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ASSET MANAGEMENT PLAN

20
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Acronyms and Abbreviations

| Acronym or Abbreviation | Meaning |
|-------------------------|-----------------------------------|
| ® | registered trademark |
| AM | Asset Management |
| AMP | Asset Management Plan |
| AS | Activated Sludge |
| AS1 | Activated Sludge 1 |
| AS2 | Activated Sludge 2 |
| BB | Blower Building |
| CCTV | Closed-Circuit Television |
| Cen Gen | Central Generation Facility |
| CCI | Construction Cost Index |
| CIP | Capital Improvement Program |
| CoF | consequence of failure |
| CP | Control Panel |
| CM | corrective maintenance |
| CTS | Co-thickened sludge |
| DAFT | Dissolved Air Flotation Thickener |
| DC | Distribution Center |
| DIP | Ductile Iron Pipe |
| EAM | Enterprise Asset Management |
| E&I | Electrical & Instrumentation |
| EBDB | East Basin Distribution Box |
| EJB | Effluent Junction Box |
| Elec. | Electrical |
| EPSA | Effluent Pump Station Annex |
| FE | Facilities Engineering |
| FeCl ₃ | Ferric Chloride |
| FY | Fiscal Year |
| GWRS | Groundwater Replenishment System |
| H ₂ S | Hydrogen Sulfide |
| HCl | Hydrochloric Acid |
| HDPE | High-Density Polyethylene Resin |

| Acronym or Abbreviation | Meaning |
|-------------------------|---|
| HP | Horsepower |
| HPU | Hydraulic Power Unit |
| HVAC | Heating, Ventilation, and Air Conditioning |
| HW | Headworks |
| I&C | Instrumentation and Controls |
| Inst. | Instrument |
| JB | Junction Box |
| JSA | Junction Structure A |
| kV | Kilovolt |
| kW | Kilowatt |
| LEL | Lower Explosive Limit |
| LoF | Likelihood of Failure |
| LOFLO | Low Flow |
| LOX | Liquid Oxygen |
| M&D | Metering & Diversion |
| MCC | Motor Control Center |
| MES | Major Equipment Status |
| MGD | Million Gallons Per Day |
| ML | Mixed Liquor |
| MP | Maintenance Project |
| MSP | Main Sewage Pump |
| MTBF | Mean Time between Failure |
| N/A | Not Applicable |
| NaOH | Sodium Hydroxide |
| NASSCO | National Association of Sewer Service Companies |
| NFPA | National Fire Protection Association |
| No. | Number |
| NPDES | National Pollutant Discharge Elimination System |
| NSC | North Scrubber Complex |
| O&M | Operations and Maintenance |
| OC San | Orange County Sanitation District |
| OCWD | Orange County Water District |
| OEM | Original Equipment Manufacturer |

| Acronym or Abbreviation | Meaning |
|-------------------------|---|
| O OBS | Ocean Outfall Booster Station |
| OPT | Optimization |
| OSHA | Occupational Safety and Health Administration |
| OXI | Oxidizer |
| P1 | Plant No. 1 |
| P2 | Plant No. 2 |
| PB | Power Building |
| PC | Primary Clarifier |
| PSB | Primary Sedimentation Basin |
| 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 |
| PISB | Primary Influent Splitter Box |
| PLC | Programmable Logic Controller |
| PM | Preventive Maintenance |
| PRN | Project Request Number |
| PS | Pump Station |
| psi | Pounds Per Square Inch |
| PVC | Polyvinyl Chloride |
| PWPS | Plant Water Pump Station |
| RAS | Return-Activated Sludge |
| RCM | Reliability-Centered Maintenance |
| RCP | Reinforced Concrete Pipe |
| RFID | Radio Frequency Identification |
| RSS | Return Secondary Sludge |
| RUL | Remaining Useful Life |
| RWQCB | Regional Water Quality Control Board |

| Acronym or Abbreviation | Meaning |
|-------------------------|--|
| SARI | Santa Ana River Interceptor |
| SBF | Sludge Blending Facility |
| SC | Secondary Clarifier |
| SCADA | Supervisory Control and Data Acquisition |
| SCR | Selective Catalytic Reduction |
| SE | Secondary Effluent |
| SEJB | Secondary Effluent Junction Box |
| SR | Secondary Return |
| SSC | South Scrubber Complex |
| T&D | Thickening & Dewatering |
| TBD | To Be Determined |
| TF | Trickling Filter |
| TFPS | Trickling Filter Pump Station |
| TFSC | Trickling Filter Secondary Clarifier |
| TFSE | Trickling Filter Secondary Effluent |
| TFSEJB-2 | Trickling Filter Secondary Effluent Junction Box 2 |
| TL | Trunkline |
| TPAD | Temperature-phased Anaerobic Digester |
| UPS | Uninterruptible Power Supply |
| V | Voltage |
| VCP | Vitrified Clay Pipe |
| VDC | Volts 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 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 our 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 management, while achieving our mission and vision statements. We manage asset reliability, mitigate risk, and ensure the quality of our delivered services according to the following stated intent for our 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.”

~ James D. Herberg, OC San General Manager

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. Our collection system infrastructure includes 388 miles of regional trunk sewer pipelines and 15 pump stations located throughout the OC San service area (Figure ES-1-1). Wastewater is conveyed to Reclamation Plant No. 1 in Fountain Valley and Treatment Plant No. 2 in Huntington Beach. These facilities treat an average daily wastewater flow of 180 million gallons per day (MGD), serving over 2.6 million people in central and northern Orange County, California.

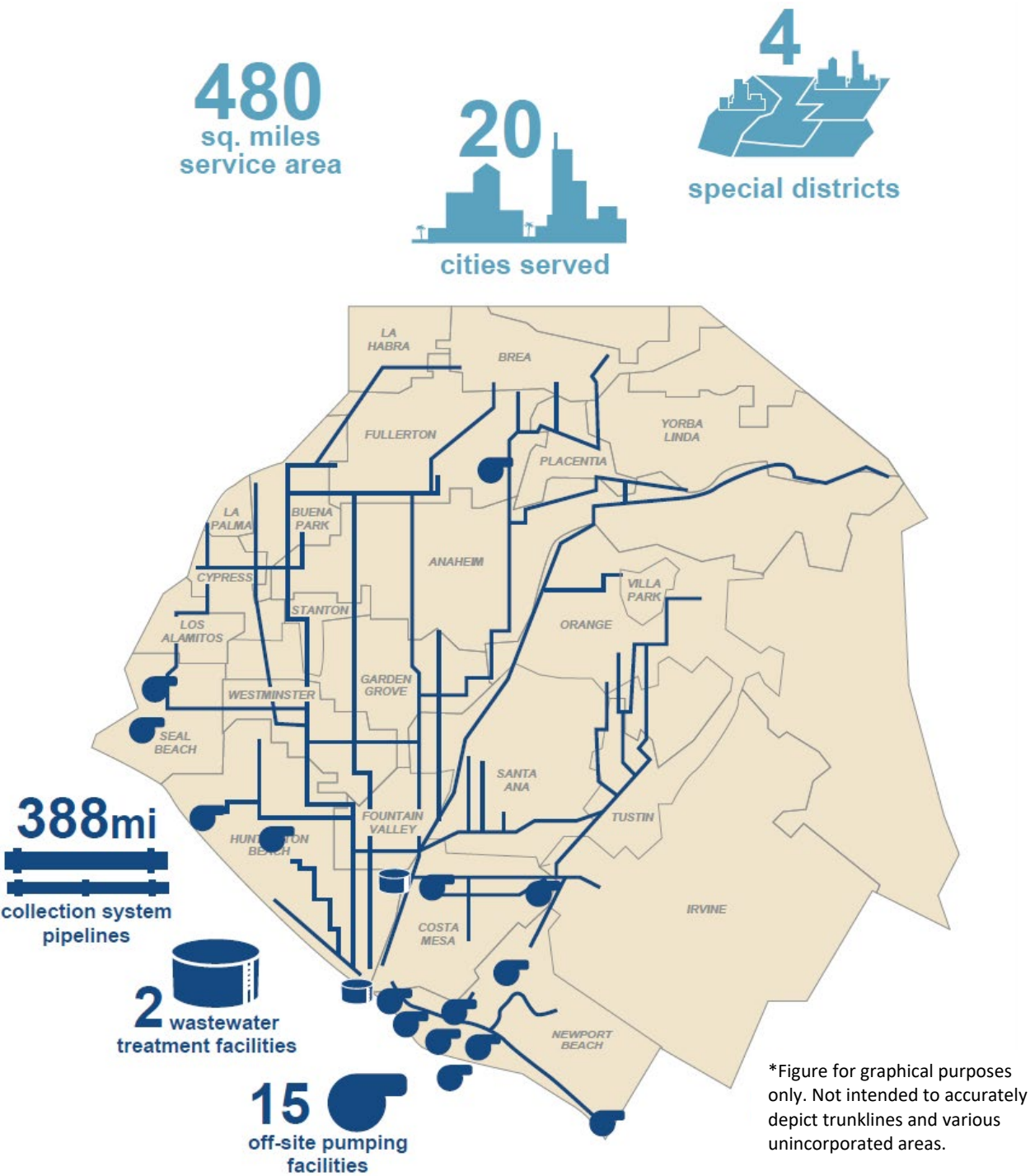


Figure ES-1-1. OC San's Service Area

Figure ES-1-2 shows the facility valuation by asset system for OC San's wastewater infrastructure. The valuation was prepared as part of the 2017 Facilities Master Plan. The estimated replacement value in FY 2022-23 is \$11.6 billion based on the Engineering News Record Construction Cost Index (CCI) increases since the 2017 Facilities Master Plan.

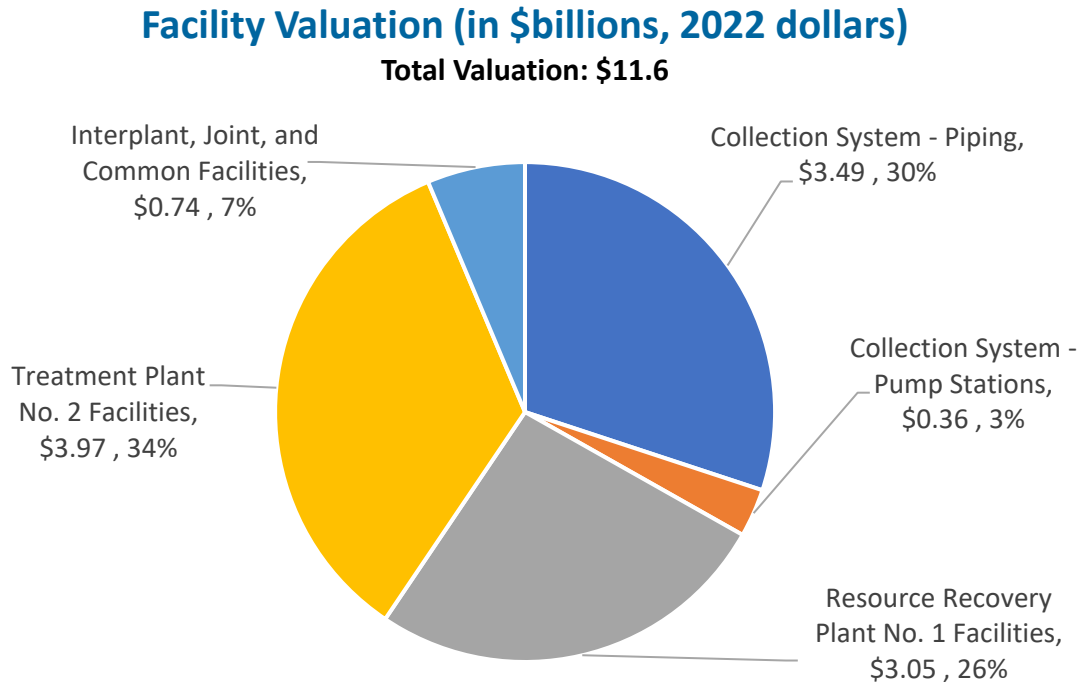


Figure ES-1-2. Facility Valuation by Location

State of OC San's Infrastructure

The following system-level summary tables and condition score maps provide a high-level overview of the Area Asset Management (AM) Summaries contained in Section 2. The system-level summaries are organized as follows:

- Plant No. 1 (Figure ES-1-3 and Table ES-1-1);
- Plant No. 2 (Figure ES-1-4 and Table ES-1-2);
- Collection System – Pump Stations and Newport Force Mains (Figure ES-1-5 and Table ES-1-3); and
- Collection – Pipelines (Figure ES-1-6 and Table ES-1-4).

The system-level summaries generally include the following fields:

- **Area No.:** Number which corresponds to individual plant asset areas. 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 by Asset Engineers in the detailed Area AM Summaries.
- **Percentage of RUL Scores with 4s or 5s:** Percentage based on total number of RUL asset scores assigned to each area in the detailed Area AM Summaries. The percentage is an alternate metric for the overall condition of the area and equipment. A RUL score of 5 indicates less than 5 years of useful life remains for an asset or set of assets. A RUL score of 4 indicates 5 to 10 years of useful life remains for an asset or a set of assets.
- **Replacement Value (\$ millions):** Process area replacement value from the facility valuation.

ASSET MANAGEMENT SYSTEM SUMMARY – PLANT NO. 1 OVERVIEW

Figure ES-1-3. Plant No. 1 Process Area – Remaining Useful Life Score Map

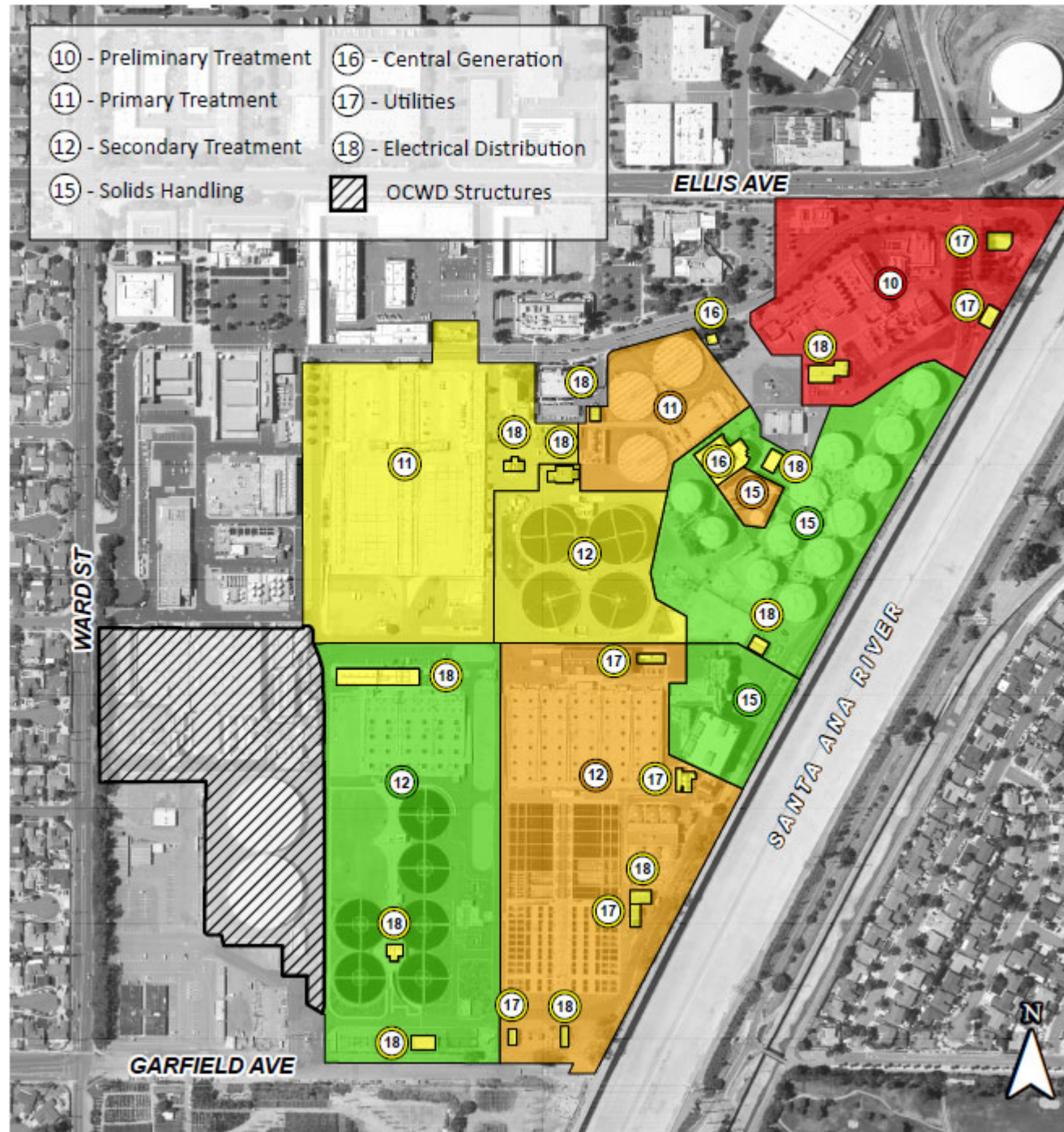


Table ES-1-1. Plant No. 1 Remaining Useful Life and Replacement Value Summary

| Area No. | Area Name | Average Remaining Useful Life Score | | | | | | Percentage of RUL Scores with 4s or 5s | Replacement Value (\$millions, in 2022 Dollars) |
|--------------------------|--|--|------------|------------|------------|-----------------|------------|--|---|
| | | Civil | Structural | Mechanical | Electrical | Instrumentation | All Assets | | |
| 10 | Preliminary Treatment | 2 | 3 | 5 | 5 | 5 | 5 | 64% | \$379.2 |
| 11 | Primary Treatment - Basins (1-5) | 5 | 3 | 4 | 5 | 5 | 4 | 70% | \$105.1 |
| 11 | Primary Treatment - Basins (6-31) | 4 | 3 | 3 | 3 | 4 | 3 | 27% | \$382.6 |
| 12 | Secondary Treatment - Activated Sludge 1 (AS1) | 3 | 3 | 4 | 4 | 5 | 4 | 82% | \$592.1 |
| 12 | Secondary Treatment - Activated Sludge 2 (AS2) | 1 | 1 | 2 | 3 | 3 | 2 | 13% | \$366.0 |
| 12 | Secondary Treatment - Trickling Filter | 1 | 1 | 3 | 4 | 3 | 3 | 16% | \$66.5 |
| 14 | Interplant | 2 | 2 | 2 | | 1 | 2 | 12% | \$737.7 |
| 15 | Solids Handling - Digesters | 2 | 1 | 3 | 2 | 2 | 2 | 2% | \$249.7 |
| 15 | Solids Handling – Thickening & Dewatering (T&D) Facilities | 1 | 1 | 2 | 2 | 1 | 2 | 0% | \$186.4 |
| 15 | Solids Handling - Gas Handling | 3 | 4 | 4 | 4 | 5 | 4 | 67% | \$36.6 |
| 16 | Central Generation ^a | | 1 | 4 | 4 | 3 | 3 | 53% | \$167.2 |
| 17 | Utilities | 3 | 2 | 3 | 2 | 2 | 3 | 0% | \$190.3 |
| 18 | Electrical Distribution ^a | | | | 3 | | 3 | 42% | \$80.0 |
| 19 | Occupied Buildings | Refer to Asset Management System Summary - Area 19 | | | | | | | \$244.1 |
| Plant No. 1 Total | | | | | | | | 37% | \$3,783.4 |

