useful life or market conditions drive replacement. Instead of a single solution, the EMP provides a 5- to 10-year roadmap for eventual replacement and includes future planning updates, recommending the plan be reviewed and updated in about 5 years to reflect evolving energy and regulatory conditions. In addition, multiple projects are

planned to upgrade and modernize support systems to ensure continued safe and reliable operation of the facilities during this transition period.

- PS21-07 CenGen Digital Twin Project: OC San launched Project PS21-07 to model the CenGen systems at Plant No. 1 and Plant No. 2 using digital twin technology integrated with the APRICOT™ platform. These models support operations, maintenance, troubleshooting, and process optimization. The project focused on developing digital twins to analyze system performance, detect anomalies, and assess the long-term use of anomaly detection tools. Given the plants' 30+ years of operation, the study team collected design documents, site data, and historical records to model key units, using loop-based energy balance calculations where data was limited. Completed in May 2025, the study provided recommendations to improve current systems and represented an early milestone in the District's use of artificial intelligence for smarter, data-driven plant management, while acknowledging that many steps will still be needed to further optimize performance and integrate advanced technologies.
- Various cable replacement maintenance projects were executed to address failed power cables feeding critical equipment. These include MP1-011 for Main Sewage Pump No. 2 and MP1-016 for Gas Compressor No. 1 at Plant 1, and MP2-025 for Solids Contact Blower No. 2 at Plant 2.

3.5 Asset Management Program Improvement Opportunities

The Asset Management Team continues to look at ways to improve the Asset Management Program. To facilitate continuous improvement and move to a more data-driven program, the team has created a Digital Asset Management Study (PS23-04).

The key objectives of this study are to:

- Allow available asset data to be analyzed more quickly and efficiently with the creation of business intelligence (BI) dashboards.
- Enhance collaboration and data sharing between the Maintenance and Engineering teams to support both short-term and long-term planning through BI dashboards.
- Provide a simpler and more robust means to convey asset management information in the AMP and to executive leadership.
- Improve asset planning and prioritization of projects by developing a risk framework.
- Find additional program improvement opportunities based on industry trends and new technology.

OC San has a lot of asset data available through various platforms, programs, and systems to assess OC San's major assets. One of the challenges is being able to utilize all that data more efficiently in one location or platform. The Digital Asset Management Study will create asset management and maintenance KPI BI dashboards, providing real-time asset information for improved and defensible decision making and asset planning. Developing a risk assessment framework will also improve asset management planning and project prioritizing with the goal of having average risk scores for every project that take into account consequences of failure. The following list describes the future Asset Management Program improvement opportunities, both short-term and long-term, how the new Digital Asset Management Study will address many of these improvement opportunities, and their status.

Condition Assessments:

- Track future condition assessments and proactively plan ahead with Operations for assessments that require process interruptions. *STATUS: In progress and led by internal staff.*
- Understand the condition and RUL of all of OC San's major assets. *STATUS: In progress and led by internal staff.*

Remaining Useful Life:

- Consider ways to improve the accuracy of RUL in addition to the Condition Scoring Guidelines already created. *STATUS: In progress via Digital Asset Management Study.*
- Create more condition scoring categories in the 1- to 10-year range as RUL accuracy improves over time. *STATUS: Future goal after completion of Digital Asset Management Study.*

Asset Registries:

- Ensure all pertinent asset information is included in the Asset Registries, including having a plan to address all assets with a RUL less than 10 years. *STATUS: Completed.*
- Determine the best way to track major assets in the long term such that the Asset Registries are compatible with BI dashboards. *STATUS: In progress via Digital Asset Management Study.*

Data-Driven Asset Management:

- Develop asset management BI dashboards to track maintenance KPIs and key major asset information, including RULs and future project planning. *STATUS: In progress via Digital Asset Management Study.*
- Use BI dashboard algorithms to more accurately estimate asset performance and RUL. *STATUS: Future goal after completion of Digital Asset Management Study.*
- Optimize CIP planning using BI cost and risk modeling and constraints. *STATUS: Future goal after completion of Digital Asset Management Study.*

Risk Assessment (Likelihood and Consequence of Failure):

- Identify a risk assessment approach and develop a framework that fits OC San's needs. *STATUS: In progress via Digital Asset Management Study.*
- Use risk assessment modeling and scoring to better prioritize projects. *STATUS: Future goal after completion of Digital Asset Management Study.*

These improvement opportunities will be evaluated and updated in the annual AMP. The Asset Management Program must always consider the mission statement of "delivering the required level of service, at the lowest life cycle cost, with an acceptable level of risk."

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4 Budgetary Considerations

The AMP focuses on documenting short- to long-term planning of maintenance and capital improvement projects to support effective budget development and sustainable operations. OC San has been striving to identify more accurate medium- to long-term capital cash flow requirements. Specifically, the Planning Division has developed a 20-year CIP, creating project plans for forecasted rehabilitation, replacement, improvements, or expansion for the collection system and treatment plants. The CIP budget is evaluated and updated on a yearly basis as new information becomes available.

4.1 Capital Improvement Expenditures

The FY 2025–2026 Budget Update, updated in June 2025, includes updates to the current 20-year CIP outlay. Figure 4-1 shows the 20-year CIP outlay, which includes current and projected future CIP projects. The FY 2025–2026 CIP Outlay is $289.0 million and is further divided into process categories, as shown on Figure 4-2. Liquid Treatment, Collection Facilities, and Other are the primary areas where the FY 2025–2026 CIP outlay will be spent.

For liquid treatment, Project P1-105, Headworks Rehabilitation at Plant No. 1, and Project P2-98, Primary Treatment Rehabilitation at Plant No. 2, are expected to be the largest expenditures of $24 million and $23 million, respectively, in FY 2025–2026. For Other, equipment purchases are expected to be the largest expenditures of $59 million in FY 2025–2026. Lastly, for collection facilities, Project 3-67, Seal Beach Pump Station Replacement, Project 5-67, Bay Bridge Pump Station Replacement, and Project 11-33, Edinger Pump Station Replacement, comprise nearly 40% of collections CIP spending at a combined expenditure of $25 million.