RUL Legend:

■ RUL <5 years
 ■ RUL 5-10 years
 ■ RUL 11-15 years
 ■ RUL 16-20 years
 ■ RUL >20 years

Acronym Key:

AS1 = Activated Sludge Plant No. 1; AS2 = Activated Sludge Plant No. 2; OCWD = Orange County Water District; RUL = Remaining Useful Life; TBD = To Be Determined; T&D = Thickening and Dewatering

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

ASSET MANAGEMENT SYSTEM SUMMARY – PLANT NO. 2 OVERVIEW

Figure ES-1-4. Plant No. 2 Process Area – Remaining Useful Life Score Map

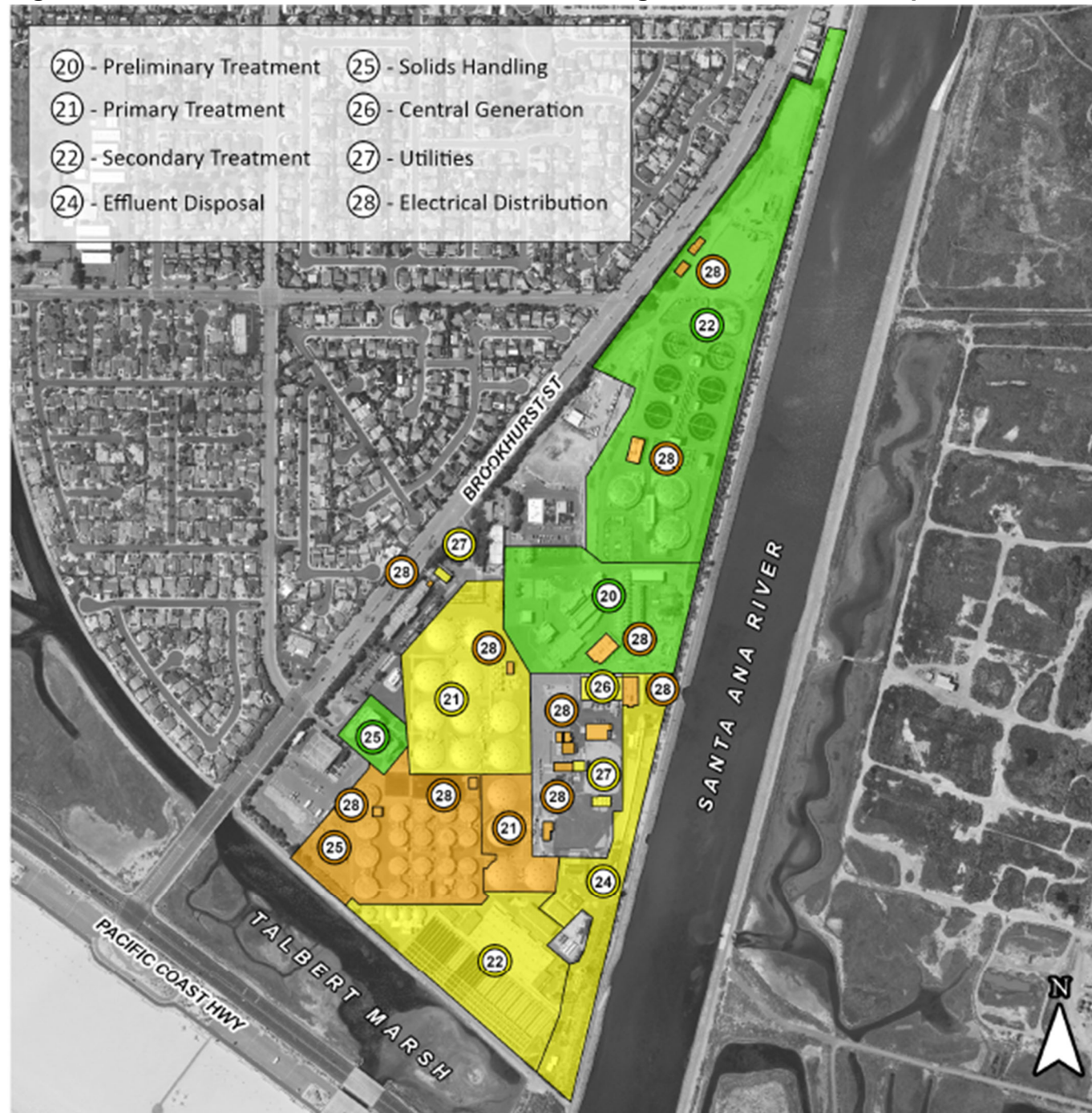


Table ES-1-2. Plant No. 2 Remaining Useful Life and Replacement Value Summary

| Area No. | Area Name | Average Remaining Useful Life Score | | | | | | Percentage of RUL Scores with 4s or 5s | Replacement Value (\$millions, in 2022 Dollars) | |
|--------------------------|--|--|------------|------------|------------|-----------------|------------|--|---|------------------|
| | | Civil | Structural | Mechanical | Electrical | Instrumentation | All Assets | | | |
| 20 | Preliminary Treatment | 1 | 1 | 2 | 2 | 2 | 2 | 10% | \$350.6 | |
| 21 | Primary Treatment - A Side | 5 | 4 | 4 | 3 | 3 | 4 | 57% | \$163.5 | |
| 21 | Primary Treatment - B & C Side | 3 | 3 | 3 | 3 | 3 | 3 | 4% | \$327.0 | |
| 22 | Secondary Treatment - Activated Sludge (AS) | 3 | 3 | 3 | 4 | 3 | 3 | 32% | \$600.5 | |
| 22 | Secondary Treatment – Dissolved Air Flotation Thickener (DAFT) | 4 | 1 | 2 | 3 | 3 | 3 | 5% | \$56.6 | |
| 22 | Secondary Treatment - Trickling Filter | 2 | 1 | 2 | 3 | 3 | 2 | 1% | \$335.6 | |
| 24 | Effluent Disposal | 2 | 2 | 3 | 3 | 4 | 3 | 19% | \$882.4 | |
| 25 | Solids Handling - Digesters | 3 | 4 | 4 | 4 | 4 | 4 | 70% | \$348.5 | |
| 25 | Solids Handling - Facilities | 2 | 1 | 2 | 2 | 2 | 2 | 3% | \$181.0 | |
| 25 | Solids Handling - Gas Handling | 3 | 3 | 3 | 4 | 4 | 4 | 33% | \$36.6 | |
| 26 | Central Generation ^a | | 1 | 4 | 4 | 3 | 3 | 62% | \$356.6 | |
| 27 | Utilities | 3 | 3 | 3 | 3 | 2 | 3 | 0% | \$106.1 | |
| 28 | Electrical Distribution ^a | | | | 4 | | 4 | 65% | \$78.5 | |
| 29 | Occupied Buildings | Refer to Asset Management System Summary - Area 29 | | | | | | | | \$143.3 |
| Plant No. 2 Total | | | | | | | | | 37% | \$3,966.6 |

RUL Legend:

■ RUL <5 years
 ■ RUL 5-10 years
 ■ RUL 11-15 years
 ■ RUL 16-20 years
 ■ RUL >20 years

Acronym Key:

AS = Activated Sludge; DAFT = Dissolved Air Flotation Thickener; RUL = Remaining Useful Life; TBD = To Be Determined

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

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM PUMP STATION OVERVIEW

Figure ES-1-5. Collection System Pump Station – Remaining Useful Life Score Map

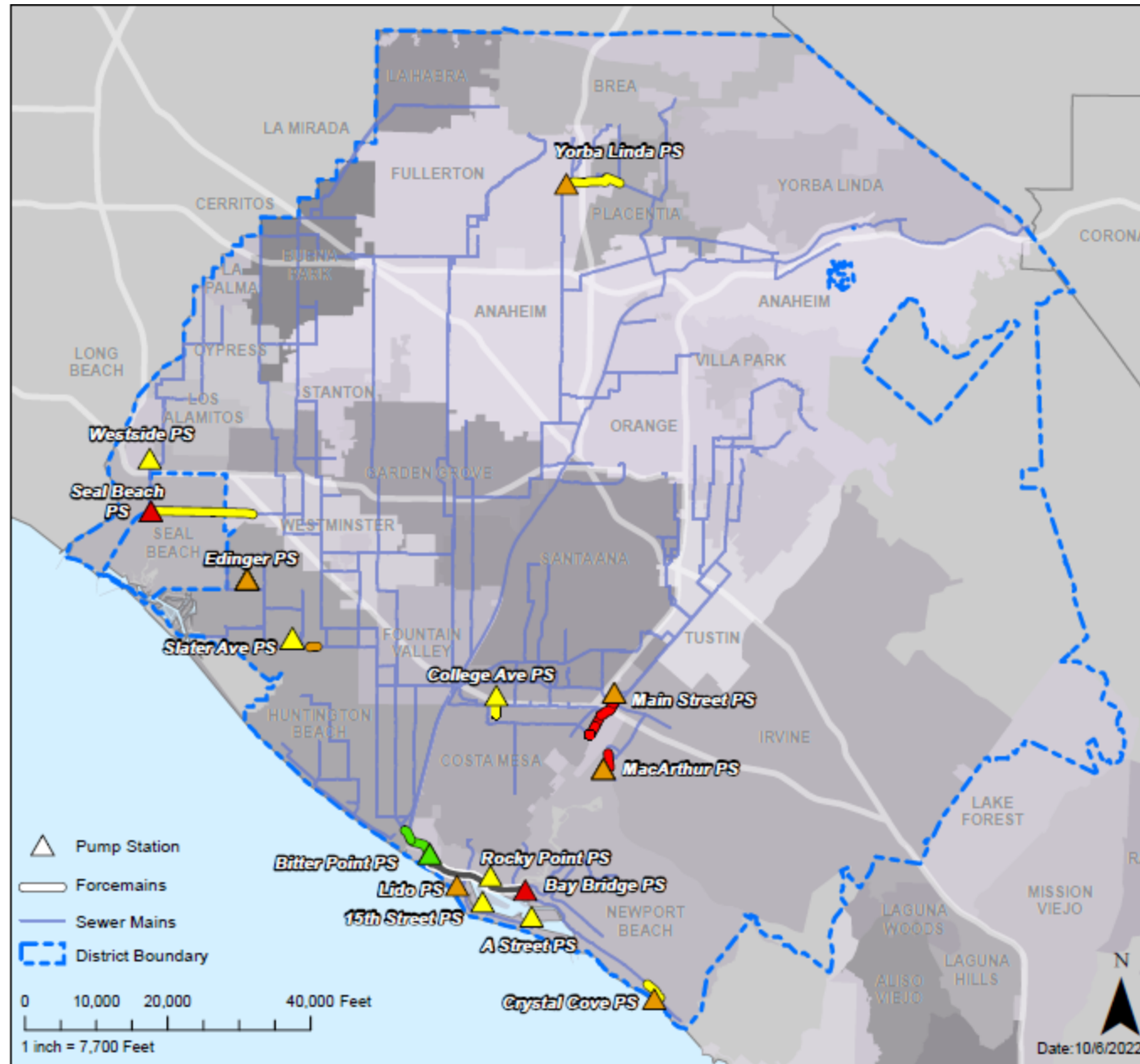
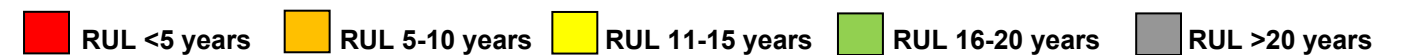


Table ES-1-3. Pump Station and Force Main Remaining Useful Life and Replacement Value Summary

| Pump Station | Average Remaining Useful Life Score | | | | | | Percentage of RUL Scores with 4s or 5s | Replacement Value (\$millions, in 2022 Dollars) |
|----------------------------------|-------------------------------------|------------|------------|------------|-----------------|------------|--|---|
| | Civil | Structural | Mechanical | Electrical | Instrumentation | All Assets | | |
| 15th Street | 3 | 4 | 4 | 3 | 2 | 3 | 31% | \$14.6 |
| A Street | 3 | 4 | 4 | 3 | 2 | 3 | 25% | \$12.7 |
| Bay Bridge | 4 | 4 | 5 | 4 | 3 | 5 | 77% | \$36.8 |
| Bitter Point | 2 | 3 | 2 | 2 | 2 | 2 | 15% | \$34.9 |
| College | 3 | 3 | 3 | 2 | 2 | 3 | 8% | \$26.0 |
| Crystal Cove | 3 | 4 | 3 | 4 | 3 | 4 | 42% | \$2.7 |
| Edinger | 5 | 4 | 3 | 4 | 4 | 4 | 45% | \$14.0 |
| Lido | 5 | 4 | 4 | 4 | 4 | 4 | 67% | \$21.8 |
| MacArthur | 5 | 4 | 4 | 4 | 2 | 4 | 73% | \$17.7 |
| Main Street | 5 | 3 | 4 | 3 | 3 | 4 | 46% | \$47.6 |
| Rocky Point | 1 | 4 | 3 | 2 | 2 | 3 | 15% | \$17.3 |
| Slater | 4 | 4 | 4 | 3 | 3 | 3 | 31% | \$38.2 |
| Seal Beach | 3 | 4 | 5 | 5 | 4 | 5 | 83% | \$45.0 |
| Westside | 3 | 3 | 3 | 2 | 3 | 3 | 8% | \$33.1 |
| Yorba Linda | 3 | 4 | 4 | 3 | 3 | 4 | 36% | Not Valued |
| Newport Force Mains ^a | 1 | | | | | 1 | 0% | -- |
| Total | | | | | | | 39% | \$362.2 |

RUL Legend:



Acronym Key:

PS = Pump Station; RUL = Remaining Useful Life

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

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.

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM PIPELINES OVERVIEW

Figure ES-1-6. Collection System Pipelines – Remaining Useful Life Score Map

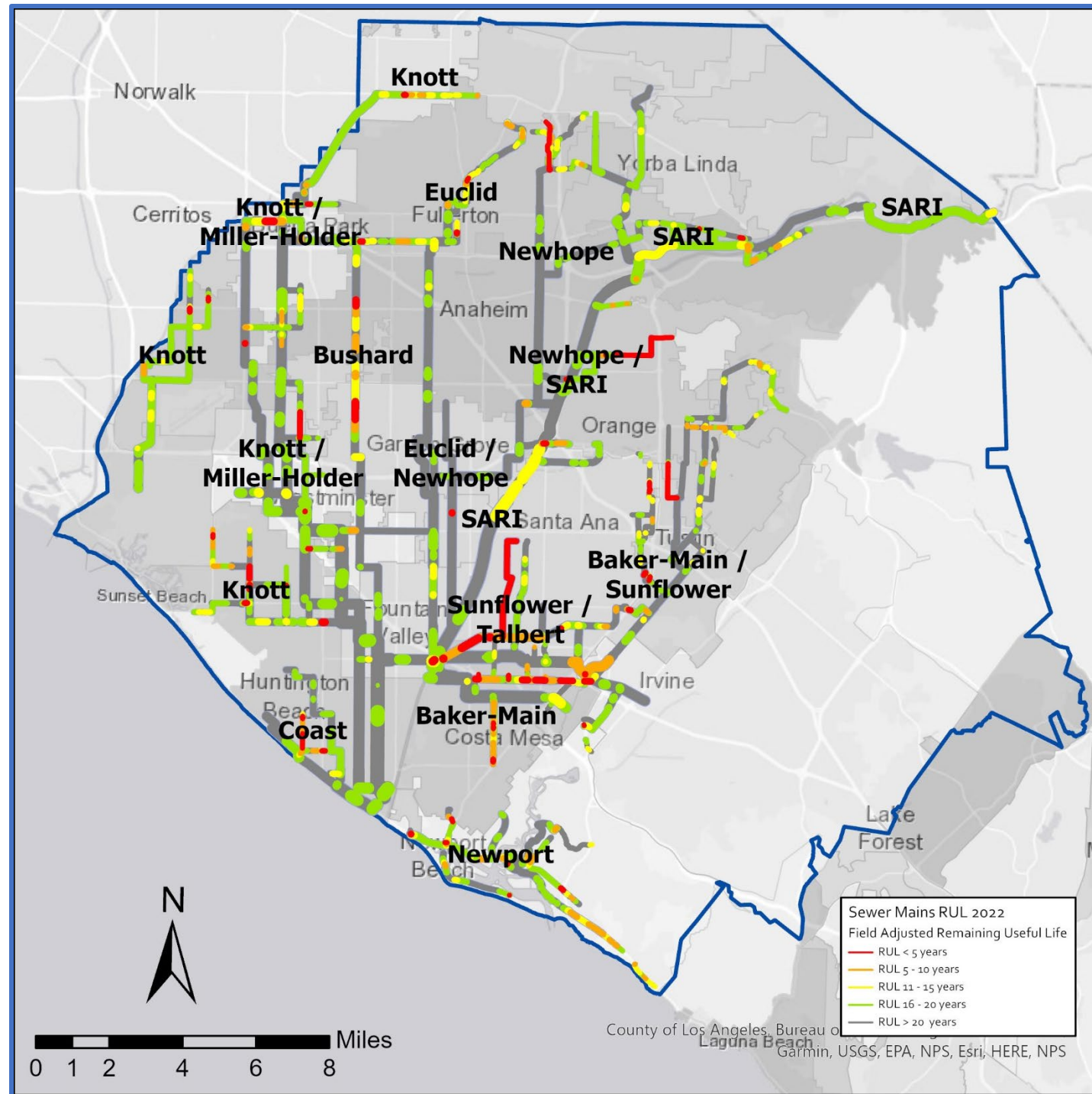


Table ES-1-4. Collection System Pipelines Remaining Useful Life and Replacement Value Summary

| Trunklines (TL) | No. of Pipes with RUL Scores of 4 or 5 | Miles of Pipes with RUL Scores of 4 or 5 | Percentage of RUL Scores with 4s or 5s (By Length) | Replacement Value (\$ Millions, in 2022 Dollars) ^a |
|------------------------------------|--|--|--|---|
| Baker-Main | 84 | 6.17 | 15% | \$298.3 |
| Bushard | 11 | 1.79 | 8% | \$261.6 |
| Coast | 16 | 1.05 | 9% | \$106.7 |
| Euclid | 8 | 0.54 | 2% | \$292.3 |
| Interplant | 0 | 0.00 | 0% | \$124.9 |
| Knott | 33 | 2.90 | 4% | \$676.7 |
| Miller-Holder | 24 | 1.75 | 6% | \$320.6 |
| Newhope | 24 | 1.83 | 6% | \$226.3 |
| Newport | 33 | 2.11 | 10% | \$234.2 |
| Santa Ana River Interceptor (SARI) | 57 | 3.06 | 6% | \$558.8 |
| Sunflower | 22 | 1.80 | 5% | \$324.7 |
| Talbert | 74 | 5.85 | 70% | \$62.4 |
| Total | 386 | 28.85 | 8% | \$3,487.5 |

RUL Legend:

■ RUL <5 years
 ■ RUL 5-10 years
 ■ RUL 11-15 years
 ■ RUL 16-20 years
 ■ RUL >20 years

Acronym Key:

RUL = Remaining Useful Life; SARI = Santa Ana River Interceptor; TL = Trunkline

^a The abandoned pipelines at the Airbase (\$6,366,516) and the Harvard Area Trunk Sewer (\$191,784) areas are not included in the total.