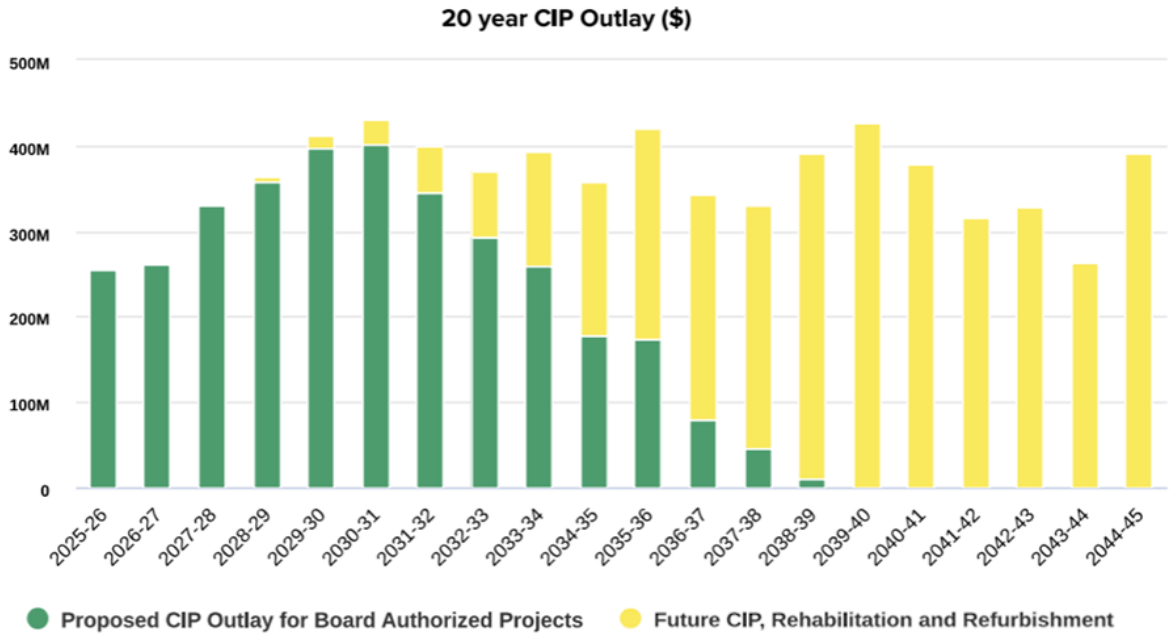


Figure 4-1. 20-Year CIP Outlay

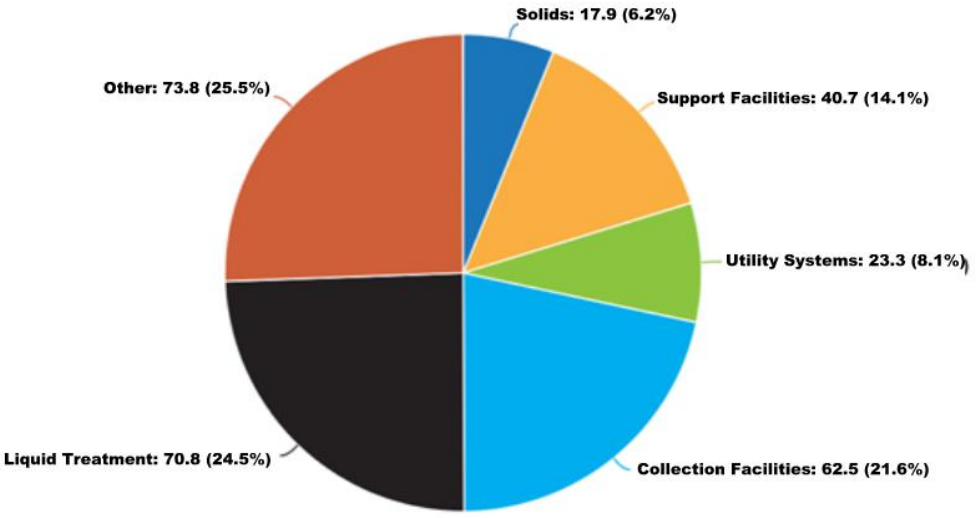


Figure 4-2. FY 2025–2026 CIP Outlay by Process – $289.0 Million

4.2 Maintenance Expenditures

4.2.1 Five-Year Historical Maintenance Expenditures

Figure 4-3 and Figure 4-4 show the historical actual versus budgeted operational and maintenance expenditures for the treatment plants and collection system, respectively.

- The treatment plant expenditures include maintenance services and materials (budget objects 54010 and 54020).
- The collection system expenditures include maintenance services and materials (budget objects 54010, 54020, and 53180).
- These costs represent the O&M costs of fixed assets, including operationally funded repair/replacement projects.

A variety of factors and variables are not reflected in the development of the budget. As a result, some years reflect higher expenditures than budgeted. These factors include but are not limited to the following:

- Annual inflation rates
- Manufacturing cost increases (which are also affected by increases in labor, raw material demand, fuel, chemicals, and fees to expedite due to long lead times)
- Supply chain cost increases
- Geopolitical events
- Additional maintenance expenses that were unforeseen or unplanned but include necessary repairs or procurements

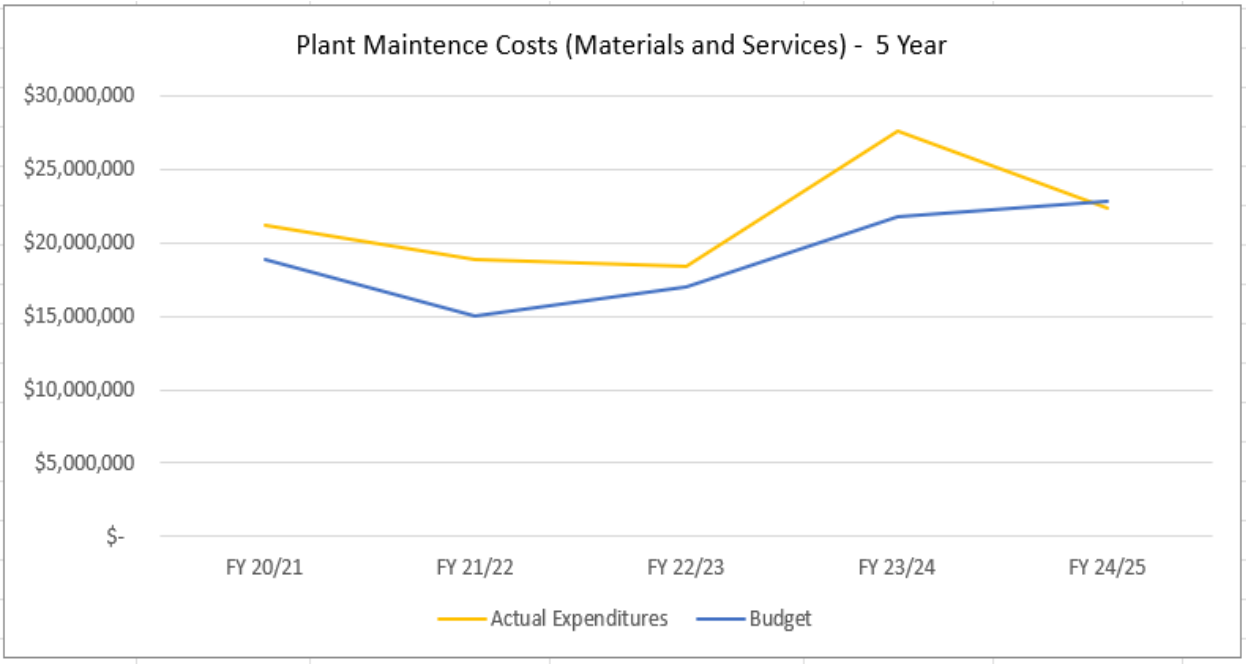


Figure 4-3. Five-Year Historical Maintenance Costs for Treatment Plants

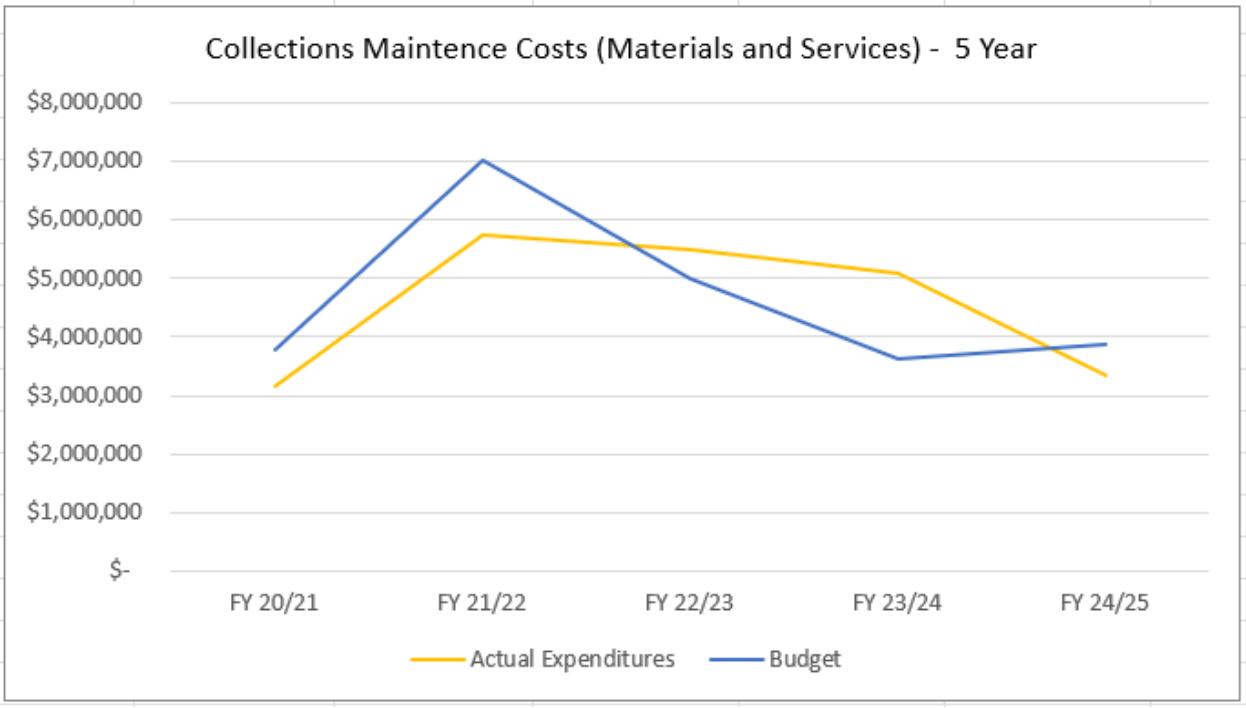


Figure 4-4. Five-Year Historical Maintenance Costs for Collection System

4.2.2 Three-Year Look-Ahead Maintenance Expenditures

Table 4-1 shows operationally funded projects identified to date and includes the projected annual expenditures over the next 3 years. It is likely future projects and costs will fluctuate based on the condition of assets as they age.

The projects are grouped by location (Collection System, Plant No. 1, Plant No. 2, and Joint), and then sorted by the project start fiscal year. The list encompasses projects identified as of August 1, 2025, with the following criteria:

- Estimated construction cost is equal to or greater than $50,000 and has projected expenditures within the next 3 years.
- Projects on the list represent expenditures that are operationally funded.
- Some projects that are similar in nature have been combined into a single project for more efficient project execution.
- Blanket purchase order contracts are not included.

Table 4-1. Projected Annual Expenditures

PRN	ALT. PROJECT NO.	PROJECT TITLE	FY 2025–2026	FY 2026–2027	FY 2027–2028	3-YEAR TOTAL COST
COLLECTIONS – TRUNKLINES AND DIVERSIONS						
PRN-00373/PRN-00869	FRC-0014	Magnolia Sewer Manhole Abandonment at Interstate 5	$0	$131,000	$0	$131,000
PRN-00592	FRC-0007	Redhill Relief Sewer Liner Repair at State Route 55	$118,610	$0	$0	$118,610
PRN-00730l	FRC-0010	Warner Avenue Vault Cover Improvements	$900,300	$0	$0	$900,300
PRN-00766	FRC-0011	Richfield Sub-Trunk Encasement for BNSF Railway Addition	$64,268	$56,831	$0	$121,099
		COLLECTIONS – TRUNKLINES AND DIVERSIONS SUBTOTALS	$1,083,178	$187,831	$0	$1,271,009
COLLECTIONS – PUMP STATIONS						
PRN-00527/PRN-00790/PRN-00808/PRN-00949	FRC-0018	Valve Replacements at Lido, Crystal Cove, A St., and 15th St. Pump Stations	$0	$0	$1,330,428	$1,330,428
PRN-00767		Lido PS Bathroom Reconfigure	$50,000	$0	$0	$50,000
PRN-00734/PRN-00892	FRC-0017	Valve Replacements and Wet Well Access Improvements at Slater Pump Station	$51,005	$719,996	$0	$771,001
PRN-00926	FRC-0020	College Pump Station Wet Well Rehabilitation	$0	$2,530,000	$0	$2,530,000
		COLLECTIONS – PUMP STATIONS SUBTOTALS	$101,005	$3,249,996	$1,330,428	$4,681,429
PLANT 1						
PRN-00492/PRN-0053	FR1-0011	VFD Replacements at Plant No. 1	$595,980	$387,637	$0	$983,617
PRN-00525	FR1-0005	CenGen and 12kV Service Center Switchgear Battery System Upgrades at Plant No. 1	$101,408	$0	$0	$101,408
PRN-01053		AS1 and AS2 Blowers Vane Actuators Replacement at Plant No. 1	$300,000	$115,000	$0	$415,000
PRN-01029		AS1/AS2 Bleach Line Repair at Plant No. 1	$440,000	$0	$0	$440,000
PRN-01003	MP1-017	Activated Sludge Final Clarifiers 11&13 Rebuild at Plant No. 1	$1,440,000	$0	$0	$1,440,000
PRN-01033		Thickening & Dewatering Building Lighting Improvements	$0	$88,000	$0	$88,000
	FR1-0016	Waste Sidestream Pump Station VFD replacements at Plant No. 1[a]	$16,495	$0	$0	$16,495
	FR1-0017	Trickling Filter Valve Replacement at Plant No. 1[a]	$12,865	$0	$0	$12,865
PRN-00914	MP1-003	WSSPS-1 Pump Replacement at Plant No. 1	$100,000	$0	$0	$100,000
PRN-00815	FR1-0018	Dewatering Centrifuge Diverter Gate Improvements at Plant No. 1	$195,288	$1,090,828	$3,387	$1,289,503
PRN-00894/PRN-00890	FR1-0023	Secondary Treatment Area Cable Replacement at Plant No. 1	$3,475	$746,524	$0	$749,999
PRN-00898	FR1-0022	Backup Power for Laboratory Equipment at Plant No. 1	$75,168	$1,933	$0	$77,101
	FR1-0020	Traffic Signal Installation at Ellis Avenue and Mt. Langley Street Intersection	$746,250	$0	$0	$746,250
PRN-00569/PRN-00846	FR1-0019	Generator Protection Relay Replacements & Add Control Center Backup Power at Plant No. 1	$0	$143,692	$421,309	$565,001
PRN-00721/PRN-00821	FR1-0024	Power Building 7 & 8 Generator and Centrifuge Motor Disconnect Improvements at Plant No. 1	$0	$121,767	$543,233	$665,000
PRN-001000		Sunflower Pump Station Effluent Channel Temporary Repairs[a]	$35,000	$0	$0	$35,000
PRN-01051		HVAC Replacement for T&D Building at Plant No. 1	$630,000	$0	$0	$630,000
PRN-01011		Primary Clarifier Manual Slide Gate Replacement at Plant No. 1	$65,000	$0	$0	$65,000
PRN-01012		Primary Clarifier Effluent Gate PLC Panel Replacement at Plant 1	$0	$473,000	$0	$473,000
PRN-01022		Replace Main Sewage Pump No. 4 with Spare at Plant No. 1	$150,000	$0	$0	$150,000
PRN-01014		Spare Parts Purchase for Sunflower Pump #1 at Plant 1	$305,500	$0	$0	$305,500