Budgetary Considerations

The Asset Management Plan 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. OC San has been striving to identify more accurately medium- to long-term capital cash flow requirements.

Fiscal Year (FY) 2022-2023 Budget Update, the first year of the two-year budget adopted in June 2022, includes updates to the 20-year Capital Improvement Program (CIP) outlay. Figure ES-1-7 includes current and projected CIP projects.

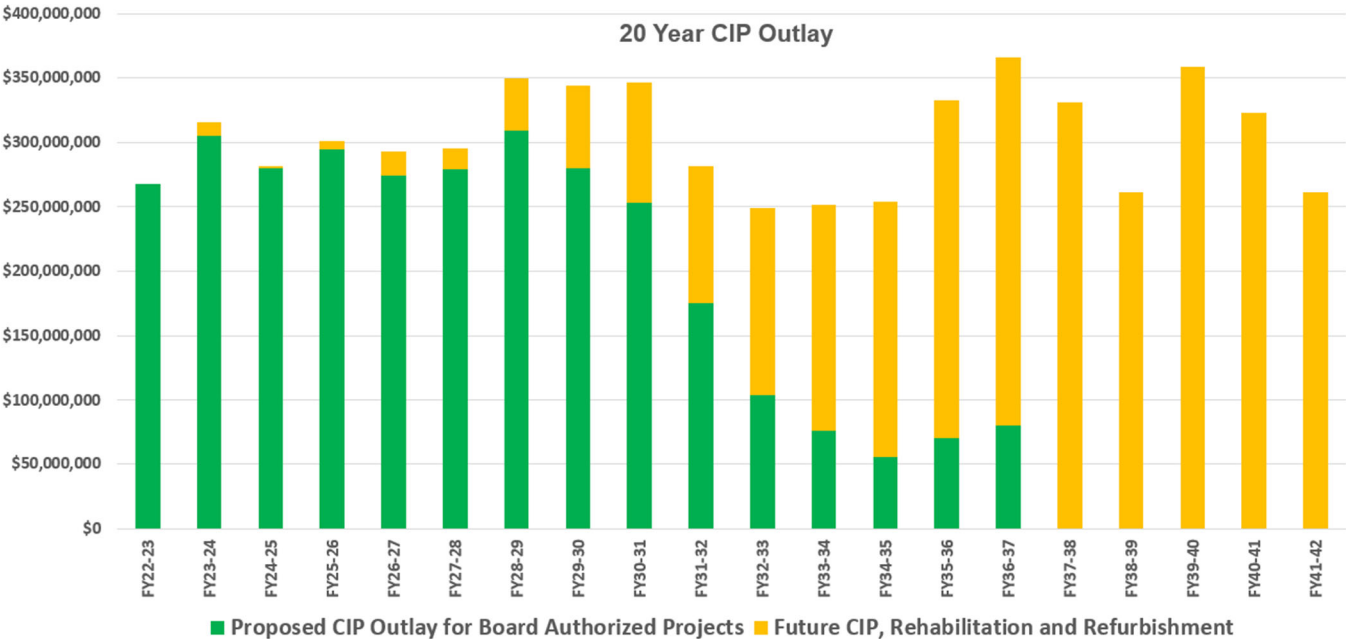


Figure ES-1-7. 20-Year CIP Outlay

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1 Introduction

The Orange County Sanitation District (OC San) Board of Directors developed mission and vision statements to clearly communicate OC San's purpose to our stakeholders and to articulate OC San's organizational objectives. OC San's vision supports our mission by expressing what we strive 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, we are better able to coordinate and plan actions to ensure our collection system, treatment, and resource recovery infrastructure is safe and reliable, and meets the rigorous level of service embodied by our 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 make up OC San's asset management strategy.

Asset Management Policy

OC San will assess and manage the collection system and treatment plant systems and assets to improve resilience and reliability while lowering lifecycle 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

- *Create an annual Asset Management Plan documenting the condition of the collection system and treatment plants, and upcoming maintenance or capital projects.*

- *Coordinate the efforts of operations, collections, mechanical maintenance, electrical maintenance, instrument maintenance, and engineering through process teams to assure the 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 nearly \$11 billion in assets on a prioritized risk basis to establish rate structures.*

The Asset Management Plan is a living document that describes constantly evolving operation strategies, maintenance and refurbishment plans and adaptations, and CIP implementation initially captured in the Facilities Master Plan and revised on an annual basis through the budgeting process. The information included in the Asset Management Plan 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:

- 1) Take a proactive approach to repair, rehabilitation, and replacement.
- 2) Ensure assets are reliable and operating when needed.
- 3) Minimize unplanned outages and equipment downtime.
- 4) Manage risks associated with asset or service impairment through asset performance optimization.
- 5) Develop cost-effective management strategies for the long term.
- 6) Strive to implement world class asset management strategies through continual improvement in our asset management practices.

ALIGNMENT



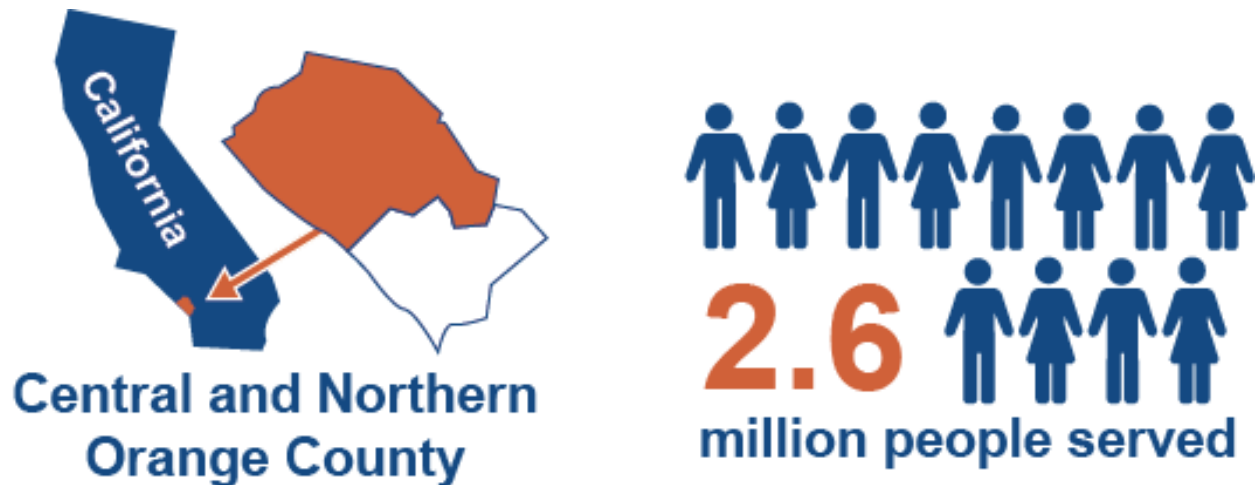
The Asset Management Plan is a key component of OC San's overall planning activities. It aligns with the OC San's Strategic Plan and the Facilities Master Plan (inclusive of the projects identified therein), while identifying potential and new opportunities that may require funding in the budget development process. Table 1-1 describes the relationship of the Asset Management Plan to 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 Asset Management Plan 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 Asset Management Plan and refined as appropriate. | 20-year | Varies |
| Asset Management Plan | Documents the overall condition of treatment and collection system 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 | Annual |
| Budget Book | Lays out the framework of OC San's activities and serves as a source of information for our Board of Directors, rate payers, and employees. It includes operational, capital, and debt service expenditures necessary to support our mission and to execute the Strategic Plan adopted by our Board of Directors. The Asset Management Plan 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 northern Orange County, California. OC San's two resource recovery and wastewater treatment facilities treat an average daily wastewater flow of 180 million gallons per day (MGD) from residential, commercial, and industrial sources.



In addition to our plant facilities, OC San owns and operates wastewater collection system infrastructure. Our collection system infrastructure includes 388 miles of regional trunk sewer pipelines and 15 pump stations located throughout OC San's service area (Figure 1-1). Wastewater is conveyed via the collection system to Reclamation Plant Number (No.) 1 in Fountain Valley, and Treatment Plant No. 2 in Huntington Beach, where resource recovery and wastewater treatment take place.

OC San's treatment plants currently operate under a regulatory permit from the Regional Water Quality Control Board (RWQCB). This authority is established through the National Pollutant Discharge Elimination System (NPDES) that permits the discharge of treated wastewater through an ocean outfall system to the Pacific Ocean. While some of this treated water is released five 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.

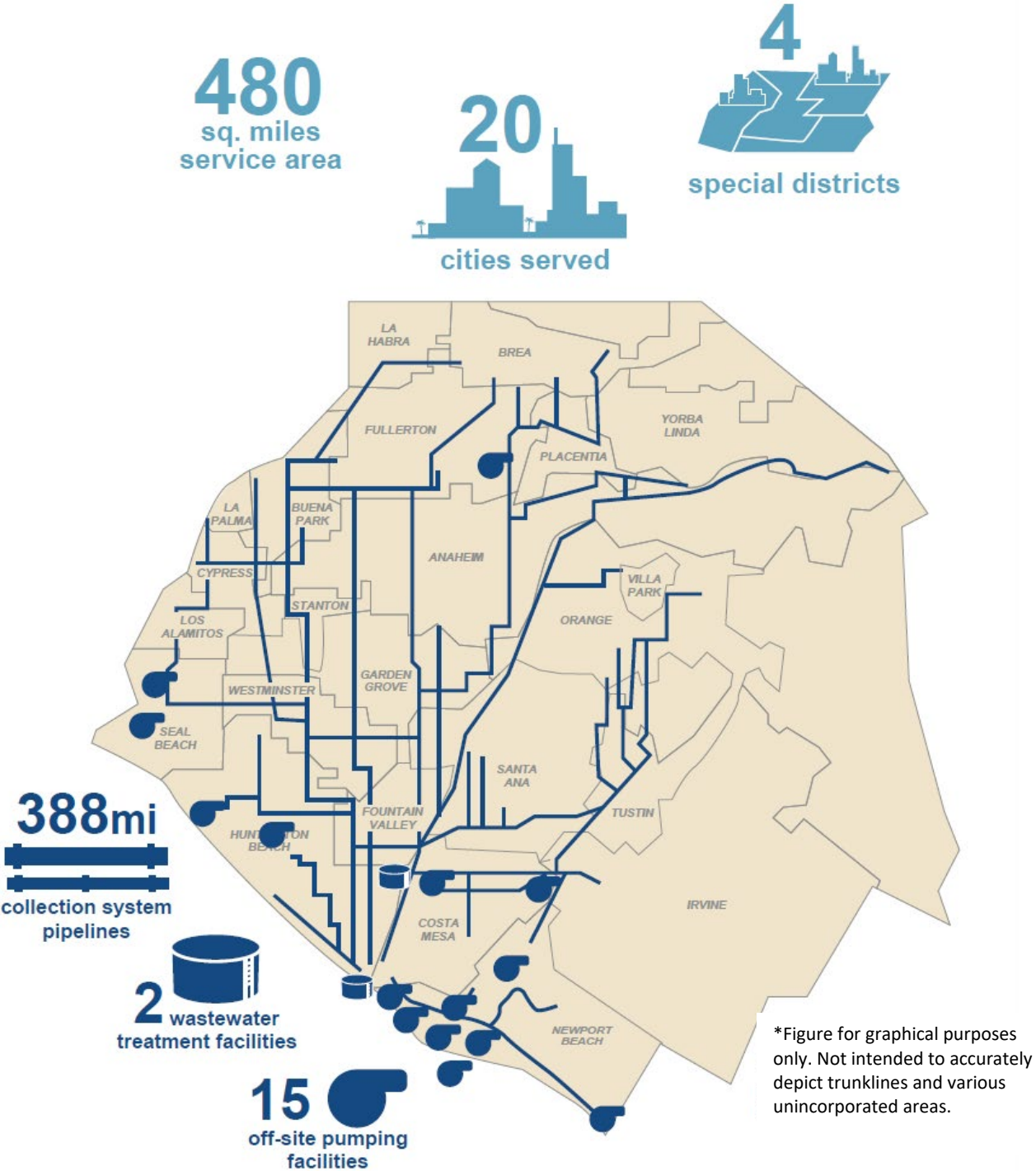
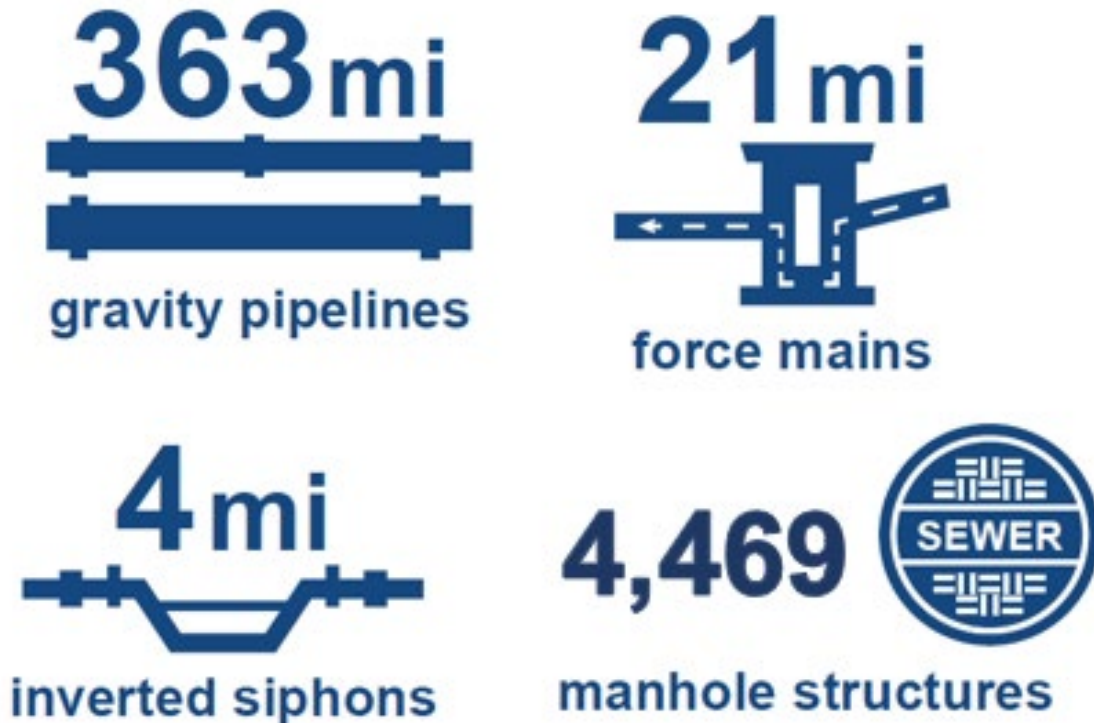


Figure 1-1. OC San's Service Area

1.1.1 Collection System

OC San's collection system serves as a regional conveyance system, collecting and conveying flows from 20 cities, 4 special districts, and various unincorporated areas. OC San's 388 miles of collection system pipelines and 15 pump stations are spread throughout northern Orange County and include 363 miles of gravity pipelines, 21 miles of force mains, 4 miles of inverted siphons and 4,469 manhole structures.



OC San has worked with member city and agency staff to understand future development plans, flow estimates, and has collected historical inflow and infiltration rates during wet weather events to assure 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.

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 and Treatment 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 structure, mechanical bar screens, grit chambers, and primary basins, before going to one of two air-activated sludge processes, or trickling filters, and secondary clarifiers. Thereafter, secondary effluent is diverted to OCWD’s facilities for tertiary treatment prior to reuse. The remaining flow goes to the Plant No. 2 ocean outfall system. For a summary of Plant No. 1 design capacity, please refer to Table 1-3. For a map of the facilities and more detailed understanding of how Plant No. 1 treatment processes work together, please refer to Appendices A and B, respectively.

Solids treatment at Plant No.1 includes co-thickening of primary and secondary sludge, followed by 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. In addition, Plant No. 1 includes facilities for odor control and chemical addition to support the aforementioned.

Treatment 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 oxygen activated sludge secondary treatment facility or the trickling filters/solids contact basins.

Currently, Plant No. 2 secondary effluent is discharged to the ocean through the outfall system. After the construction of OCWD's GWRS final expansion and associated projects in 2023, Plant No. 2 reclaimable secondary effluent together with Plant No. 1 secondary effluent will be diverted to OCWD for advanced treatment and ground water injection. For a summary of Plant No. 2 design capacity, please refer to Table 1-4. For a map of the facilities and more detailed understanding of how Plant No. 2 treatment processes work together, before and after the final expansion of GWRS, please refer to Appendices C, D, and E, respectively.

Solids treatment at Plant No. 2 includes dissolved air flotation thickening of waste-activated sludge (WAS) and 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 a 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 Main Sewage Pump (MSP) replacement by P1-105, with 4 duty pumps in service and 1 stand by |
| Primary | 153 | 352 | With 1 circular and 2 rectangular PCs out of service |
| Secondary | 182 | 345 | With all basins, TFs and clarifiers in service |

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

| Treatment Processes | ADWF Capacity (mgd) | PWWF Capacity (mgd) | Notes |
|---------------------|---------------------|---------------------|---|
| Headworks | 144 | 322 | After P2-122, with 3 large and 2 small duty pumps in service, and 1 large and 1 small pumps standby |
| Primary | 156 | 312 | With 1 PC out of service |
| Secondary | 150 | 317 | With all basins, TFs and clarifiers in service |

1.1.3 Outfall System

The ocean outfall system includes three discharge structures: **Outfall No. 1**, **Outfall No. 2**, and the **Santa Ana River Emergency Overflow Weirs**.

Outfall No. 2 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 and is currently undergoing a comprehensive assessment and will undergo a rehabilitation to ensure its reliability for many years to come.

OUTFALL NO. 2 PRIMARY OCEAN OUTFALL



Outfall No. 1 serves as an emergency outfall and primary backup to Outfall No. 2, discharging treated wastewater over a mile offshore at a depth of approximately 65 feet. It was originally constructed in 1954 and was later modified in 1965. It is located over a mile offshore at a depth of approximately 65 feet and serves as a primary backup to Outfall No. 2. OC San's NPDES permit specifies that this outfall can only be used in the case of an emergency or during planned maintenance activities. This outfall will also go through a comprehensive assessment in the near future.