PRN	ALT. PROJECT NO.	PROJECT TITLE	FY 2025–2026	FY 2026–2027	FY 2027–2028	3-YEAR TOTAL COST
PRN-01057		West Primary Effluent Pipe Joint Repair at Plant 1	$600,000	$0	$0	$600,000
PRN-001002	FR1-0026	Sunflower Pump Station Effluent Channel Repair	$743,927	$0	$0	$743,927
		PLANT 1 SUBTOTALS	$6,556,356	$3,168,381	$967,929	$10,692,666
PLANT 2						
PRN-00633/PRN-00849	FR2-0023	Activated Sludge Clarifier Entry Improvements at Plant No. 2	$145,318	$0	$0	$145,318
PRN-00770	MP2-0010	PEPS Pumps #1, #2, and #3 Overhaul at Plant No. 2	$220,000	$190,000	$0	$410,000
PRN-00997	MP2-023	Primary Clarifier N Drive Assessment and Replacement	$285,000	$0	$0	$285,000
PRN-00742	FR2-0033	Digesters O-T Bridge Repair at Plant No. 2	$255,961	$0	$0	$255,961
PRN-00867	FR2-0032	Digester K Dome Repair at Plant No. 2	$865,449	$0	$0	$865,449
PRN-00902	FR2-0031	Activated Sludge System Scum Rerouting at Plant No. 2	$2,025	$397,975	$0	$400,000
PRN-00901		P2 EPSA VFD Control Wiring	$55,000	$0	$0	$55,000
PRN-00923	MP2-018	Spare Main Sewage Pump Repair for Pump No. 1 at Plant No. 2	$999,780	$0	$0	$999,780
PRN-00985		Centrifuge Dewatering Lubrication Pump Replacement at Plant 2	$212,000	$0	$0	$212,000
PRN-01046		Trickling Filter Clarifier B Repair at Plant No. 2	$200,000	$0	$0	$200,000
PRN-01018		Headworks Area Cable Replacements at Plant 2	$225,000	$225,000	$0	$450,000
PRN-01017		DAFT D Coating Repair at Plant No. 2	$129,000	$0	$0	$129,000
PRN-01043		Headworks Generator #1 Radiator Replacement at Plant 2	$180,000	$0	$0	$180,000
PRN-01035		Power Building D Automatic Transfer Switch Replacement at Plant 2	$150,000	$0	$0	$150,000
Task Order		DAFT A Coating Repair at Plant No. 2	$129,000	$0	$0	$129,000
PRN-01020		B- & C-Side Primary Clarifier Drive Replacements at Plant No. 2	$0	$2,100,000	$0	$2,100,000
PRN-01027		Distribution Center H 12kV Switchgear Relay Replacement at Plant 2	$200,000	$200,000	$0	$400,000
PRN-01047		Procurement of Two Spare Return Secondary Sludge Pumps at Plant No. 2	$710,000	$0	$0	$710,000
PRN-01056		EPSA Generator #3 Radiator Replacement at Plant 2	$100,000	$100,000	$0	$200,000
PRN-01055		Dewatering Facility Biofilter Media Replacement at Plant No. 2	$300,000	$300,000	$0	$600,000
		PLANT 2 SUBTOTALS	$4,653,533	$3,512,975	$0	$8,166,508
JOINT						
PRN-00630	FRJ-0003	Interplant Gas Line Blow Off Vault Repairs	$1,026,627	$47,374	$0	$1,074,001
PRN-00977		Joint CenGen Engine Emission Compliance Catalyst Housing Cracks	$1,150,000	$1,150,000	$0	$2,300,000
PRN-00965		Joint CenGen Engine Ignition System Obsolescence Replacement	$295,707	$400,000	$0	$695,707
		JOINT SUBTOTALS	$2,472,334	$1,597,374	$0	$4,069,708

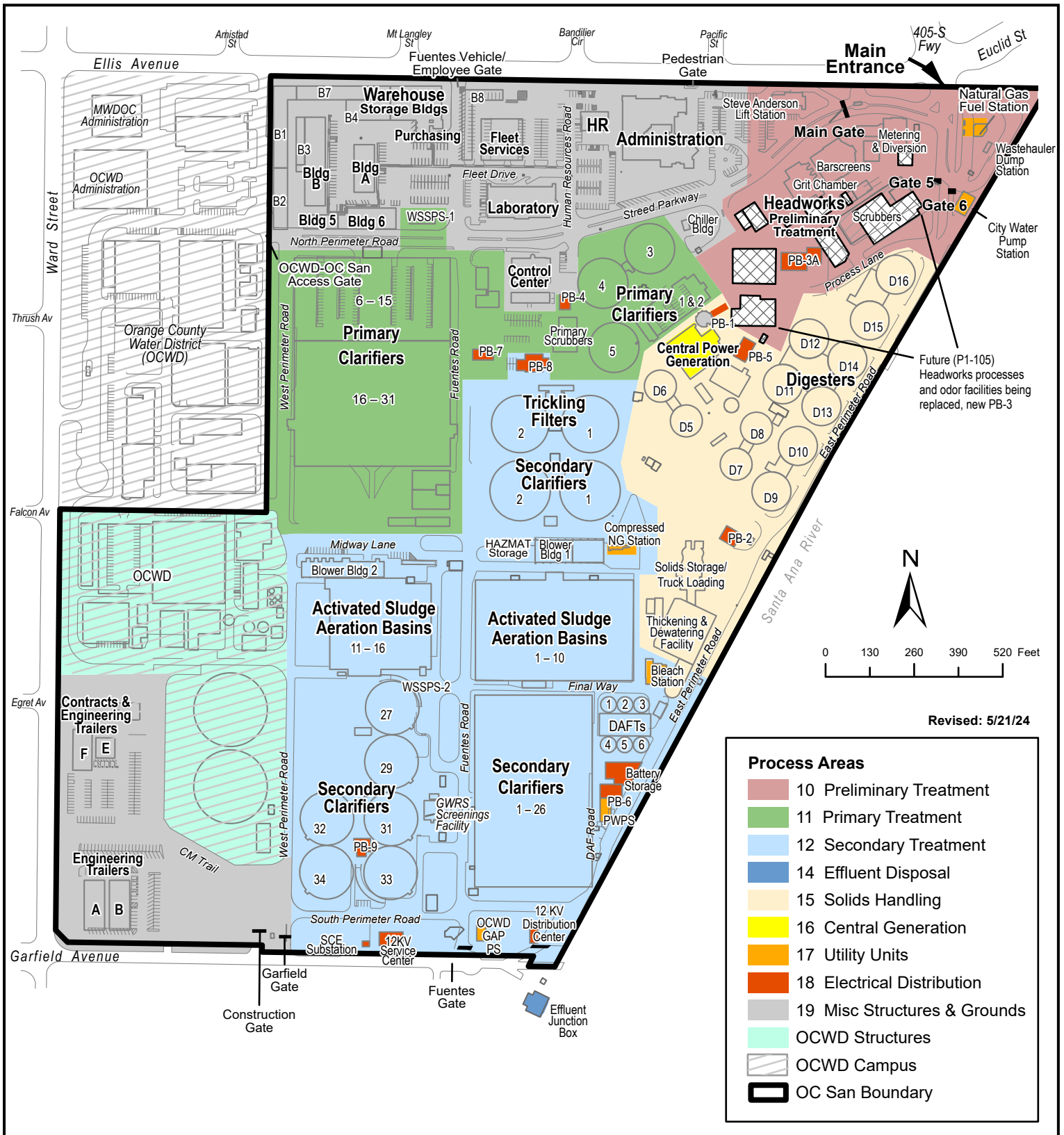
[a] Remaining budget from last FY 2024–2025

Appendix A:
Plant No. 1 Process Areas Map

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ORANGE COUNTY SANITATION DISTRICT