OUTFALL NO. 1 EMERGENCY OUTFALL



The outfall system has two **Santa Ana River Emergency Overflow Weirs** at Plant No. 2, which 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 Facility Valuation

As part of the 2017 Facilities Master Plan, OC San commissioned an engineering study to determine the 2017 valuation of all OC San capital facilities, including Plant No. 1, Plant No. 2, interplant and joint treatment facilities, and the collection system (including sewer pipelines and pump stations). The estimated replacement value in FY 2022-23 is \$11.6 billion based on the Engineering News Record Construction Cost Index (CCI) increases since the 2017 Facilities Master Plan.

Figure 1-2 shows the valuation information, presented in five general sub-process areas:

- Collections Systems Piping;
- Collection Systems Pump Stations;
- Reclamation Plant No. 1 Facilities;
- Treatment Plant No. 2 Facilities; and
- Interplant, Joint, and Common Facilities.

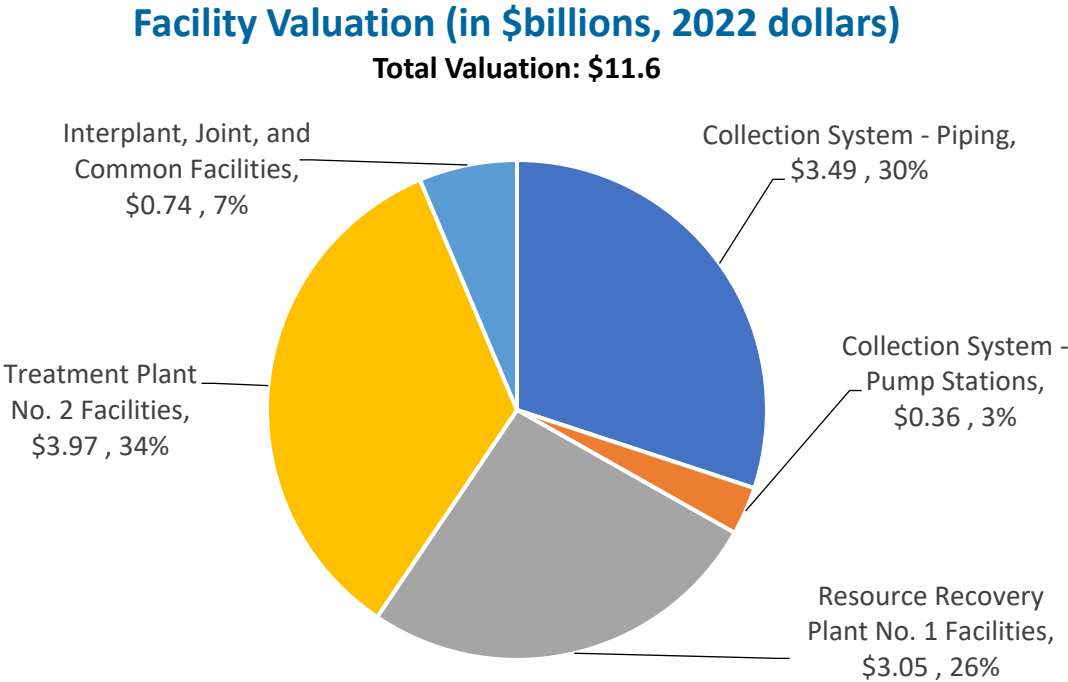


Figure 1-2. Facility Valuation by Area

1.3 Asset Management Organization

Asset management is an essential part of OC San, and our overall mission to deliver safe, economical, and reliable wastewater treatment services. Every part of our organization is involved in some aspect of asset management and ensuring that assets are designed, constructed, operated, and maintained to reliably deliver the required level of service to our customers. Through a very collaborative effort, each group plays an important role in ensuring that the individual asset management initiatives are properly executed (Figure 1-3).



Figure 1-3. 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.
- **Engineering Planning** provides engineering support for short- and long-term management of assets, while working towards asset management objectives.

- **Engineering Project Management** manages 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 design and construction management of facilities and maintenance projects.
- **Engineering 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 requirements.
- **Information Technology** ensures all assets commissioned through projects are included in the Enterprise Asset Management (EAM) database.

To fulfill our commitment to our ratepayers for providing safe and reliable services, OC San's Asset Management Program is structured to align the Engineering and Operations and Maintenance (O&M) departments. OC San's Asset Management Group, within the Engineering Planning Division, consists of nine Asset Engineers assigned to the various process areas in the treatment plants and collection system. They are responsible for understanding the key issues or concerns related to the condition of OC San's assets and for developing and coordinating plans or strategies to ensure that the assets operate reliably and are functioning properly. The Asset Engineers, assigned to their respective process or collection system area(s), work closely with the O&M Area Team members to maintain familiarity with all aspects that may impact the operation, condition, process, and/or maintenance-related issues within their assigned areas. The Operations team focuses on operating 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 maintain installed assets in a ready state for Operations and balance planned maintenance activities with the Capital Improvement Program.

Collectively, the Area Teams work together to reach the goal of providing the required level of service to our customers, at the lowest lifecycle cost with an acceptable level of risk. This strategy involves a significant investment in internal coordination but ensures that we are properly assessing risks, solving problems and process deficiencies in a timely manner.

1.3.1 Major Assets

A "major asset" is defined as any asset that is specifically tracked, monitored, or recorded for the purposes of fulfilling the directives as defined by the Asset Management Plan (AMP). While a major asset is typically defined as a higher-level assembly of simple assets, a major asset can be comprised of other assets. For example, while collectively a clarifier can be called a major asset, it is comprised of other assets such as pumps, drive mechanisms, motors, etc. The term major asset is used by the Asset Engineer 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. It should be noted here that "major assets" are sometimes simply referred to as "assets" for simplicity purposes. Here are some examples of tests that are used to differentiate between a major asset and merely an asset:

- 1) Does it perform a substantial role in the collection, treatment, or effluent process?
- 2) Does its direct use help us to meet level of service and quality metrics?
- 3) Does it require a predictive, proactive, or preventative maintenance service approach to facilitate its management?
- 4) Does its failure present a large impact to a process or system?

- 5) Is its reliability pertinent to the operation of the plant?
- 6) Does its function, or lack thereof, present a detriment to plant performance metrics?
- 7) Is it critical to the operation of the plant?
- 8) Does it have a propensity to affect or influence the safety of the plant?
- 9) Does it directly influence our plant permit compliance?

There are other variations to 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 assets using an EAM system, Maximo®. Furthermore, the AMP definition deviates from the Finance & Accounting Department commonly used meaning of an “asset”, as that definition is typically defined relative to accounting practices for tax purposes. In summary, the Asset Management, Maintenance, and Finance groups look at and define assets somewhat differently, albeit minor in some cases, and it is important to identify those similarities and differences.

1.3.2 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 below.

Table 1-5. Remaining Useful Life Score vs. 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 remaining useful life from original installation, repair, or rehabilitation date(s) and regular maintenance activities based on historical data;
- Condition assessments, manned, or remote inspections as applicable;
- O&M field observations and recommendations;
- Performance, maintenance, and reliability history including condition monitoring reports from Maintenance Reliability Group;
- Regular field inspections of asset areas; and
- Engineering judgement.

1.3.3 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, enabling the real-time performance of assets. The premise of PdM is a proactive approach to minimize unexpected breakdowns, reduce repair cost, extend the Mean Time Between Failure (MTBF), monitor the actual equipment health through quantifiable means, and perform advanced analysis and failure detection. In addition, when sudden changes or variations in the process manifest, they are often found during the regular Maintenance Reliability rounds as part of their 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, improving the overall equipment reliability, and assisting the Asset Management Group with accurately determining an asset's RUL.

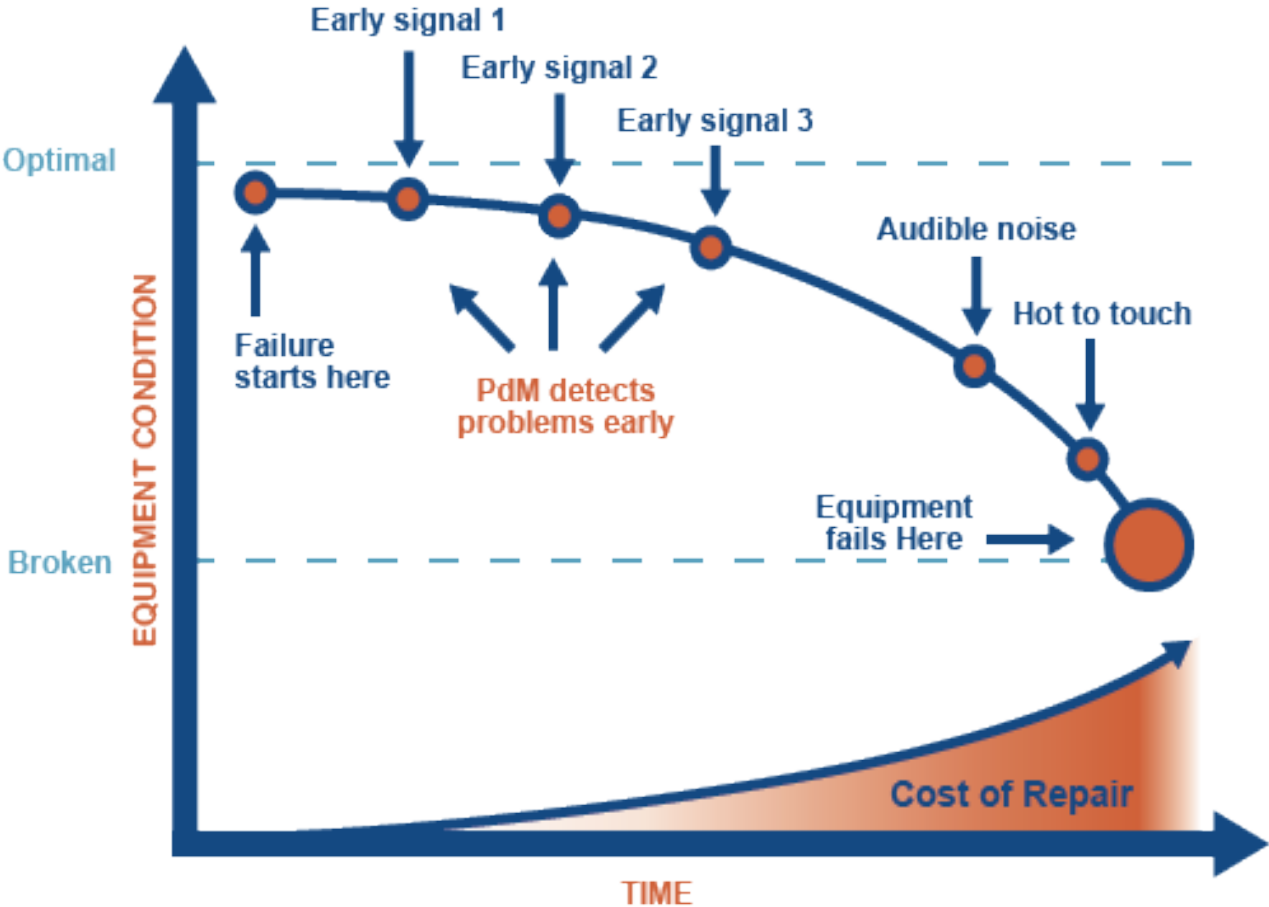


Figure 1-4. PdM Summary

1.3.3.1 Mechanical Discipline

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

- Vibration analysis to measure imbalance in rotating equipment;
- Oil analysis to predict lubricant and equipment degradation;
- Airborne Ultrasound;
- Infrared thermograph to detect hot spots; and
- IRIS motion camera (measures deflection and displacement).

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

1.3.3.2 Electrical Discipline

The electrical PdM Program currently 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; and
- Medium voltage feeder cable testing to determine the health of cables and insulation.

1.3.4 Preventive and Corrective Maintenance

Beyond the advanced PdM strategies, OC San also performs time and cycle-based preventive maintenance (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 these activities:

- OC San has created a PM Optimization Group that is tasked with conducting an in-depth assessment to optimize preventive maintenance strategies for new and existing assets and to establish maintenance approaches and strategies for assets installed by capital improvement projects prior to beneficial occupancy. The PM Optimization Program tracks, maintains, and manages assets throughout their lifecycles from design, construction, commissioning, beneficial occupancy, operations, and maintenance to the eventual decommissioning or replacement of those assets. This ensures that asset lifecycle is maximized with the lowest risk to 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 ensuring that work groups have sufficient 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 preventive maintenance activities within Maximo® (which includes fine tuning job plans based on input received from field staff, leads, and 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.

1.3.4.1 Civil Discipline

PM and CM activities include:

- 1) Cleaning of civil facilities;
- 2) Chemical conditioning of the sewage to reduce corrosion and control odors;
- 3) Minor repairs;
- 4) Application and repair of coatings; and
- 5) Maintenance and testing of cathodic protection systems.

1.3.4.2 Mechanical, Electrical, and Instrumentation Disciplines

PM and CM activities include:

- 1) Valve and gate exercising program comprising more than 264 PM tasks for over 1,650 valves and gates in both plants and collection system;
- 2) Equipment rotation program to ensure equipment wear is predictable;
- 3) Adjustments and mechanical alignments;
- 4) Equipment rebuilding and regular testing;
- 5) Changing of lubricants and filters;
- 6) Electrical equipment cleaning and tightening;
- 7) Electrical power distribution equipment PM;
- 8) Circuit breakers and protective relays PM; and
- 9) Sensors and meters calibration.

2 State of OC San's Infrastructure

The Area AM Summaries are intended to summarize the condition of major assets, identify key issues for further investigation, and summarize maintenance and CIP projects planned over the next 10 to 15 years. The approach for developing the AM Summaries is to assemble a list of major assets, document key issues, define the average remaining useful lives of these assets, and identify OC San's plan to address performance and reliability issues of these assets over the 1-, 5-, and 10-year planning horizons. Each month, Asset Engineers present one or more of the AM Summaries to the AM Council; over the course of a year all the process areas, pump stations and collection system are presented. The Area AM Summaries are updated as needed and incorporated into the AMP, which is published annually.

2.1 Asset Management System Summaries

The following system-level summaries provide a high-level overview of the Area AM Summaries contained in Section 2.2. The RUL scores are an average of the RUL scores for that discipline within that process area. Detailed condition scores are presented in the Area AM Summaries. The system-level summaries are organized by:

- Plant No. 1;
- Plant No. 2;
- Collection System – Pump Stations; and
- Collection System – Pipelines.

The system-level summaries include an area map showing the general layout of the process areas or collection system, and a table with the following fields:

- **Area No.:** Number which 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 by Asset Engineers in the detailed Area AM Summaries.
- **Percentage of RUL Scores with 4s or 5s:** Percentage based on total number of RUL scores assigned to each area by Asset Engineers in the detailed Area AM Summaries. The percentage is an alternate metric for the overall condition of the area.
- **Replacement Value (\$million):** Process area replacement value in FY 2022-23 dollars based on the Engineering News Record CCI increases since the 2017 Facilities Master Plan.

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ASSET MANAGEMENT SYSTEM SUMMARY – PLANT NO. 1 OVERVIEW

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



Table 2-1. Plant No. 1 Remaining Useful Life and Replacement Value Summary

| Area No. | Area Name | Average Remaining Useful Life Score | | | | | | Percentage of RUL Scores with 4s or 5s | Replacement Value (\$millions, in 2022 Dollars) |
|--------------------------|--|--|------------|------------|------------|-----------------|------------|--|---|
| | | Civil | Structural | Mechanical | Electrical | Instrumentation | All Assets | | |
| 10 | Preliminary Treatment | 2 | 3 | 5 | 5 | 5 | 5 | 64% | \$379.2 |
| 11 | Primary Treatment - Basins (1-5) | 5 | 3 | 4 | 5 | 5 | 4 | 70% | \$105.1 |
| 11 | Primary Treatment - Basins (6-31) | 4 | 3 | 3 | 3 | 4 | 3 | 27% | \$382.6 |
| 12 | Secondary Treatment – Activated Sludge 1 | 3 | 3 | 4 | 4 | 5 | 4 | 82% | \$592.1 |
| 12 | Secondary Treatment – Activated Sludge 2 | 1 | 1 | 2 | 3 | 3 | 2 | 13% | \$366.0 |
| 12 | Secondary Treatment – Trickling Filter | 1 | 1 | 3 | 4 | 3 | 3 | 16% | \$66.5 |
| 14 | Interplant | 2 | 2 | 2 | | 1 | 2 | 12% | \$737.7 |
| 15 | Solids Handling - Digesters | 2 | 1 | 3 | 2 | 2 | 2 | 2% | \$249.7 |
| 15 | Solids Handling - Facilities | 1 | 1 | 2 | 2 | 1 | 2 | 0% | \$186.4 |
| 15 | Solids Handling - Gas Handling | 3 | 4 | 4 | 4 | 5 | 4 | 67% | \$36.6 |
| 16 | Central Generation ^a | | 1 | 4 | 4 | 3 | 3 | 53% | \$167.2 |
| 17 | Utilities | 3 | 2 | 3 | 2 | 2 | 3 | 0% | \$190.3 |
| 18 | Electrical Distribution ^a | | | | 3 | | 3 | 42% | \$80.0 |
| 19 | Occupied Buildings | Refer to Asset Management System Summary - Area 19 | | | | | | | \$244.1 |
| Plant No. 1 Total | | | | | | | | 37% | \$3,783.4 |

RUL Legend:

■ RUL <5 years
 ■ RUL 5-10 years
 ■ RUL 11-15 years
 ■ RUL 16-20 years
 ■ RUL >20 years

Acronym Key:

OCWD = Orange County Water District; RUL = Remaining Useful Life; T&D = Thickening and Dewatering

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

ASSET MANAGEMENT SYSTEM SUMMARY – PLANT NO. 2 OVERVIEW

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

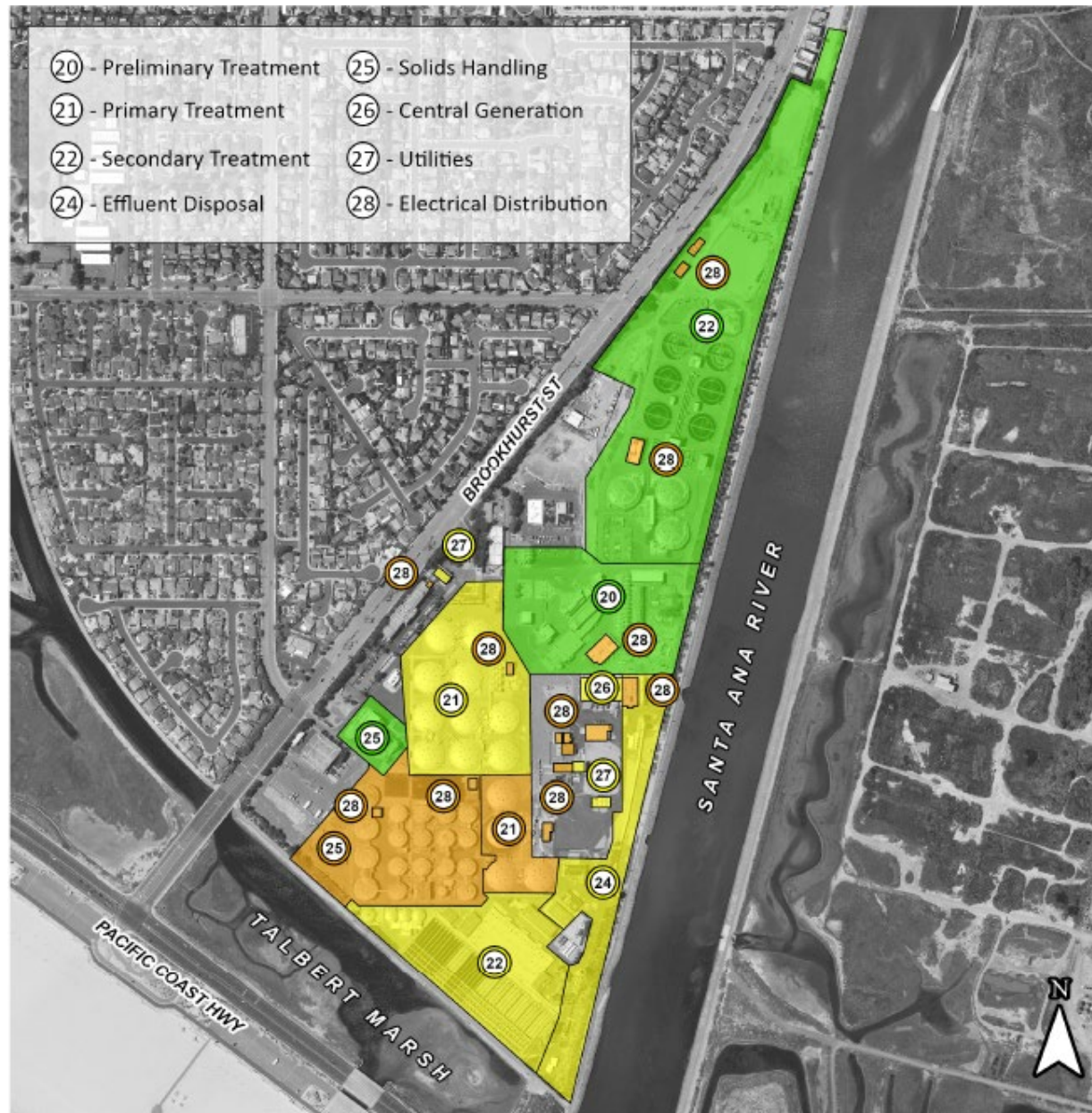


Table 2-2. Plant No. 2 Remaining Useful Life and Replacement Value Summary

| Area No. | Area Name | Average Remaining Useful Life Score | | | | | | Percentage of RUL Scores with 4s or 5s | Replacement Value (\$millions, in 2022 Dollars) |
|--------------------------|--|--|------------|------------|------------|-----------------|------------|--|---|
| | | Civil | Structural | Mechanical | Electrical | Instrumentation | All Assets | | |
| 20 | Preliminary Treatment | 1 | 1 | 2 | 2 | 2 | 2 | 10% | \$350.6 |
| 21 | Primary Treatment - A Side | 5 | 4 | 4 | 3 | 3 | 4 | 57% | \$163.5 |
| 21 | Primary Treatment - B & C Side | 3 | 3 | 3 | 3 | 3 | 3 | 4% | \$327.0 |
| 22 | Secondary Treatment – Activated Sludge | 3 | 3 | 3 | 4 | 3 | 3 | 32% | \$600.5 |
| 22 | Secondary Treatment - DAFT | 4 | 1 | 2 | 3 | 3 | 3 | 5% | \$56.6 |
| 22 | Secondary Treatment – Trickling Filter | 2 | 1 | 2 | 3 | 3 | 2 | 1% | \$335.6 |
| 24 | Effluent Disposal | 2 | 2 | 3 | 3 | 4 | 3 | 19% | \$882.4 |
| 25 | Solids Handling - Digesters | 3 | 4 | 4 | 4 | 4 | 4 | 70% | \$348.5 |
| 25 | Solids Handling - Facilities | 2 | 1 | 2 | 2 | 2 | 2 | 3% | \$181.0 |
| 25 | Solids Handling - Gas Handling | 3 | 3 | 3 | 4 | 4 | 4 | 33% | \$36.6 |
| 26 | Central Generation ^a | | 1 | 4 | 4 | 3 | 3 | 62% | \$356.6 |
| 27 | Utilities | 3 | 3 | 3 | 3 | 2 | 3 | 0% | \$106.1 |
| 28 | Electrical Distribution ^a | | | | 4 | | 4 | 65% | \$78.5 |
| 29 | Occupied Buildings | Refer to Asset Management System Summary - Area 29 | | | | | | | \$143.3 |
| Plant No. 2 Total | | | | | | | | 37% | \$3,966.6 |

RUL Legend:

■ RUL < 5 years
 ■ RUL 5-10 years
 ■ RUL 11-15 years
 ■ RUL 16-20 years
 ■ RUL > 20 years

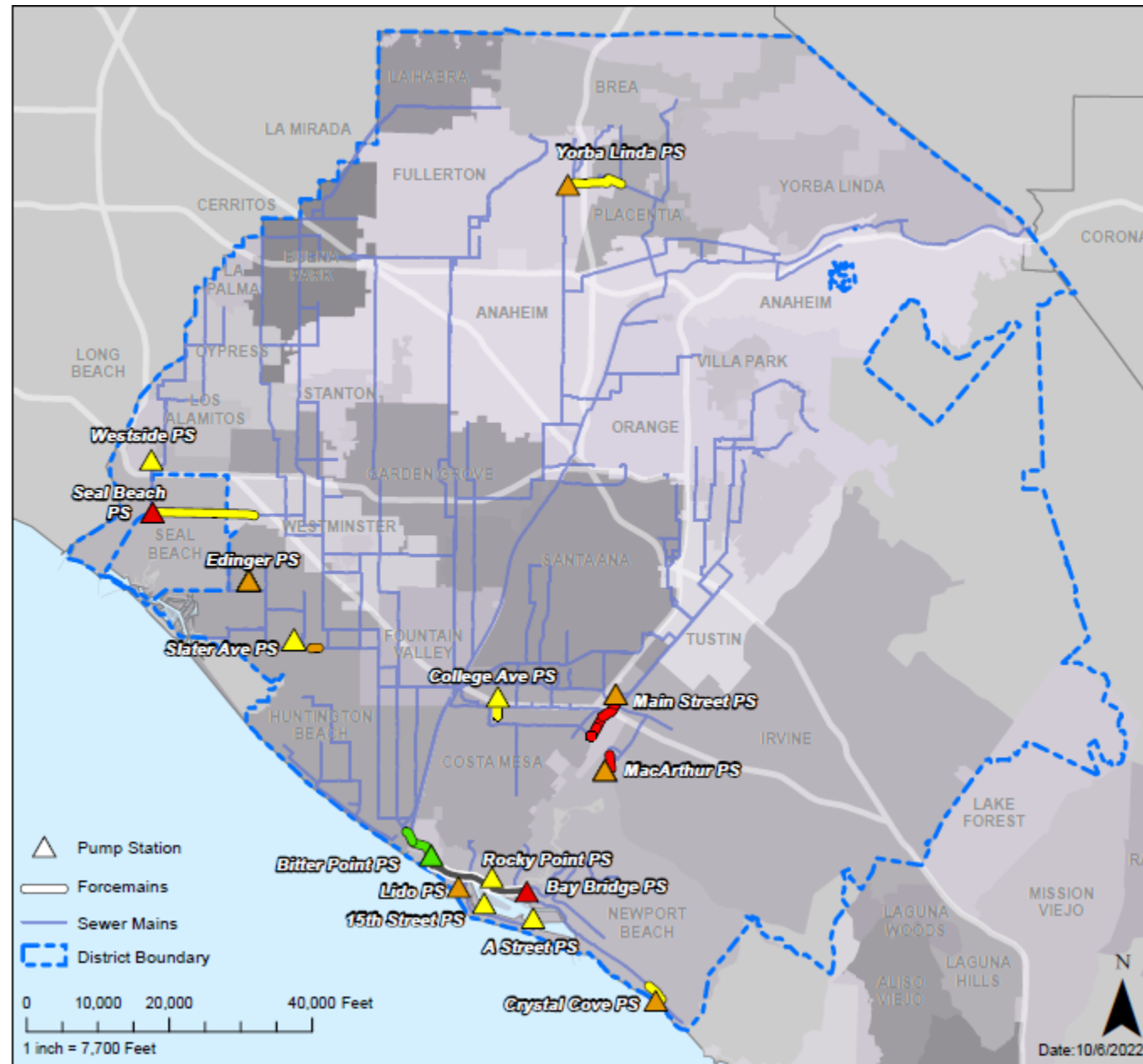
Acronym Key:

DAFT = Dissolved Air Flotation Thickener; RUL = Remaining Useful Life

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

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM PUMP STATION OVERVIEW

Figure 2-3. Collection System Pump Station – Remaining Useful Life Score Map



Note: Not all pump station force mains are shown on this map. Only longer force mains are shown.

Table 2-3. Pump Station and Force Main Remaining Useful Life and Replacement Value Summary

| Pump Station | Average Remaining Useful Life Score | | | | | | Percentage of RUL Scores with 4s or 5s | Replacement Value (\$millions, in 2022 Dollars) |
|---------------------|-------------------------------------|------------|------------|------------|-----------------|------------|--|---|
| | Civil | Structural | Mechanical | Electrical | Instrumentation | All Assets | | |
| 15th Street | 3 | 4 | 4 | 3 | 2 | 3 | 31% | \$14.6 |
| A Street | 3 | 4 | 4 | 3 | 2 | 3 | 25% | \$12.7 |
| Bay Bridge | 4 | 4 | 5 | 4 | 3 | 5 | 77% | \$36.8 |
| Bitter Point | 2 | 3 | 2 | 2 | 2 | 2 | 15% | \$34.9 |
| College | 3 | 3 | 3 | 2 | 2 | 3 | 8% | \$26.0 |
| Crystal Cove | 3 | 4 | 3 | 4 | 3 | 4 | 42% | \$2.7 |
| Edinger | 5 | 4 | 3 | 4 | 4 | 4 | 45% | \$14.0 |
| Lido | 5 | 4 | 4 | 4 | 4 | 4 | 67% | \$21.8 |
| MacArthur | 5 | 4 | 4 | 4 | 2 | 4 | 73% | \$17.7 |
| Main Street | 5 | 3 | 4 | 3 | 3 | 4 | 46% | \$47.6 |
| Rocky Point | 1 | 4 | 3 | 2 | 2 | 3 | 15% | \$17.3 |
| Slater | 4 | 4 | 4 | 3 | 3 | 3 | 31% | \$38.2 |
| Seal Beach | 3 | 4 | 5 | 5 | 4 | 5 | 83% | \$45.0 |
| Westside | 3 | 3 | 3 | 2 | 3 | 3 | 8% | \$33.1 |
| Yorba Linda | 3 | 4 | 4 | 3 | 3 | 4 | 36% | Not Valued |
| Newport Force Mains | 1 | | | | | 1 | 0% | |
| Total | | | | | | | 39% | \$362.2 |

RUL Legend:

■ RUL <5 years
 ■ RUL 5-10 years
 ■ RUL 11-15 years
 ■ RUL 16-20 years
 ■ RUL >20 years

Acronym Key:

PS = Pump Station; RUL = Remaining Useful Life

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

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM PIPELINES OVERVIEW

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

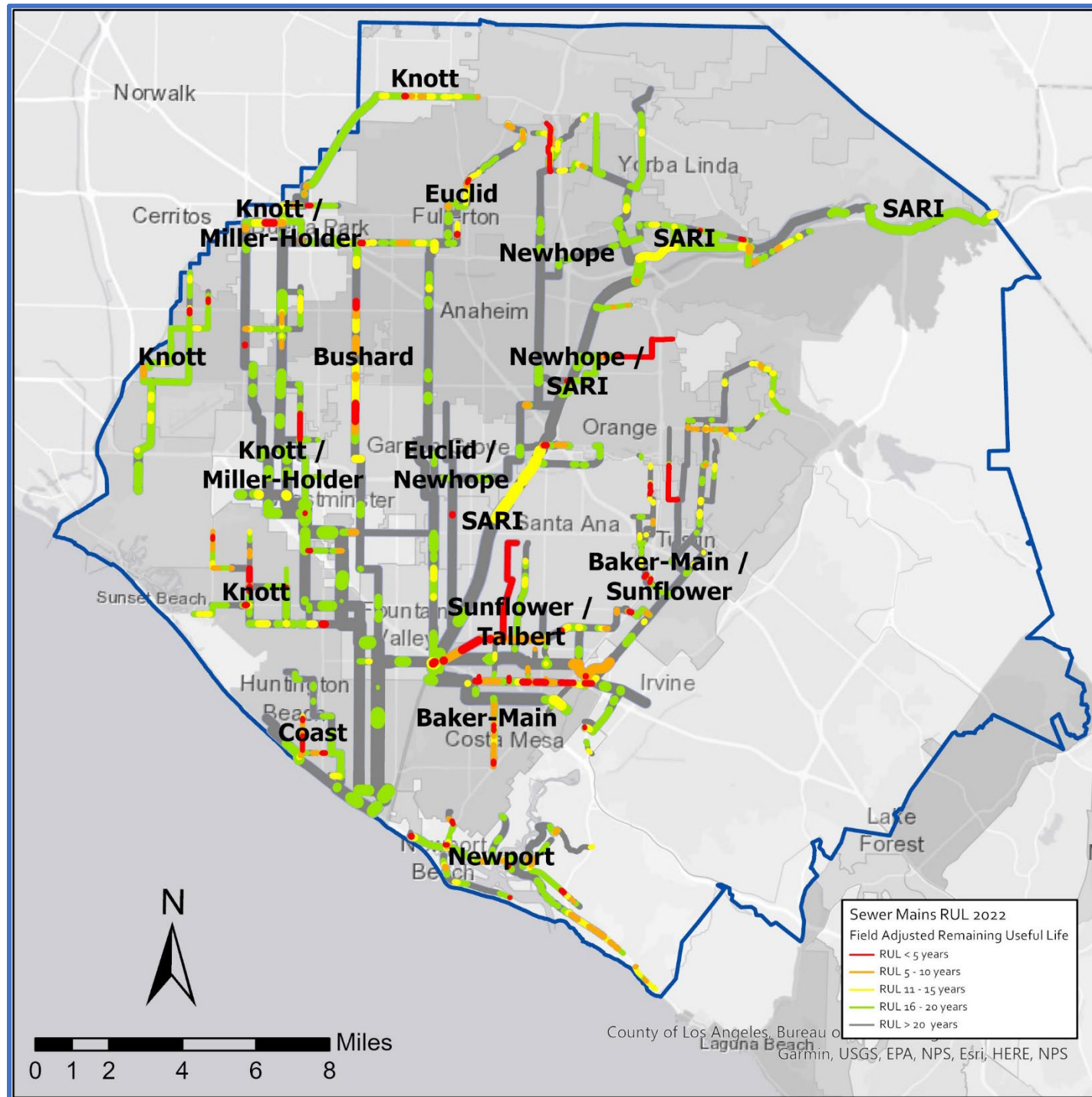


Table 2-4. Collection System Remaining Useful Life and Replacement Value Summary

| Trunklines | No. of Pipes with RUL Scores of 4 or 5 | Miles of Pipes with RUL Scores of 4 or 5 | Percentage of RUL Scores with 4s or 5s (By Length) | Replacement Value (\$ Millions, in 2022 Dollars) ^a |
|---------------|--|--|--|---|
| Baker-Main | 84 | 6.17 | 15% | \$298.3 |
| Bushard | 11 | 1.79 | 8% | \$261.6 |
| Coast | 16 | 1.05 | 9% | \$106.7 |
| Euclid | 8 | 0.54 | 2% | \$292.3 |
| Interplant | 0 | 0.00 | 0% | \$124.9 |
| Knott | 33 | 2.90 | 4% | \$676.7 |
| Miller-Holder | 24 | 1.75 | 6% | \$320.6 |
| Newhope | 24 | 1.83 | 6% | \$226.3 |
| Newport | 33 | 2.11 | 10% | \$234.2 |
| SARI | 57 | 3.06 | 6% | \$558.8 |
| Sunflower | 22 | 1.80 | 5% | \$324.7 |
| Talbert | 74 | 5.85 | 70% | \$62.4 |
| Total | 386 | 28.85 | 8% | \$3,487.5 |

RUL Legend:

■ RUL <5 years
 ■ RUL 5-10 years
 ■ RUL 11-15 years
 ■ RUL 16-20 years
 ■ RUL >20 years

Acronym Key:

RUL = Remaining Useful Life; SARI = Santa Ana River Interceptor

^a The abandoned pipelines at the Airbase (\$6,366,516) and the Harvard Area Trunk Sewer (\$191,784) areas are not included in the total.

2.2 Area Asset Management Summaries

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 Asset Management Summaries

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

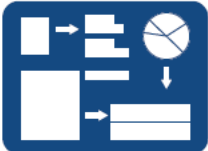
Plant No. 2 Asset Management Summaries

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

Collection System Asset Management Summaries

- Pump Stations; and
- Pipelines.

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 below.