PROCESS AREAS – Reclamation Plant No. 1

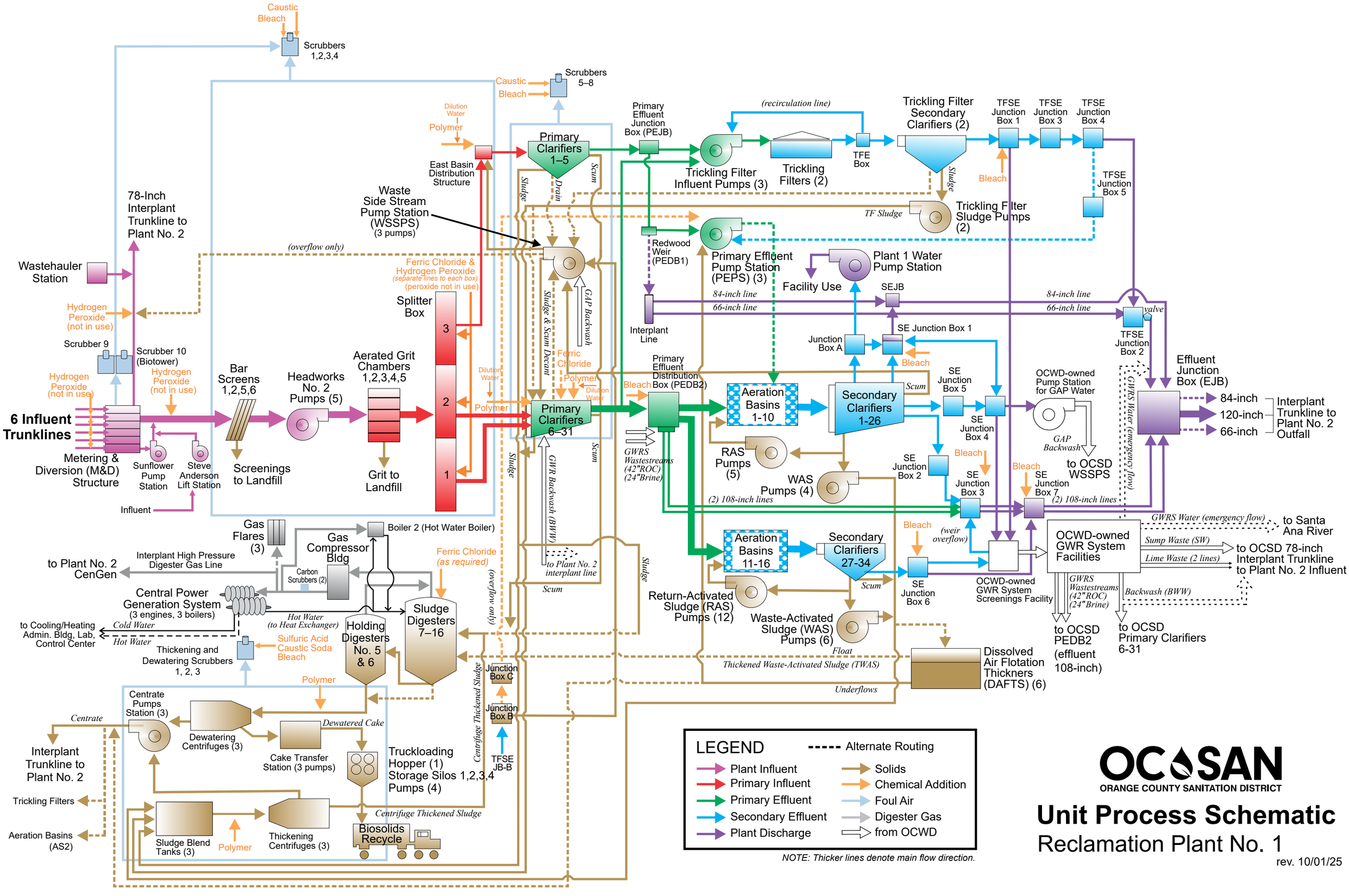


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Appendix B:
Plant No. 1 Process Diagram

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Caustic
Bleach
Scrubbers 1,2,3,4
Scrubbers 5–8
Dilution Water
Polymer
East Basin Distribution Structure
Primary Clarifiers 1–5
Primary Effluent Junction Box (PEJB)
(recirculation line)
Trickling Filter Influent Pumps (3)
Trickling Filters (2)
TFE Box
Trickling Filter Secondary Clarifiers (2)
TFSE Junction Box 1
TFSE Junction Box 3
TFSE Junction Box 4
TFSE Junction Box 5
Bleach
Sludge
Scum
Drain
Waste Side Stream Pump Station (WSSPS) (3 pumps)
78-Inch Interplant Trunkline to Plant No. 2
(overflow only)
TF Sludge
Trickling Filter Sludge Pumps (2)
Redwood Weir (PEDB1)
Primary Effluent Pump Station (PEPS) (3)
Plant 1 Water Pump Station
Facility Use
SEJB
84-inch line
66-inch line
Interplant Line
Wastehauler Station
Ferric Chloride & Hydrogen Peroxide
(separate lines to each box)
(peroxide not in use)
Splitter Box
Sludge & Scum Decant
GAP Backwash
Ferric Chloride
Polymer
Dilution Water
Junction Box A
SE Junction Box 1
Hydrogen Peroxide (not in use)
Scrubber 9
Scrubber 10 (Biotower)
Bar Screens 1,2,5,6
Headworks No. 2 Pumps (5)
Aerated Grit Chambers 1,2,3,4,5
Primary Clarifiers 6–31
Primary Effluent Distribution Box (PEDB2)
Aeration Basins 1-10
Secondary Clarifiers 1-26
SE Junction Box 5
SE Junction Box 4
OCWD-owned Pump Station for GAP Water
GAP Backwash
to OCSD WSSPS
TFSE Junction Box 2
Effluent Junction Box (EJB)
GWRS Water (emergency flow)
84-inch
120-inch
66-inch
Interplant Trunkline to Plant No. 2 Outfall
6 Influent Trunklines
Metering & Diversion (M&D) Structure
Sunflower Pump Station
Steve Anderson Lift Station
Influent
Screenings to Landfill
Grit to Landfill
GWRS Wastestreams (42"ROC) (24"Brine)
RAS Pumps (5)
WAS Pumps (4)
(2) 108-inch lines
SE Junction Box 2
SE Junction Box 3
SE Junction Box 7
Bleach
Aeration Basins 11-16
Secondary Clarifiers 27-34
(weir overflow)
SE Junction Box 6
OCWD-owned GWR System Facilities
OCWD-owned GWR System Screenings Facility
GWRS Water (emergency flow)
to Santa Ana River
Sump Waste (SW)
Lime Waste (2 lines)
to OCSD 78-inch Interplant Trunkline to Plant No. 2 Influent
Backwash (BWW)
to OCSD PEDB2 (effluent 108-inch)
to OCSD Primary Clarifiers 6-31
Return-Activated Sludge (RAS) Pumps (12)
Waste-Activated Sludge (WAS) Pumps (6)
Float
Thickened Waste-Activated Sludge (TWAS)
Underflows
Dissolved Air Flotation Thickners (DAFTS) (6)
Gas Flares (3)
Gas Compressor Bldg
Boiler 2 (Hot Water Boiler)
Interplant High Pressure Digester Gas Line
to Plant No. 2 CenGen
Carbon Scrubbers (2)
Ferric Chloride (as required)
Central Power Generation System (3 engines, 3 boilers)
Hot Water (to Heat Exchanger)
Cold Water
Hot Water
to Cooling/Heating Admin. Bldg, Lab, Control Center
Thickening and Dewatering Scrubbers 1, 2, 3
Sulfuric Acid
Caustic Soda
Bleach
Holding Digesters No. 5 & 6
Sludge Digesters 7–16
Polymer
Junction Box C
Junction Box B
TFSE JB-B
Centrifuge Thickened Sludge
Centrate Pumps Station (3)
Centrate
Dewatering Centrifuges (3)
Dewatered Cake
Cake Transfer Station (3 pumps)
Truckloading Hopper (1)
Storage Silos 1,2,3,4
Pumps (4)
Interplant Trunkline to Plant No. 2
Trickling Filters
Aeration Basins (AS2)
Sludge Blend Tanks (3)
Thickening Centrifuges (3)
Biosolids Recycle
GWR Backwash (BWW)
to Plant No. 2 interplant line
LEGEND
Alternate Routing
Plant Influent
Primary Influent
Primary Effluent
Secondary Effluent
Plant Discharge
Solids
Chemical Addition
Foul Air
Digester Gas
from OCWD
NOTE: Thicker lines denote main flow direction.
OCSAN
ORANGE COUNTY SANITATION DISTRICT
Unit Process Schematic
Reclamation Plant No. 1
rev. 10/01/25

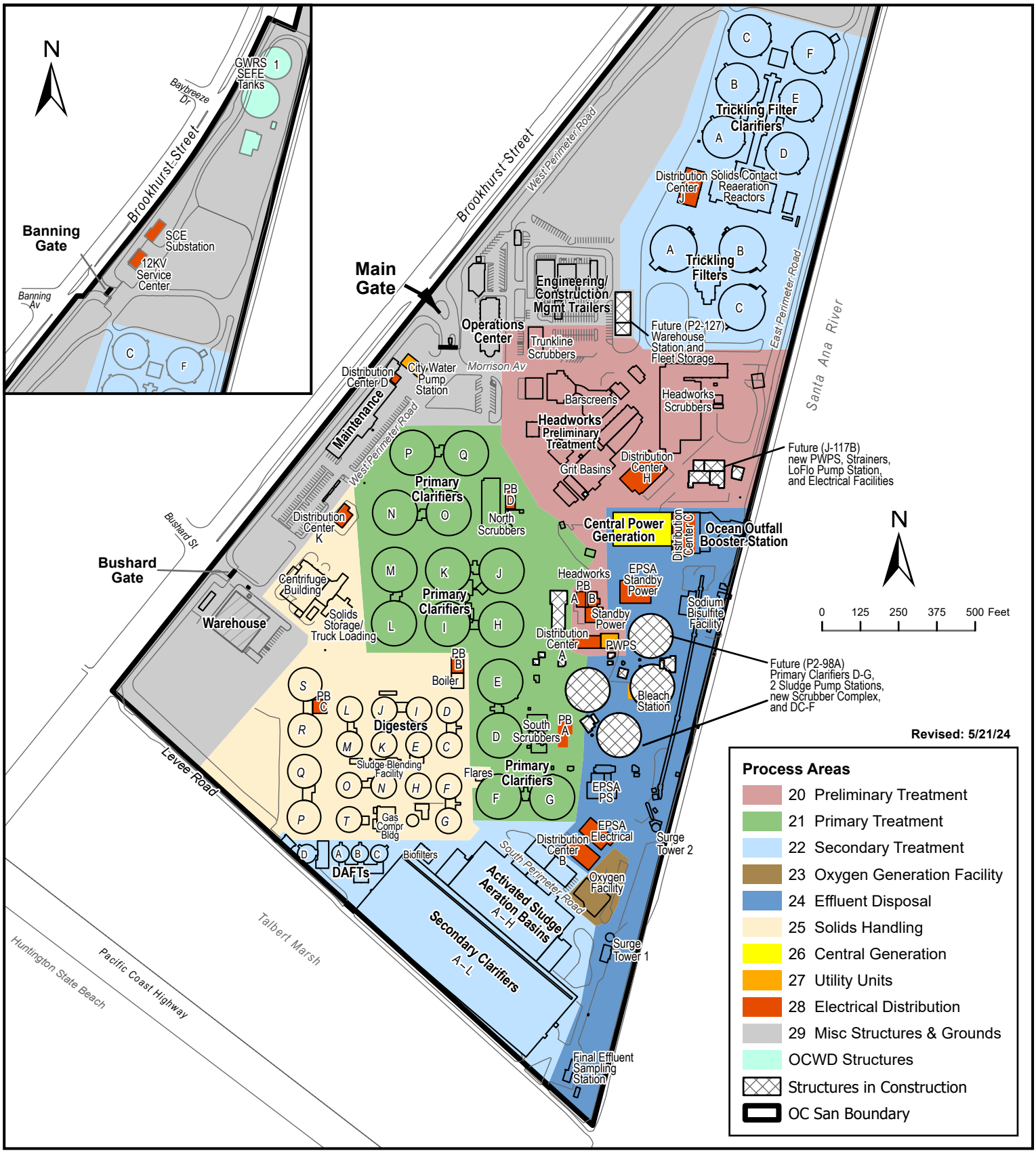
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Appendix C:
Plant No. 2 Process Areas Map

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ORANGE COUNTY SANITATION DISTRICT

PROCESS AREAS – Reclamation Plant No. 2



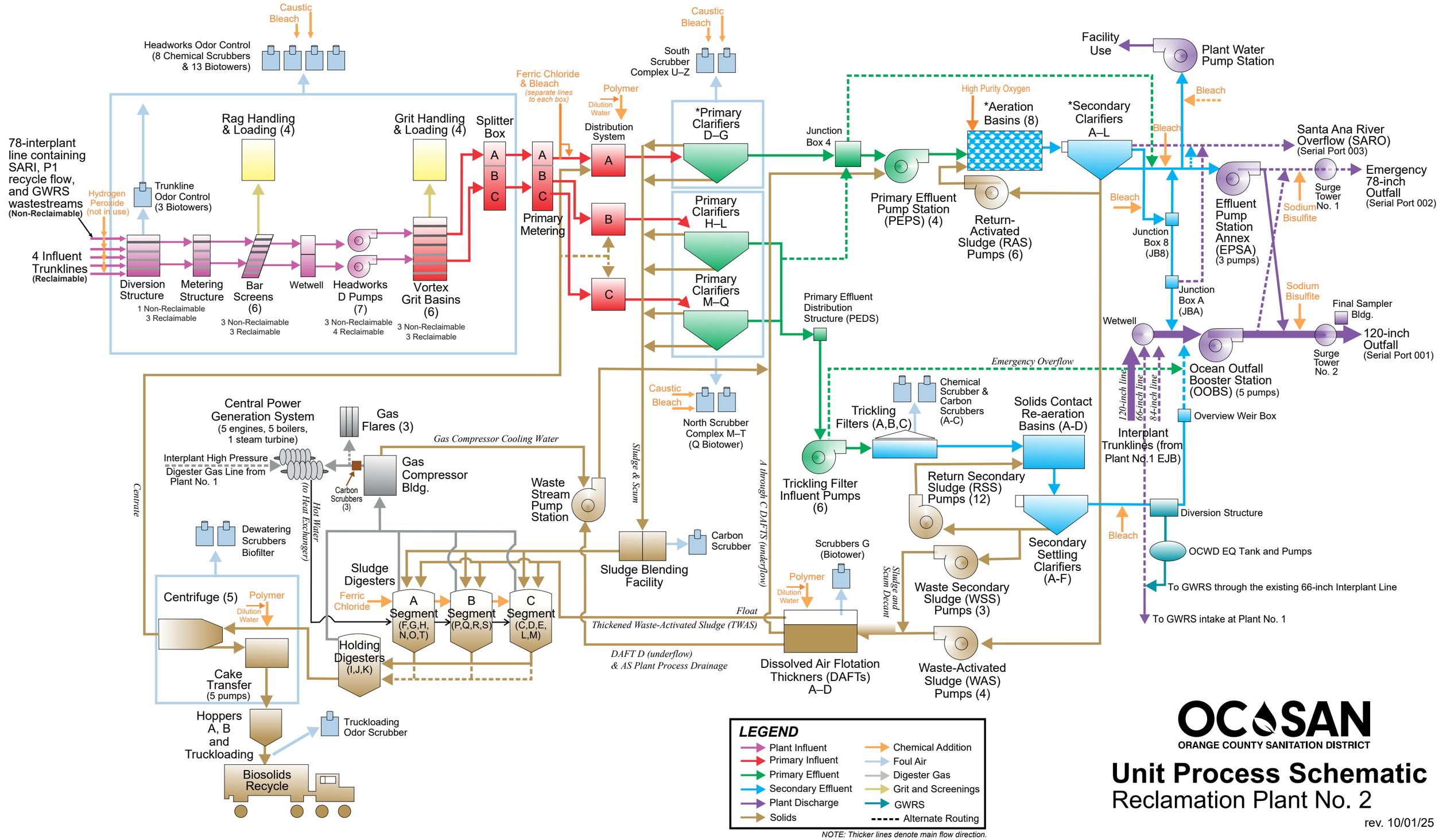
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Appendix D:
Plant No. 2 Process Diagram

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Unit Process Schematic — OC San Reclamation Plant No. 2



OC SAN
ORANGE COUNTY SANITATION DISTRICT

Unit Process Schematic
Reclamation Plant No. 2

rev. 10/01/25

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Appendix E: Asset Management KPI Supplemental Information