Process Schematic

Provides high-level process schematic to communicate area function and interrelation of key assets within the area



Count of Major Assets

Provides a count of major assets within the area



Major Assets Remaining Useful Life

Provides high-level summary of the condition of area systems and asset types



Key Issues, Actions and Recommendations

Identifies key issues and planned or recommended actions to remedy the issue



Current & Future Projects Over the Next Ten Years

Identifies the timing of current and planned projects impacting major assets within the area

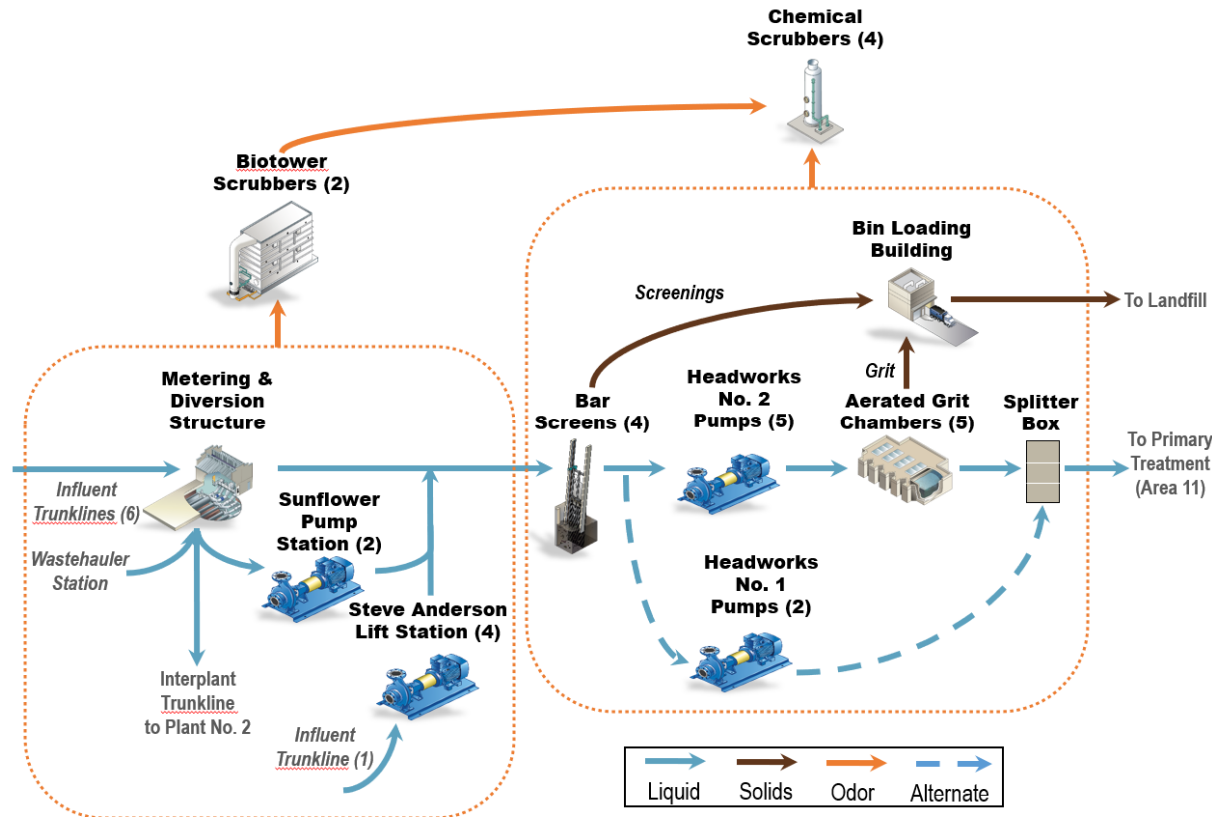
Figure 2-5. Area Asset Management Summary Structure

Plant No. 1 Asset Management Summaries

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

Process Schematic



Major Assets Remaining Useful Life

| Asset Type | Metering & Diversion | Sunflower Pump Station | Steve Anderson Lift Station | Barscreens | Main Sewage Pumps | Grit Chamber | Splitter Box | Bin Loading | Odor Control | Wastehauler Station |
|------------------------------|----------------------|------------------------|-----------------------------|------------|-------------------|--------------|--------------|-------------|--------------|---------------------|
| Civil | | | | | | | | | | |
| Effluent Piping | - | - | - | - | - | - | 2 | - | - | - |
| Structural | | | | | | | | | | |
| General | 2 | 3 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
| Mechanical | | | | | | | | | | |
| Piping | 5 | - | 1 | - | 2 | - | - | - | - | 3 |
| Gates/Valves | 5 | 5 | 2 | 5 | 5 | 5 | 5 | - | 5 | 2 |
| Gearboxes | - | 5 | - | 1 | - | - | - | 5 | - | - |
| Screens | - | - | - | 4 | - | - | - | - | - | - |
| Pumps | - | 4 | 2 | - | 4 | - | - | - | 5 | - |
| Conveyors | - | - | - | 5 | - | - | - | 4 | - | - |
| Fans/Blowers | 4 | 4 | 2 | 5 | 5 | 5 | - | 5 | 5 | 2 |
| Electrical | | | | | | | | | | |
| Operators | 5 | - | - | - | - | - | 5 | - | - | - |
| Motors | - | 4 | 1 | 3 | 5 | - | - | 5 | - | - |
| Variable Frequency Drives | - | - | 3 | - | 5 | - | - | - | 4 | - |
| Motor Control Centers (MCCs) | 5 | 5 | 2 | 5 | 5 | 5 | - | 5 | 5 | 4 |
| Instrumentation | | | | | | | | | | |
| General | 5 | 5 | 3 | 5 | 4 | - | 5 | - | 5 | 4 |

Asset RUL Legend:

- RUL <5 years
- RUL 5-10 years
- RUL 11-15 years
- RUL 16-20 years
- RUL >20 years

Major Assets

| Major Assets | Quantities |
|------------------------------------|------------|
| Metering & Diversion | |
| Flowmeters | 7 |
| Gates | 26 |
| Sunflower Pump Station | |
| Screw Pumps | 2 |
| Motors | 2 |
| Gearboxes | 2 |
| Lube Oil Systems | 2 |
| Gates | 5 |
| Steve Anderson Lift Station | |
| Pump/Motor/VFD | 4 |

| Major Assets | Quantities |
|--------------------------|------------|
| Flowmeter | 1 |
| Barscreens | |
| 5/8" Barscreens | 2 |
| 1" Barscreens | 2 |
| Gates | 22 |
| Main Sewage Pumps | |
| Pump/Motor/VFD | 5 |
| Headworks #1 Pumps | 2 |
| Gates | 15 |
| Splitter Box | |
| Gates | 5 |

| Major Assets | Quantities |
|----------------------|------------|
| Weir Gates | 15 |
| Flowmeters | 3 |
| Grit Chambers | |
| Grit Chambers | 5 |
| Gates | 19 |
| Stop Plates | 10 |
| Flap Gates | 5 |
| Blowers | 3 |
| Bin Loading | |
| Paddle Conveyors | 2 |
| Belt Conveyor | 1 |

| Major Assets | Quantities |
|----------------------------|------------|
| Odor Control | |
| Bioscrubbers | 2 |
| Chemical Scrubbers | 4 |
| Wastehauler Station | |
| Flushing System | 1 |
| Barrier Arm | 1 |
| Fan | 1 |

Acronym Key:
 MCC = Motor Control Center;
 RUL = Remaining Useful Life;
 VFD = Variable Frequency Drive

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

Key Issues

| Key Issues | Actions and Recommendations |
|--|---|
| <ul style="list-style-type: none"> Headworks Maintainability – P1-105 project will rehabilitate most assets throughout the preliminary treatment area; however, the construction completion date is February 2028. Some assets have very little remaining life or have failed already and will need interim solutions before they are addressed by the project, such as exhaust fans, hydrogen sulfide (H₂S) monitoring system, and grit paddles. | <ul style="list-style-type: none"> Continue to actively monitor the condition of aging assets scheduled for repairs/replacement under P1-105 and develop temporary/minimal solutions as applicable until a permanent solution is provided by P1-105. |
| <ul style="list-style-type: none"> Sunflower Pump Station – This pump station is equipped with two screw pumps, which are experiencing issues with bearings and gear boxes. The assets in the pump station are approaching end of useful life. | <ul style="list-style-type: none"> FE19-04 is planned to replace Pump No. 1 with associated gear box, bearings, couplings and rehabilitate the concrete trough. The project will also upgrade electrical, and instrumentations required for successful operation of Pump No. 1. Pump No.2 will be replaced during a separate project due to conflict with P1-105 schedule. |
| <ul style="list-style-type: none"> Wastehauler Station – The station currently lacks an appropriate office building for the staff and that has raised some safety and security concerns. | <ul style="list-style-type: none"> FE20-01 will improve safety and security of the Wastehauler Station by installing entrance and exit gates with Radio-Frequency Identification (RFID) system, providing an office facility for the staff, and installation of two automated sampling system to collect samples from wastehauler trucks. |
| <ul style="list-style-type: none"> Headworks Vulnerability – The bar screens and related equipment may be vulnerable to a high debris/ragging event especially during loss of power. | <ul style="list-style-type: none"> An evaluation of the Barscreen facility and Headworks Metering and Diversion (M&D) Facilities was performed. The evaluation noted that operations has developed an emergency response plan to barscreen failures. The recommendations from the evaluation include recalibration of the level instruments in M&D bypass channel and performing a hydraulic evaluation to assess the possibility of an overflow in the collection system in case of a blockage at the Barscreen Facility. |
| <ul style="list-style-type: none"> Headworks 1 Capacity – Existing pumps at Headworks 1 were deemed unreliable to provide sufficient pumping capacity during wet weather. P1-105 bypass will be installed in 21-22 wet weather season. | <ul style="list-style-type: none"> A temporary pumping system was installed by P1-105 during wet weather season of 21-22 to provide sufficient pumping capacity. The bypass system will be available every wet weather season after that until installation of new MSP pumps by P1-105 project. |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY36/37 |
|-------------|--|-----------------------------|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---------|
| | | | | | | | | | | | | | | | | | | |
| P1-105 | Headworks Rehabilitation at Plant No. 1 | Headworks | <ul style="list-style-type: none"> Rehabilitate structures of impacted facilities, replace mechanical/electrical/instrumentation as needed throughout impacted facilities, improve grit handling. | | | | | | | | | | | | | | | |
| FE19-04 | Sunflower Pump Replacement at Plant No. 1 | Sunflower Pump Station | <ul style="list-style-type: none"> Rehabilitate Sunflower Pump Station and replace pump #1 | | | | | | | | | | | | | | | |
| FE20-01 | Wastehauler Station Safety and Security Improvements | Wastehauler Station | <ul style="list-style-type: none"> Install automatic samplers, RFID entrance system, and office trailer. | | | | | | | | | | | | | | | |
| X-102 | Wastehauler Facility Improvements | Wastehauler Station | <ul style="list-style-type: none"> Demolish abandoned wastehauler pump station and provide permanent building for staff. | | | | | | | | | | | | | | | |
| X-044 | Steve Anderson Lift Station Rehabilitation | Steve Anderson Lift Station | <ul style="list-style-type: none"> Rehabilitate or replace mechanical, electrical, and instrumentation. | | | | | | | | | | | | | | | |

Types of Project Legend:

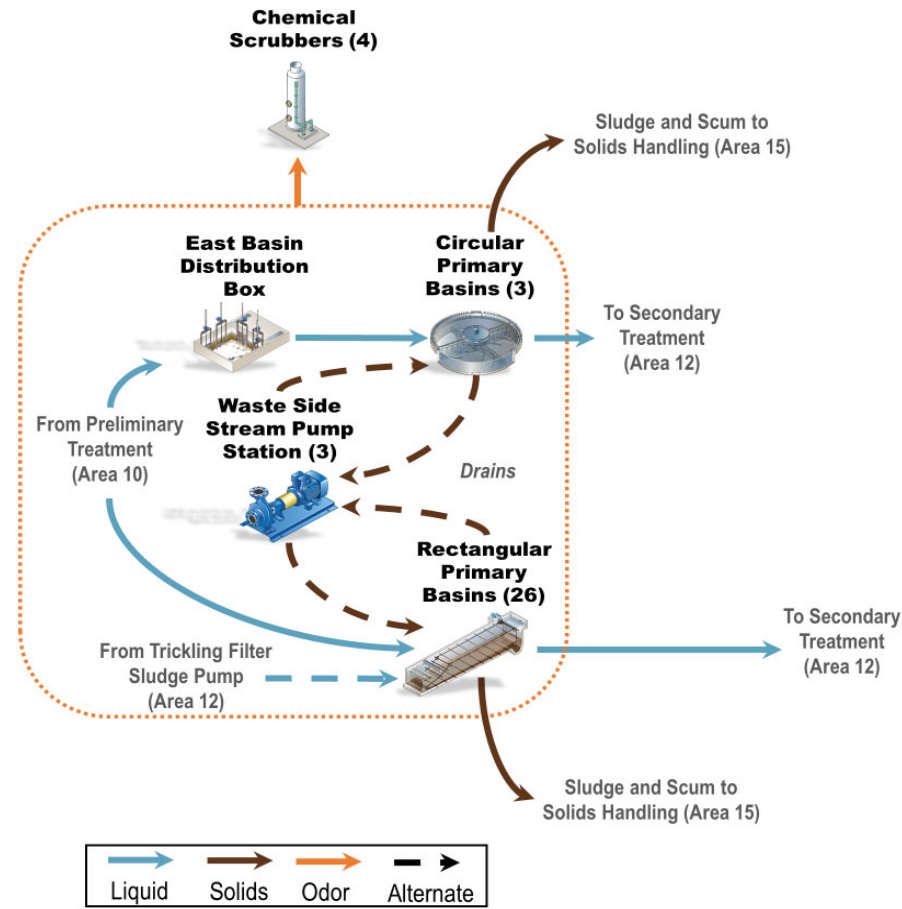
CIP - Planning
 CIP - Design
 CIP - Construction
 Maintenance Project

Acronym Key:

CIP = Capital Improvements Program; FY = Fiscal Year; RFID = Radio-Frequency Identification; LEL = Lower Explosive Limit

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

Process Schematic



Note: Primary Basins No. 1 and 2 are not shown. The facilities are available for emergency capacity during high flows and are scheduled to be demolished within the next ten years.

Major Assets

| Major Assets | Quantities |
|-----------------------------------|------------|
| Rectangular Primary Basins | |
| Basins | 26 |
| Thickened Sludge Pumps | 9 |
| Dilute Sludge Pumps | 4 |
| Dilute Sludge Sumps | 2 |
| Scum Pumps | 12 |
| Scum Pits | 6 |

| Major Assets | Quantities |
|--------------------------------|------------|
| Circular Primary Basins | |
| Basins | 3 |
| Sludge Pumps | 4 |
| Scum Pumps | 3 |
| Chemicals | |
| Polymer Tanks | 4 |
| FeCl ₃ Tanks | 1 |

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

| Major Assets | Quantities |
|--------------|------------|
| NaOH Pumps | 5 |
| Bleach Tanks | 1 |
| Bleach Pumps | 8 |

Acronym Key:
 EBDB = East Basin Distribution Box;
 FeCl₃ = Ferric chloride; HCl = Hydrochloric acid;
 NaOH = Sodium hydroxide; PEDB = Primary Effluent Distribution Box;
 PEDB-1 = Primary Effluent Distribution Box 1; PEJB = Primary Effluent Junction Box;
 PSB = Primary Sedimentation Basin;
 PISB = Primary Influent Splitter Box;
 RUL = Remaining Useful Life;
 WSSPS = Waste Sidestream Pump Station

Major Assets Remaining Useful Life

| Asset Type | EBDB | PEDB -1 | PEJB | PSB 1-2 | PSB 3-5 | PSB 6-15 | PSB 16-31 | WSSPS | PISB | Centerfeed Channels | Phys Chem | Odor Control |
|-------------------------------|------|---------|------|---------|---------|----------|-----------|-------|------|---------------------|-----------|--------------|
| Civil | | | | | | | | | | | | |
| Effluent Piping | 5 | 5 | 4 | 5 | 4 | 4 | 5 | 3 | - | - | - | - |
| Structural | | | | | | | | | | | | |
| Structures | 2 | 4 | 1 | 3 | 3 | 2 | 2 | 3 | 4 | 3 | 3 | 3 |
| Cover | - | - | - | 3 | 3 | 2 | 2 | - | 2 | 3 | - | - |
| Mechanical | | | | | | | | | | | | |
| Piping | - | - | - | - | - | - | - | 3 | - | - | 3 | - |
| Gates/Valves | 2 | 4 | 3 | 5 | 5 | 3 | 3 | 3 | 5 | 3 | 3 | 3 |
| Sludge/Scum Collection System | - | - | - | 5 | 5 | 3 | 3 | - | - | - | - | - |
| Sludge Pumping System | - | - | - | 5 | 4 | 3 | 4 | - | - | - | - | - |
| Scum Pumping System | - | - | - | 5 | 4 | 4 | 4 | - | - | - | - | - |
| Electrical | | | | | | | | | | | | |
| Process – MCC, VFDs | - | - | - | 5 | 4 | 2 | 2 | 5 | 2 | - | 3 | 4 |
| Instrumentation | | | | | | | | | | | | |
| PLC, Flow Meters | - | - | - | 5 | 4 | 3 | 3 | 4 | 3 | - | 3 | 5 |

RUL Legend:

■ RUL <5 years
 ■ RUL 5-10 years
 ■ RUL 11-15 years
 ■ RUL 16-20 years
 ■ RUL >20 years





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

Key Issues

| Key Issues | Actions and Recommendations |
|---|--|
| <ul style="list-style-type: none"> Rectangular Primary Basin – The rectangular primary basins experience relatively frequent issues with mechanical part replacement and sludge pumping system that require maintenance. These issues require ongoing attention from maintenance and can affect Plant No. 1 treatment capacity. | <ul style="list-style-type: none"> Project P1-133 is planned to address rectangular primary basin reliability by replacing launders in PISB box, sludge pumps for primary basins 17-31, and improving the lighting in the area. Also, X-017 is the future project that will rehabilitate the basins and will improve scum removal system. However, inspecting some areas such as center/influent feed channels remain to be a challenge. Operation and maintenance needs to perform regular preventive maintenance on scum pits and pumps to prevent scum accumulation in the basins, especially during times when capacity is reduced by projects. |
| <ul style="list-style-type: none"> Construction Sequencing – There are many upcoming projects that will perform work on the Plant No. 1 primary treatment system. These projects are largely interdependent on one another and will temporarily impact the primary capacity at Plant No. 1. | <ul style="list-style-type: none"> Project P1-126 which will replace the circular basins at P1 is dependent on the schedule of P1-105. Additionally, P1-133 which is improving the reliability of rectangular basins must be completed prior to start of P1-126. X-017 project, which is the future project that will rehabilitate rectangular primary basins completely, can only start after completion of P1-126. Due to all these interdependencies, continue to holistically assess the primary treatment capacity, especially in case of change in the project schedules. |
| <ul style="list-style-type: none"> Circular Primary Basin – The rotating arm on Primary Basin 3 is jammed and currently is inoperable. | <ul style="list-style-type: none"> Perform a condition assessment to evaluate and identify the cause and develop a repair plan. |
| <ul style="list-style-type: none"> Junction Structure A – Junction Structure A (JSA) is leaking through the recently installed bulkhead by P1-105 on demolished Headworks No.1. | <ul style="list-style-type: none"> Develop a Statement of Work (SOW) to apply coating to the bulkhead and provide a watertight seal on the installed bulkhead (PRN-00896). |
| <ul style="list-style-type: none"> Scum Management – The scum collection system 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. | <ul style="list-style-type: none"> PRN-00563 will perform a comprehensive evaluation of the scum collection system and provides 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. |