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Appendix E

Program Monitoring KPI Data

Plant No. 1 Maintenance Activity Data

Sum of actlabhrs	Column Labels			
Row Labels	**CM**	**PD**	**PM**	**Grand Total**
Preliminary Treatment	82%	0%	18%	100%
Primary Treatment	71%	0%	29%	100%
Secondary Treatment - Activated Sludge	56%	1%	44%	100%
Secondary Treatment - Trickling Filters	72%	0%	28%	100%
Solids Handling - Digesters	77%	1%	22%	100%
Solids Handling - Facilities	65%	3%	32%	100%
Central Power Generation	49%	6%	46%	100%
Electrical Distribution	30%	6%	64%	100%
Headquarters	92%	0%	8%	100%
Interplant	65%	6%	28%	100%
Utilities	75%	0%	25%	100%
Grand Total	**64%**	**2%**	**34%**	**100%**

Plant No. 1 Maintenance Materials and Services Cost

Sum of Mat and Srvs Cost	Column Labels			
Row Labels	**FY22/23**	**FY23/24**	**FY24/25**	**Grand Total**
Preliminary Treatment	$ 443,107	$ 522,432	$ 811,409	$ 1,776,948
Primary Treatment	$ 424,590	$ 776,895	$ 1,216,467	$ 2,417,951
Secondary Treatment - Activated Sludge	$ 917,777	$ 959,917	$ 1,170,699	$ 3,048,392
Secondary Treatment - Trickling Filters	$ 60,328	$ 43,293	$ 156,298	$ 259,919
Solids Handling - Digesters	$ 476,724	$ 520,297	$ 857,028	$ 1,854,049
Solids Handling - Facilities	$ 918,780	$ 1,332,562	$ 1,681,142	$ 3,932,484
Central Power Generation	$ 179,392	$ 271,362	$ 198,234	$ 648,988
Electrical Distribution	$ 134,876	$ 3,892,069	$ 252,400	$ 4,279,345
Utilities	$ 138,885	$ 292,095	$ 152,609	$ 583,589
Grand Total	**$ 3,760,538**	**$ 8,766,243**	**$ 6,626,976**	**$ 19,153,757**

Plant No. 1 Labor Hours

Sum of actlabhrs	Column Labels			
Row Labels	**FY22/23**	**FY23/24**	**FY24/25**	**Grand Total**
Preliminary Treatment	4,535	6,284	5,521	16,340
Primary Treatment	5,721	6,283	7,410	19,413
Secondary Treatment - Activated Sludge	8,652	8,513	7,517	24,681
Secondary Treatment - Trickling Filters	1,042	787	1,182	3,011
Solids Handling - Digesters	3,486	2,815	3,788	10,089
Solids Handling - Facilities	7,694	7,257	7,478	22,429
Central Power Generation	3,841	3,127	2,919	9,887
Electrical Distribution	3,599	3,548	3,792	10,939
Utilities	1,609	2,327	1,749	5,684
Grand Total	**41,870**	**42,543**	**42,562**	**126,974**

Plant 1 Maintenance Activity Code

Sum of actlabhrs	Column Labels					
Row Labels	**10**	**20**	**30**	**40**	**50**	**Grand Total**
Preliminary Treatment	3%	19%	37%	28%	13%	100%
Primary Treatment	3%	31%	45%	17%	5%	100%
Secondary Treatment - Activated Sludge	5%	34%	48%	9%	4%	100%
Secondary Treatment - Trickling Filters	6%	20%	47%	25%	2%	100%
Solids Handling - Digesters	7%	18%	55%	15%	5%	100%
Solids Handling - Facilities	5%	13%	59%	19%	5%	100%
Central Power Generation	3%	22%	47%	24%	4%	100%
Electrical Distribution	2%	50%	31%	4%	13%	100%
Interplant	0%	35%	44%	10%	11%	100%
Grand Total	**4%**	**27%**	**46%**	**17%**	**6%**	**100%**

Plant No. 2 Maintenance Activity Data

Sum of actlabhrs	Column Labels			
Row Labels	CM	PD	PM	Grand Total
Preliminary Treatment	71%	0%	29%	100%
Primary Treatment	74%	2%	24%	100%
Secondary Treatment - Activated Sludge	70%	1%	30%	100%
Secondary Treatment - Trickling Filters	39%	0%	61%	100%
Solids Handling - Digesters	67%	0%	33%	100%
Solids Handling - Facilities	65%	3%	32%	100%
Central Power Generation	55%	8%	37%	100%
Effluent Disposal	75%	2%	24%	100%
Electrical Distribution	41%	7%	51%	100%
Other	62%	2%	37%	100%
Grand Total	**63%**	**3%**	**35%**	**100%**

Plant No. 2 Maintenance Materials and Services Cost

Sum of Mat and Srvs Cost	Column Labels			
Row Labels	FY22/23	FY23/24	FY24/25	Grand Total
Preliminary Treatment	$ 403,824	$ 453,035	$ 649,572	$ 1,506,431
Primary Treatment	$ 190,401	$ 597,506	$ 747,824	$ 1,535,731
Secondary Treatment - Activated Sludge	$ 416,214	$ 457,448	$ 763,516	$ 1,637,178
Secondary Treatment - Trickling Filters	$ 205,874	$ 119,395	$ 3,074,381	$ 3,399,650
Solids Handling - Digesters	$ 149,772	$ 359,012	$ 576,356	$ 1,085,140
Solids Handling - Facilities	$ 559,217	$ 347,622	$ 830,639	$ 1,737,478
Central Power Generation	$ 301,748	$ 261,077	$ 449,794	$ 1,012,620
Effluent Disposal	$ 41,519	$ 19,566	$ 139,093	$ 200,178
Grand Total	**$ 2,643,439**	**$ 3,115,518**	**$ 7,867,893**	**$ 13,626,850**

Plant No. 2 Labor Hours

Sum of actlabhrs	Column Labels			
Row Labels	**FY22/23**	**FY23/24**	**FY24/25**	**Grand Total**
Preliminary Treatment	7,374	6,112	7,112	20,597
Primary Treatment	3,135	4,231	4,622	11,987
Secondary Treatment - Activated Sludge	5,469	4,316	6,404	16,189
Secondary Treatment - Trickling Filters	2,459	2,893	2,695	8,046
Solids Handling - Digesters	2,558	3,036	2,535	8,128
Solids Handling - Facilities	5,849	6,178	6,672	18,698
Central Power Generation	6,636	4,762	4,944	16,342
Effluent Disposal	1,117	829	1,305	3,251
Electrical Distribution	3,848	3,096	3,481	10,425
Utilities	1,572	1,814	1,241	4,628
Grand Total	**40,741**	**38,378**	**42,036**	**121,154**

Plant 2 Maintenance Activity Code

Sum of actlabhrs	Column Labels					
Row Labels	**10**	**20**	**30**	**40**	**50**	**Grand Total**
Preliminary Treatment	5%	16%	56%	16%	6%	100%
Primary Treatment	7%	22%	54%	14%	2%	100%
Secondary Treatment - Activated Sludge	2%	31%	43%	20%	3%	100%
Secondary Treatment - Trickling Filters	2%	10%	66%	21%	2%	100%
Solids Handling - Digesters	8%	20%	62%	5%	4%	100%
Solids Handling - Facilities	6%	16%	56%	18%	5%	100%
Central Power Generation	4%	17%	53%	14%	11%	100%
Effluent Disposal	6%	21%	42%	25%	6%	100%
Electrical Distribution	5%	49%	31%	7%	9%	100%
Grand Total	**5%**	**23%**	**51%**	**16%**	**5%**	**100%**

Pump Station Maintenance Activity Data

Sum of actlabhrs	Column Labels			
Row Labels	**CM**	**PD**	**PM**	**Grand Total**
15th Street PS	27%	0%	73%	100%
'A' Street PS	53%	0%	47%	100%
Bay Bridge PS	55%	3%	42%	100%
Bitter Point PS	38%	4%	57%	100%
College PS	58%	0%	42%	100%
Crystal Cove PS	31%	13%	56%	100%
Edinger PS	37%	0%	63%	100%
Gisler Air Jumper Station	78%	0%	22%	100%
Lido PS	41%	2%	57%	100%
MacArthur PS	50%	0%	50%	100%
Other	12%	0%	88%	100%
Rocky Point PS	53%	3%	43%	100%
SARI Metering Station	45%	0%	55%	100%
Seal Beach PS	75%	0%	24%	100%
Slater PS	40%	1%	59%	100%
Westside PS	52%	3%	45%	100%
Yorba Linda PS	45%	0%	55%	100%
Grand Total	**42%**	**2%**	**56%**	**100%**