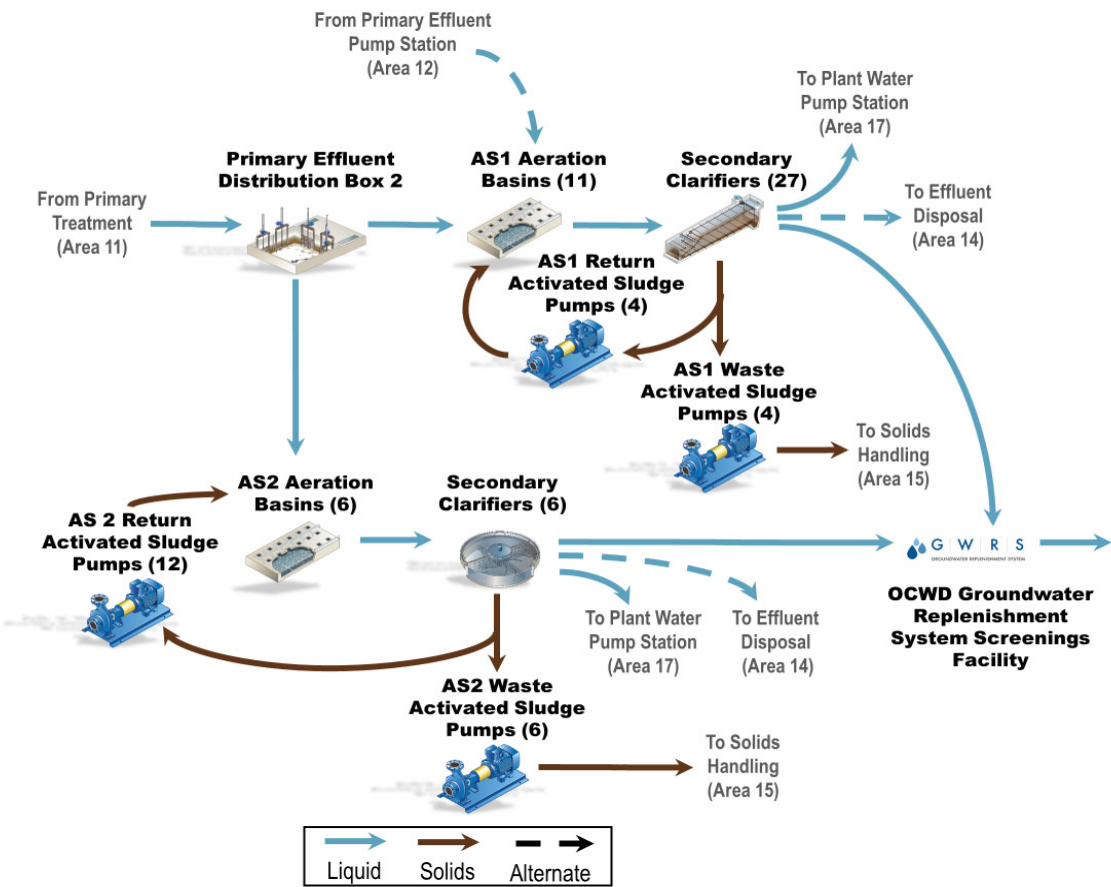
Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | | | | | | | | | | | | | | | | | | |
|-------------|---|-------------------------------|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|--|--|
| | | | | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 | | | |
| PRN-00563 | P1-33/37 Scum Study | Primary Basins 6-31 | <ul style="list-style-type: none"> Perform a study to determine the best solution to the various scums system issues, such as issues for the scum pumping system. | | | | | | | | | | | | | | | | | | |
| P1-133 | Primary Sedimentation Basins (PSB) No. 6-31 Reliability Improvements at Plant No. 1 | Primary Basins 6-31 | <ul style="list-style-type: none"> Upgrade the sludge pumping system. Structural repair of launders in PISB. Repair of foul air system. Provide adequate lighting and ventilation alarm improvements to meet current codes. | | | | | | | | | | | | | | | | | | |
| P1-126 | Primary Clarifiers Replacements and Improvements at Plant No. 1 | Primary Basins 3, 4, and 5 | <ul style="list-style-type: none"> Replace Primary Basins 3, 4, and 5 and primary scrubber system. Rehabilitate associated conveyance pipes and structures. Demolish Primary Basins 1-2. | | | | | | | | | | | | | | | | | | |
| X-017 | Plant No. 1 Primary Clarifiers 6-31 Rehabilitation | Primary Basins 6-31 | <ul style="list-style-type: none"> Major rehabilitation of Primary Basins 6-31. | | | | | | | | | | | | | | | | | | |
| X-006 | Waste Sidestream Pump Station Upgrade | Waste Sidestream Pump Station | <ul style="list-style-type: none"> Pump station rehabilitation and capacity increase. | | | | | | | | | | | | | | | | | | |

| | |
|---|---|
| Types of Project Legend:  CIP - Planning  CIP - Design  CIP - Construction  Maintenance Project | Acronym Key: CIP = Capital Improvements Program; FY = Fiscal Year; GWRS = Groundwater Replenishment System; MGD = Million Gallons per Day; OC San = Orange County Sanitation District; OCWD = Orange County Water District; PISB = Primary Influent Splitter Box; PSB = Primary Sedimentation Basin |
|---|---|

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

Process Schematic



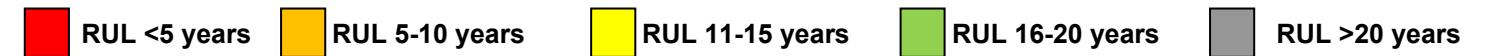
Key Issues – AS1 and AS2

| Key Issues | Actions and Recommendations |
|---|--|
| <ul style="list-style-type: none"> Activated Sludge Plant No. 1 – AS1 is an aging facility | <ul style="list-style-type: none"> Condition assessments show corrosion on the reactor wall. Baffle wall supports and vertical airpipes have corrosion in some of the basins. RAS piping has severe corrosion and will be replaced by FE20-03. Instrumentation is monitoring and replacing the equipment as needed. |
| <ul style="list-style-type: none"> Activated Sludge Basins Diffusers | <ul style="list-style-type: none"> Diffusers for activated sludge plants are starting to degrade. Maintenance will replace in kind at AS2. P1-140 will replace AS1 diffusers. |
| <ul style="list-style-type: none"> AS1 Blower Controls | <ul style="list-style-type: none"> The Blower control system is obsolete and requires an upgrade to operate efficiently. P1-140 will replace blowers and control systems. |
| <ul style="list-style-type: none"> Primary Effluent Pump Station | <ul style="list-style-type: none"> Pumps were rebuilt but do not meet the design pump capacity. PEPS will be demolished by a future project (P1-126) to allow gravity flow into AS1. |
| <ul style="list-style-type: none"> AS1 Waste-activated Sludge Pumps | <ul style="list-style-type: none"> Pumps have reached the end of useful life and two pumps do not meet pumping capacity required. Will be replaced under P1-140. |
| <ul style="list-style-type: none"> Plant Water Pump Station (PWPS) | <ul style="list-style-type: none"> PWPS only receives water from AS1. Need additional source from AS2 for reliability. Future study, PRN-00743, will address this need. |

Major Assets Remaining Useful Life

| Asset Type | PEPS | Blower Building 1 | AS1 Aeration Basins | AS1 Clarifiers | AS1 RAS PS | AS1 WAS | AS2 PEPS 2 | AS2 Blowers | AS2 Aeration Basins | AS2 Clarifiers | AS2 RAS/WAS PS | WSSPS 2 | PEPS 2 | PEDB2 | AS1 & AS2 Junction Boxes | DAFTs | DAFTs Polymer System |
|----------------------------|------|-------------------|---------------------|----------------|------------|---------|------------|-------------|---------------------|----------------|----------------|---------|--------|-------|--------------------------|-------|----------------------|
| Civil | | | | | | | | | | | | | | | | | |
| Effluent Piping | 4 | 3 | 3 | 3 | 5 | 3 | - | 1 | - | - | - | 1 | 1 | 1 | 1 | 4 | |
| Structural | | | | | | | | | | | | | | | | | |
| Buildings | 4 | 4 | - | - | 4 | - | - | 1 | - | - | - | - | - | - | - | 4 | - |
| Structures | 4 | - | 4 | 4 | - | - | 1 | - | 1 | 1 | - | 1 | 1 | 1 | 1 | 4 | 5 |
| Mechanical | | | | | | | | | | | | | | | | | |
| Piping | 4 | 4 | 4 | 4 | 5 | 4 | 2 | 2 | 2 | 2 | 2 | 2 | - | - | - | 5 | 5 |
| Pumps | 5 | - | - | - | 5 | 5 | - | - | - | - | 3 | 3 | - | - | - | 5 | 5 |
| Diffusers | - | - | 4 | - | - | - | - | 4 | - | - | - | - | - | - | - | - | - |
| Mixers | - | - | 4 | - | - | - | - | 3 | - | - | - | - | - | - | - | - | - |
| Solids Collector Mechanism | - | - | - | 4 | - | - | - | - | - | - | - | - | - | - | - | 5 | - |
| Blowers | - | 4 | - | - | - | - | - | 2 | - | - | - | - | - | - | - | - | - |
| Drain Gates & Inlet Gates | - | - | 5 | 5 | - | - | - | 2 | 2 | - | - | - | 1 | 2 | - | - | - |
| HVAC & Ventilation | - | 4 | - | - | - | - | - | 2 | - | - | - | - | - | - | - | - | - |
| Chemical/polymer Facility | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 5 |
| Electrical | | | | | | | | | | | | | | | | | |
| Variable Frequency Drives | 3 | - | 4 | 4 | 4 | 4 | - | - | 4 | 4 | 4 | 4 | - | - | - | 4 | 4 |
| Motor Control Centers | 4 | - | 4 | 4 | 4 | 4 | - | - | 2 | 2 | 2 | 2 | - | - | - | 4 | 4 |
| Instrumentation- | | | | | | | | | | | | | | | | | |
| PLC's, Flow Meters | 5 | 5 | 5 | 5 | 5 | 5 | - | 2 | 2 | 2 | 2 | 2 | - | - | - | 5 | 5 |

RUL Legend:



Acronym Key:

AS1 = Activated Sludge Plant No. 1; AS2 = Activated Sludge Plant No. 2; DAFT = Dissolved Air Flotation Thickener; HVAC = Heating, Ventilation, and Air Conditioning; OCWD = Orange County Water District; PEDB1 = Primary Effluent Distribution Box 1; PEDB2 = Primary Effluent Distribution Box 2; PEPS = Primary Effluent Pump Station; PEPS 2 = Primary Effluent Pump Station 2; PLC = Programmable Logic Controller; PS = Pump Station; PWPS = Plant Water Pump Station; RAS = Return Activated Sludge; RUL = Remaining Useful Life; WAS = Waste-activated Sludge; WSSPS2 = Waste Sidestream Pump Station 2

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

Major Assets

| Major Assets | Quantities |
|--------------------------------------|------------|
| Primary Effluent Pump Station | |
| Building | 1 |
| Wetwell | 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 |
| AS1 RAS PS/WAS PS | |
| RAS PS Building | 1 |
| RAS Pumps | 5 |
| WAS Pumps | 4 |
| Primary Effluent Pump Station 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 Pumps | 12 |
| WAS Pumps | 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 1 | |
| Structure | 1 |
| Gates | 1 |
| Primary Effluent Distribution Box 2 | |
| Structure | 1 |
| Gates | 11 |
| AS1 and AS2 Junction Boxes (JBs) | |
| Junction Box Structures | 8 |

| Major Assets | Quantities |
|---|------------|
| Dissolved Air Flotation Thickeners | |
| 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 |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 | |
|-------------|--|---|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|
| | | | | | | | | | | | | | | | | | | | |
| FE20-03 | Return-Activated Sludge (RAS) Discharge Piping Replacement at Activated Sludge Plant No. 1 | AS1 RAS Pipe Discharge | <ul style="list-style-type: none"> Replace the RAS discharge pipe located in Basins 3 and 8. | | | | | | | | | | | | | | | | |
| P1-126 | Primary Clarifiers Replacements and Improvements at Plant No. 1 | PEPS | <ul style="list-style-type: none"> Remove all equipment in PEPS. Gravity feed primary effluent from new primary basins 3,4,& 5 | | | | | | | | | | | | | | | | |
| P1-140 | Activated Sludge -1 and Secondary Clarifier Rehabilitation | AS1 Aeration Basin, Clarifiers, and Blowers | <ul style="list-style-type: none"> Major rehabilitation of all mechanical, electrical, and instrumentation assets including the blower system. | | | | | | | | | | | | | | | | |

Types of Project Legend:

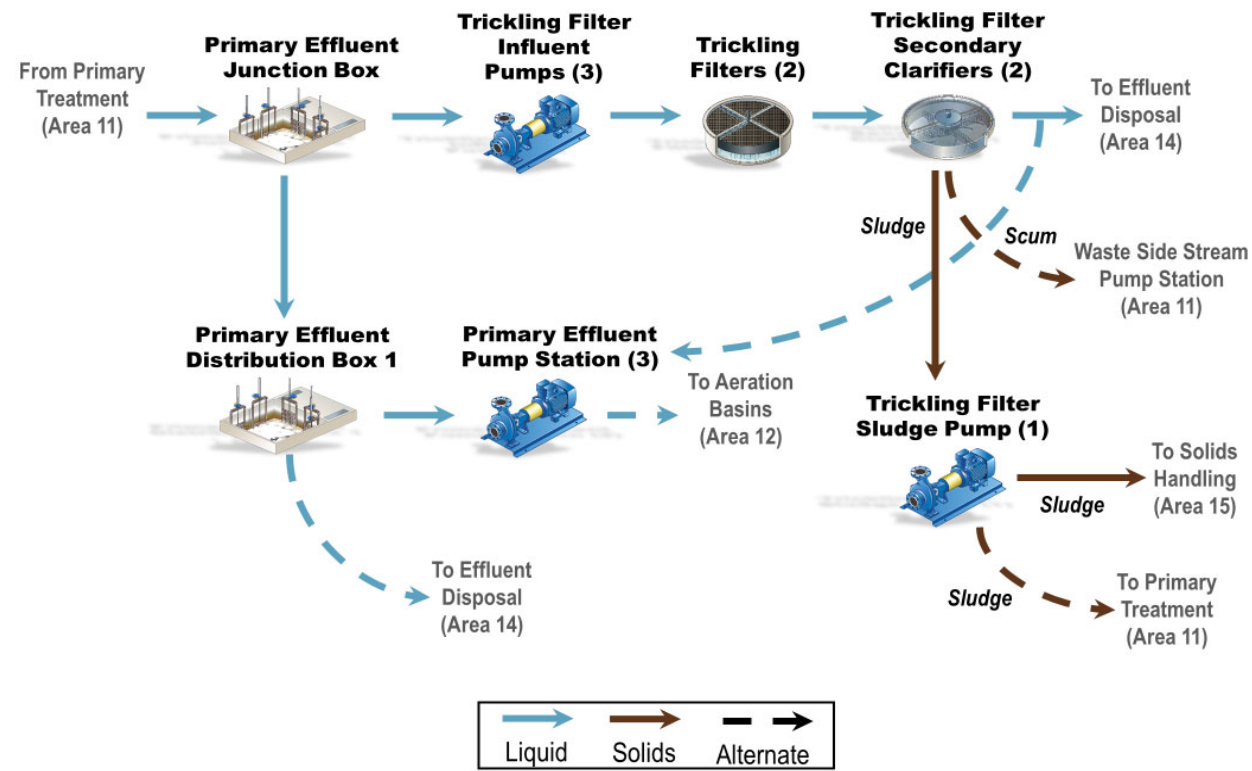
■ CIP - Planning
 ■ CIP - Design
 ■ CIP - Construction
 ■ Maintenance Project

Acronym Key:

AS1 = Activated Sludge Plant No. 1; AS2 = Activated Sludge Plant No. 2; CIP = Capital Improvement Program; DAFT = Dissolved Air Flotation Thickeners; FY = Fiscal Year; JB = Junction Box; PEPS = Primary Effluent Pump Station; PS = Pump Station; RAS = Return-activated Sludge; SC = Secondary Clarifier; TWAS = Thickened Waste-activated Sludge; WAS = Waste-activated Sludge

ASSET MANAGEMENT SYSTEM SUMMARY – AREA 12 – 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 | 1 |
| Junction Boxes | |
| Structure | 6 |

Major Assets Remaining Useful Life

| Asset Type | Trickling Filter Pump Station | Trickling Filters | Secondary Clarifiers | Sludge Pump Station | Junction Boxes |
|----------------------------|-------------------------------|-------------------|----------------------|---------------------|----------------|
| Civil | | | | | |
| Effluent Piping | 1 | 1 | 1 | - | 1 |
| Structural | | | | | |
| Buildings | - | 1 | 1 | - | - |
| Structures | 1 | 1 | 1 | 1 | 1 |
| Mechanical | | | | | |
| Pumps | 3 | - | 3 | 5 | - |
| Distributor Drive | - | 3 | - | - | - |
| Ventilation Fans | - | 3 | - | - | - |
| Trickling Filter Media | - | 4 | - | - | - |
| Clarifier Moving Mechanism | - | - | 3 | - | - |
| Valves, Gates | 3 | - | 5 | - | 2 |
| Electrical | | | | | |
| Motor Control Centers | 3 | 3 | - | 3 | - |
| Variable Frequency Drives | 5 | 3 | - | 5 | - |
| Instrumentation | | | | | |
| PLCs & Flow Meters | 3 | 3 | 3 | 3 | - |

Asset RUL Legend:

- RUL <5 years
- RUL 5-10 years
- RUL 11-15 years
- RUL 16-20 years
- RUL >20 years

Acronym Key:

PLC = Programmable Logic Controller;

RUL = Remaining Useful Life

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

Key Issues

| Key Issues | Actions and Recommendations |
|---|--|
| <ul style="list-style-type: none"> Trickling Filter Sludge Pumps – Currently, only one sludge pump is in service. | <ul style="list-style-type: none"> Project FE19-03 will replace the trickling filter’s sludge pump with two sludge pumps and VFD’s and remove the scum pumps. |
| <ul style="list-style-type: none"> Trickling Filter Influent Pumps – VFDs are obsolete and need to be replaced. Replacement parts are not available. | <ul style="list-style-type: none"> FR1-0011 will replace the VFDs and add a second source of power from SWGR-TFB bus to VFD #1. |
| <ul style="list-style-type: none"> Electrical – Low voltage cable failures. | <ul style="list-style-type: none"> Several damaged cables were replaced by Maintenance in the past, and Clearinghouse approved a project to assess the remaining low voltage cables and replace the damaged cables. FE19-03 will add new cables for the sludge pumps. Project FR1-0008 will replace the remaining cables. |
| <ul style="list-style-type: none"> Trickling Filters Snail Control – Permanent caustic dosing is needed at trickling filters pump station for snail control. Currently, temporary totes are used to dose caustic into the wet well. | <ul style="list-style-type: none"> PRN-00414 was approved to add pumps at caustic tank in primary scrubber area and trench a pipe to the trickling filters pump wet well. This project has been included in P1-126 project scope. |
| <ul style="list-style-type: none"> Trickling Filter Valve Replacement – Drain valve and stem for TF clarifier 2 need to be replaced. | <ul style="list-style-type: none"> Project FR1-0017 will replace 12-inch trickling filter clarifier 2 drain valve and valve stem. |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | | | | | | | | | | | | | | | | |
|--------------------|---|--|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|
| | | | | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 | |
| FE19-03 | FE19-03 Trickling Filter Sludge and Scum Pumps Replacement at Plant No. 1 | Sludge pumping | <ul style="list-style-type: none"> Replace the sludge pump with two new pumps and remove three scum pumps. | | | | | | | | | | | | | | | | |
| P1-126 (PRN-00414) | Primary Sedimentation Basins No. 3-5 Replacement at Plant 1 | Trickling Filters Pump Station | <ul style="list-style-type: none"> Project P1-126 will install permanent caustic dosing pumps and pipes to dose caustic to the Trickling Filters. Currently, Operations is using caustic totes. | | | | | | | | | | | | | | | | |
| FR1-0017 | Trickling Filter Valve Replacement at Plant No. 1 | Trickling Filters Secondary Clarifier 2 | <ul style="list-style-type: none"> Replace drain valve and stem for trickling filters Secondary Clarifier 2 | | | | | | | | | | | | | | | | |
| FR1-0011 | Plant No. 1 Trickling Filter Pumps VFD replacement (three pumps) | Trickling Filters Pump Station | <ul style="list-style-type: none"> Replace the obsolete VFDs on the Trickling Filter influent pumps. | | | | | | | | | | | | | | | | |
| FR1-0008 | Low Voltage Cable Replacement | Low voltage cables from Power Building (PB) 8 to the Trickling Filters | <ul style="list-style-type: none"> Replace the failed cables. | | | | | | | | | | | | | | | | |
| X-015 | Trickling Filters Facilities Rehabilitation at Plant No. 1 | Major rehabilitation project | <ul style="list-style-type: none"> Replace the Trickling Filter Feed Pumps, distribution arms and media, and secondary clarifier mechanisms. | | | | | | | | | | | | | | | | |