Pump Station Maintenance Materials and Services Cost at Pump Stations

Sum of Mat and Srvs Cost	Column Labels			
Row Labels	FY22/23	FY23/24	FY24/25	Grand Total
15th Street PS	17,447	88,765	39,285	145,497
'A' Street PS	12,521	4,546	78,740	95,807
Bay Bridge PS	98,978	31,761	170,838	301,577
Bitter Point PS	13,877	40,562	132,159	186,597
College PS	1,971	4,317	24,644	30,932
Crystal Cove PS	1,459	27,636	27,020	56,116
Edinger PS	6,093	13,338	2,642	22,074
Gisler Air Jumper Station	31,460	-	7,308	38,768
Lido PS	12,013	11,412	38,648	62,073
MacArthur PS	5,020	6,381	4,817	16,218
Main Street PS	11,316	16,680	15,869	43,864
Rocky Point PS	5,642	5,913	7,559	19,114
SARI Metering Station	1,458	3,103	26	4,587
Seal Beach PS	4,234	115,356	91,310	210,900
Slater PS	5,772	114,448	51,584	171,804
Westside PS	5,671	10,049	12,011	27,731
Yorba Linda PS	3,581	562	1,119	5,262
Grand Total	**254,338**	**528,539**	**710,982**	**1,493,858**

Pump Station Labor Hours

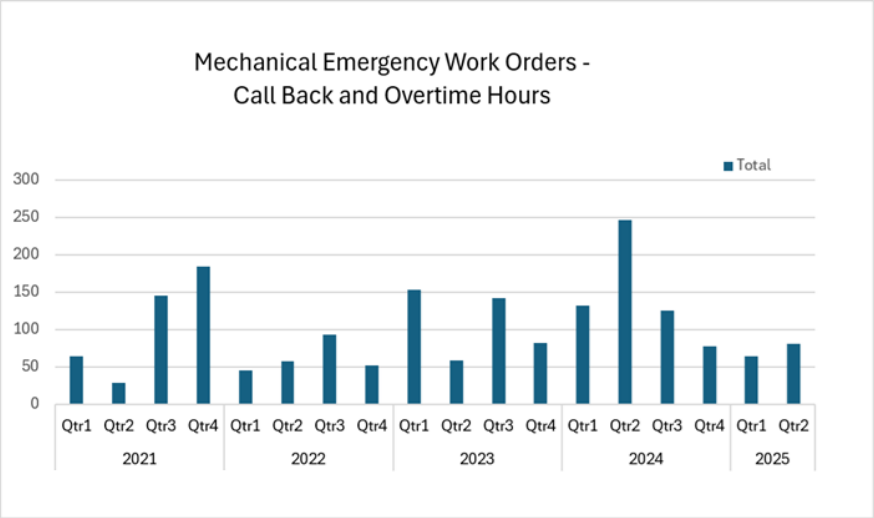
Sum of actlabhrs	Column Labels			
Row Labels	FY22/23	FY23/24	FY24/25	Grand Total
15th Street PS	608	596	652	1,855
'A' Street PS	396	284	394	1,073
Bay Bridge PS	616	428	420	1,464
Bitter Point PS	777	678	755	2,210
College PS	258	369	310	936
Crystal Cove PS	379	609	567	1,555
Edinger PS	311	212	102	624
Gisler Air Jumper Station	104	42	49	194
Other	1,135	2,065	1,314	4,514
Rocky Point PS	309	326	306	940
SARI Metering Station	133	170	109	413
Seal Beach PS	672	1,121	1,018	2,811
Slater PS	896	958	1,080	2,934
Westside PS	441	328	346	1,114
Yorba Linda PS	293	243	192	727
Grand Total	**8,736**	**9,770**	**8,720**	**27,226**

Pump Station Maintenance Activity Code

Sum of actlabhrs	Column Labels					
Row Labels	**10**	**20**	**30**	**40**	**50**	**Grand Total**
15th Street PS	2%	59%	18%	4%	18%	100%
'A' Street PS	4%	24%	37%	19%	16%	100%
Bay Bridge PS	5%	11%	57%	19%	8%	100%
Bitter Point PS	1%	14%	62%	12%	10%	100%
College PS	4%	10%	32%	26%	27%	100%
Crystal Cove PS	1%	59%	27%	4%	8%	100%
Edinger PS	5%	41%	25%	9%	21%	100%
Gisler Air Jumper Station	0%	64%	24%	0%	12%	100%
Lido PS	3%	39%	34%	6%	18%	100%
MacArthur PS	7%	49%	28%	0%	16%	100%
Main Street PS	6%	31%	30%	15%	18%	100%
Rocky Point PS	3%	16%	63%	18%	0%	100%
SARI Metering Station	0%	38%	33%	17%	12%	100%
Seal Beach PS	2%	9%	27%	31%	30%	100%
Slater PS	2%	39%	29%	16%	14%	100%
Westside PS	9%	23%	49%	9%	10%	100%
Yorba Linda PS	5%	72%	17%	0%	6%	100%
Grand Total	**3%**	**39%**	**31%**	**13%**	**14%**	**100%**

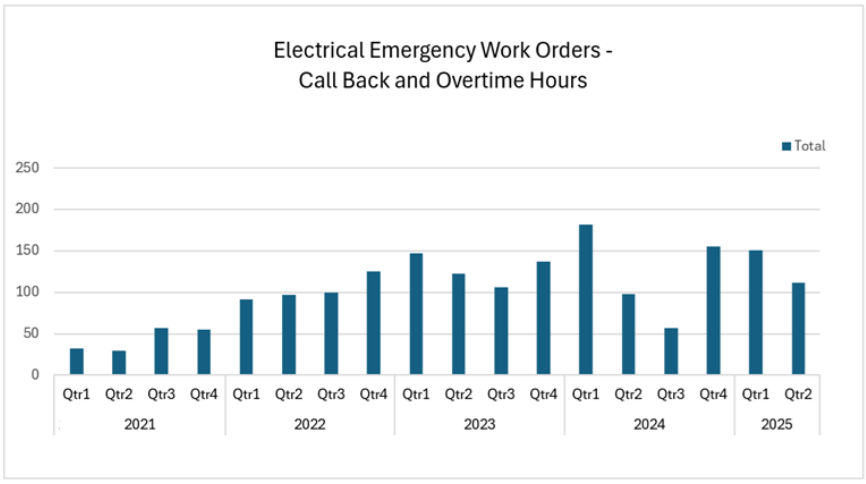
Mechanical Emergency Work Hours

Row Labels	Sum of Overtime
2021	**423.75**
Qtr1	64.75
Qtr2	29
Qtr3	145.5
Qtr4	184.5
2022	**249.25**
Qtr1	45.75
Qtr2	57.75
Qtr3	93.25
Qtr4	52.5
2023	**436.5**
Qtr1	153.5
Qtr2	58.75
Qtr3	142.25
Qtr4	82
2024	**580.25**
Qtr1	131.5
Qtr2	246.5
Qtr3	125
Qtr4	77.25
2025	**144.75**
Qtr1	64
Qtr2	80.75
Grand Total	**2177**



Electrical Emergency Work Hours

Row Labels	Sum of Overtime
2021	**174**
Qtr1	32.25
Qtr2	30
Qtr3	57
Qtr4	54.75
2022	**413.75**
Qtr1	92
Qtr2	97.25
Qtr3	99.5
Qtr4	125
2023	**513**
Qtr1	147.5
Qtr2	123
Qtr3	105.75
Qtr4	136.75
2024	**491.75**
Qtr1	181.5
Qtr2	98.25
Qtr3	57
Qtr4	155
2025	**263**
Qtr1	151.25
Qtr2	111.75
Grand Total	**2341**



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