Types of Project Legend:

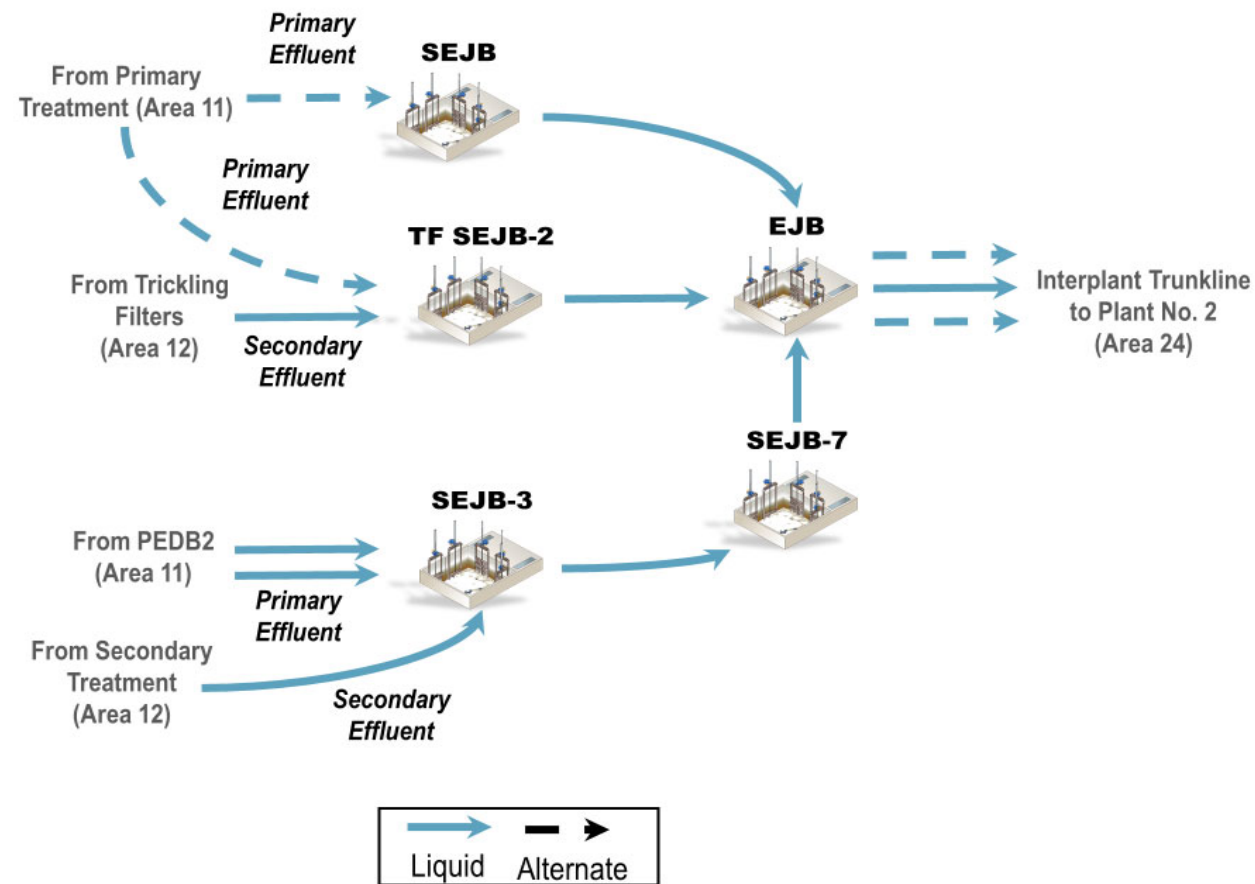
CIP - Planning
 CIP - Design
 CIP - Construction
 Maintenance Project

Acronym Key:

CIP = Capital Improvements Program; FY = Fiscal Year; VFD = Variable Frequency Drive

ASSET MANAGEMENT SYSTEM SUMMARY – AREA 14 - PLANT NO. 1 INTERPLANT

Process Schematic



Major Assets Remaining Useful Life

| Asset Type | Plant No. 1 Facility | | | | | | | Santa Ana Corridor | | | | Ellis Corridor | Brookhurst Corridor | Bushard 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 | 10" / 16" Gas |
| Civil | | | | | | | | | | | | | | | | |
| Pipeline | - | - | - | - | - | - | 4 | 3 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | - |
| Structural | | | | | | | | | | | | | | | | |
| Structure | 1 | 1 | 3 | 1 | 1 | 4 | - | - | - | - | - | - | - | - | - | - |
| Mechanical | | | | | | | | | | | | | | | | |
| Sluice Gates | 2 | - | - | 3 | 1 | 5 | - | - | - | - | - | - | - | - | - | - |
| Butterfly Valves | 2 | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Ball Valves | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - |
| Instrumentation | | | | | | | | | | | | | | | | |
| Fiber Optic | - | - | - | - | - | - | - | - | - | - | - | 1 | - | 1 | - | 1 |

Asset RUL Legend:

- RUL < 5 years
- RUL 5 - 10 years
- RUL 11 - 15 years
- RUL 16 - 20 years
- RUL > 20 years

Acronym Key:

EJB = Effluent Junction Box; PE = Primary Effluent; PEJB-1 = Primary Effluent Junction Box 1; RUL = Remaining Useful Life; SE = Secondary Effluent; SEJB = Secondary Effluent Junction Box; SEJB-3 = Secondary Effluent Junction Box 3; SEJB-7 = Secondary Effluent Junction Box 7; TFSEJB-2 = Trickling Filter Secondary Effluent Junction Box 2

Major Assets

| Major Assets | Quantities |
|-----------------------------|------------|
| Plant No. 1 Facility | |
| Large Diameter Piping | 1.1 mi |
| Junction Boxes | 6 |
| Gates | 17 |
| Butterfly Valves | 7 |

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

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

ASSET MANAGEMENT SYSTEM SUMMARY – AREA 14 – PLANT NO. 1 INTERPLANT

Key Issues

| Key Issues | Actions and Recommendations |
|--|--|
| <ul style="list-style-type: none"> Interplant Digester Gas Line Deficiencies – Surface corrosion of various severity in all blowoff vaults, water intrusion in Vaults 1-4, Vault 4 outside existing utility easement, measurable gas leaks in Vaults 4, 7, 8, and 10, access difficulties to Vaults 8 and 9, structural damage to Vault 10, lack of dedicated blowdown valves, and lack of pressure relief between the DOT valves. | <ul style="list-style-type: none"> Project FRJ-0003 will repair, replace (or relocate), and abandon blowoff vaults. The project also includes installing blowdown valve manifolds and pressure relief for the IDGP. |
| <ul style="list-style-type: none"> Santa Ana Corridor Soil Erosion (AI-353) – 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 blowoff Vault 5 on the Interplant Digester Gas Line. | <ul style="list-style-type: none"> OC Staff plan to coordinate field investigation(s) to determine the full scope of erosion issues along the Santa Ana River. Based on the findings a proposed repair plan will be developed. Project FRJ-0003 is considering the abandonment of Vaults 5 and 7 on the Interplant Digester Gas Line. |
| <ul style="list-style-type: none"> PEJB-1 – The sluice gates in PEJB-1 are in very poor condition and no longer properly seal. PEJB-1 structure is also in poor condition. | <ul style="list-style-type: none"> Rehabilitation of the PEJB-1 structure and replacement of existing sluice gates with new ones are included in the scope of Project P1-140. |
| <ul style="list-style-type: none"> 66-inch IPP – 66-inch pipelines between PEJB-1 and EJB are in poor condition per 2021 condition assessment. Conditions have not changed significantly since 2009. | <ul style="list-style-type: none"> Perform a reassessment in 2026. Project X-125 will rehabilitate the 66-inch pipelines between PEJB-1 and EJB. |
| <ul style="list-style-type: none"> Uninspected Assets – The 108-inch pipelines to EJB, SEJB-3 structure and gates, and SEJB-7 structure and gates have not had formal condition assessments since construction. | <ul style="list-style-type: none"> Given theoretical RUL, condition assessments for the 108-inch pipelines to EJB, SEJB-3 structure and gates, and SEJB-7 structure and gates are planned for 2026. |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|--|---------------------|---|----------|--|----------|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | | | J-117A | Interplant Effluent Pipeline Rehabilitation (Warranty) | 84" IPP | <ul style="list-style-type: none"> Perform warranty inspection of rehabilitated pipelines. | | | | | | | | | | | |
| FRJ-0003 | Interplant Gas Line Blow Off Repairs | Digester Gas Piping | <ul style="list-style-type: none"> Blowoff vault repair, replacement, and/or abandonment, add blowdown valves at DOT ball valves, and IDGP pressure relief | | | | | | | | | | | | | | | |
| X-125 | 66-Inch Interplant Pipelines Rehabilitation at Plant 1 | 66" PE/SE | <ul style="list-style-type: none"> Rehabilitate the Plant No. 1 66-inch piping. | | | | | | | | | | | | | | | |
| P1-140 | Activated Sludge-1 and Secondary Clarifier Rehab | PEJB-1 | <ul style="list-style-type: none"> Includes rehabilitating the PEJB-1 structure and replace existing sluice gates. | | | | | | | | | | | | | | | |
| X-118 | 84-Inch Interplant Pipelines Rehabilitation at Plant 1 | 84" PE/SE | <ul style="list-style-type: none"> Rehabilitate the Plant No. 1 84-inch piping. | | | | | | | | | | | | | | | |

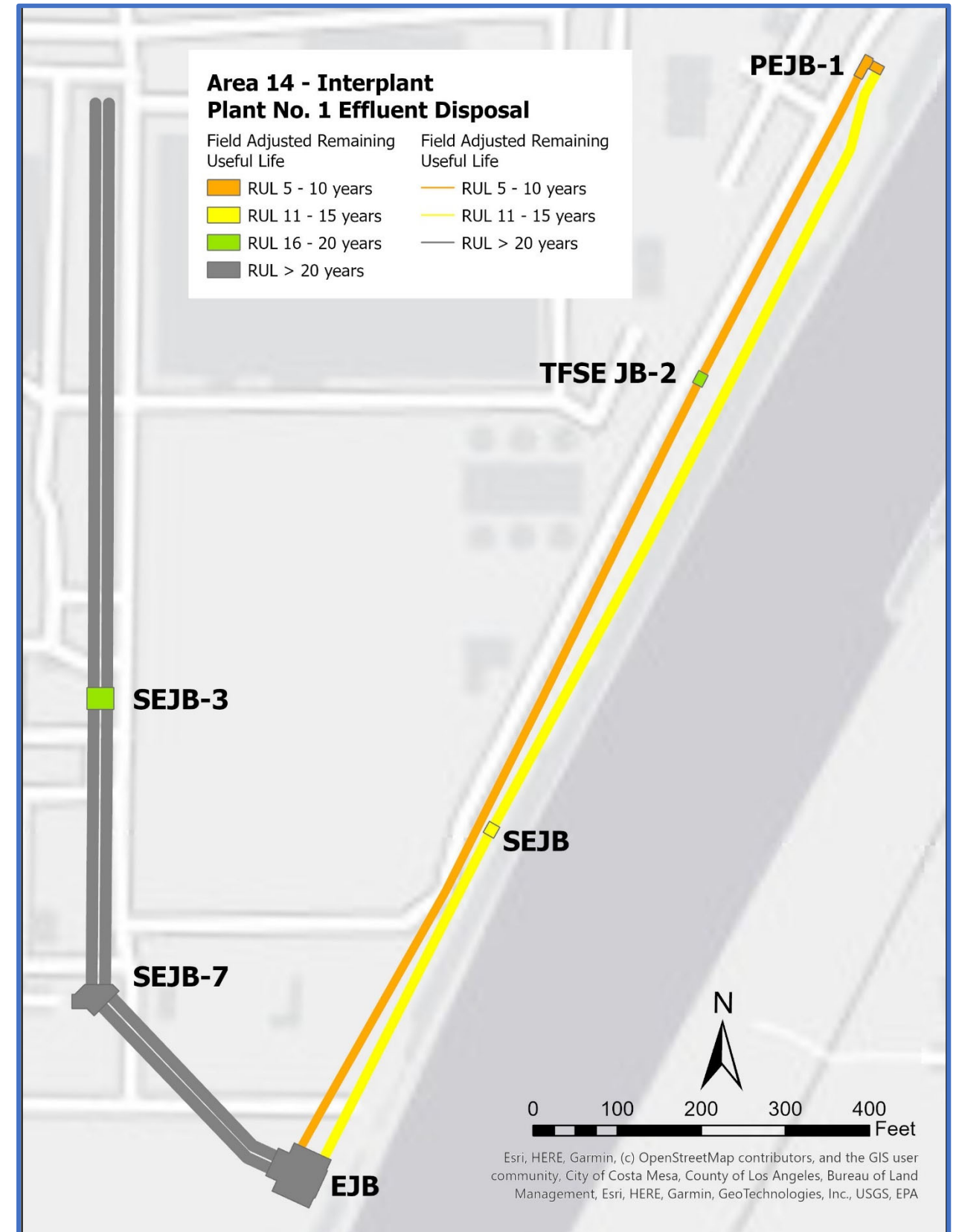
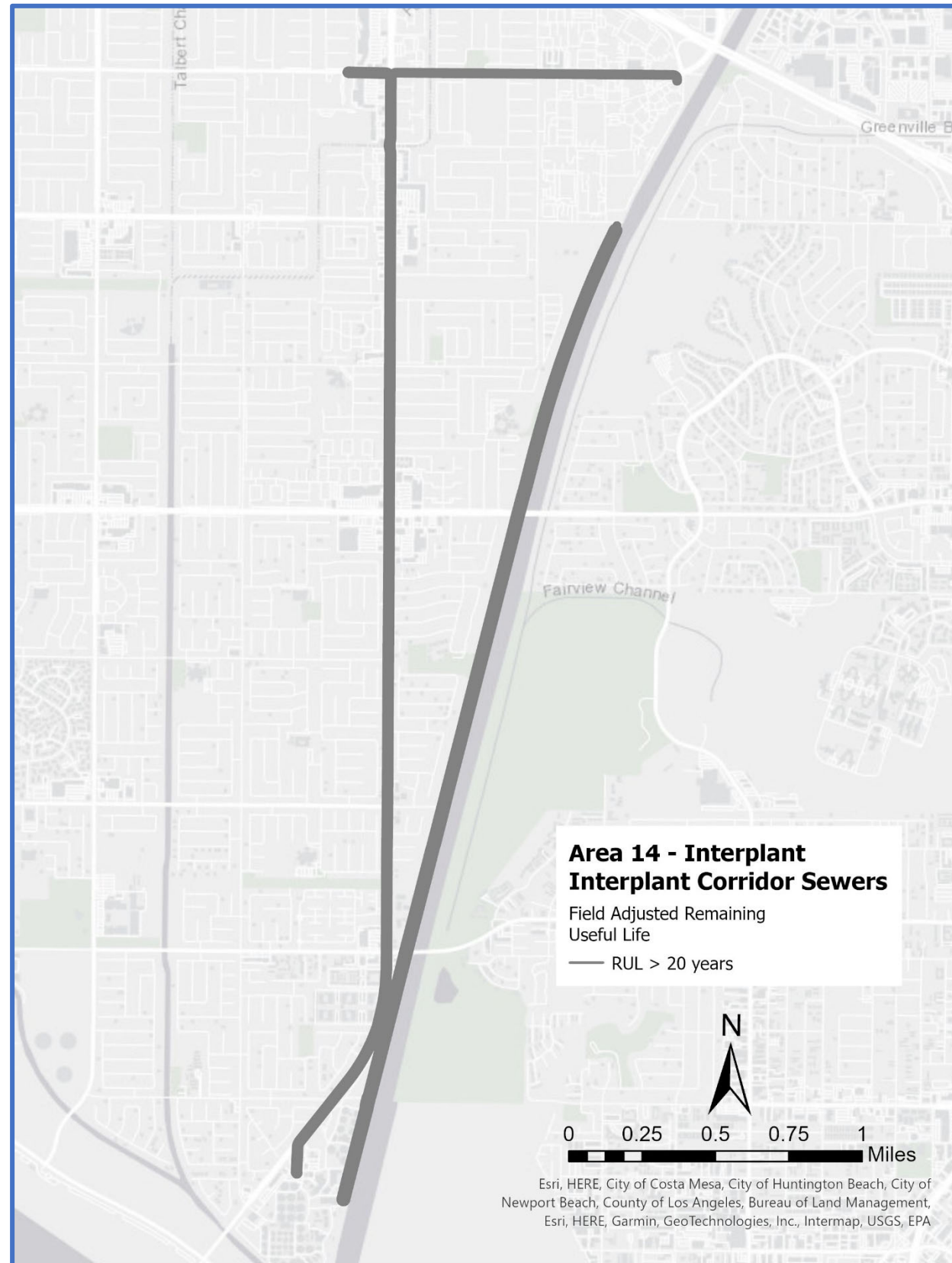
Types of Project Legend:

CIP - Planning
 CIP - Design
 CIP - Construction
 Maintenance Project

Acronym Key:
 CIP = Capital Improvement Program; DOT = Department of Transportation; EJB = Effluent Junction Box; FOC = Fiber Optic Cable; FY = Fiscal Year; GWRS = Groundwater Replenishment System; IDGP = Interplant Digester Gas Pipeline; IPP = Interplant Piping; LOFLO = Low Flow; OCWD = Orange County Water District, OOBs = Ocean Outfall Booster Station; PE = Primary Effluent; PEJB-1 = Primary Effluent Junction Box 1; RUL = Remaining Useful Life; SE = Secondary Effluent; SEJB-3 = Secondary Effluent Junction Box 3; SEJB-7 = Secondary Effluent Junction Box 7

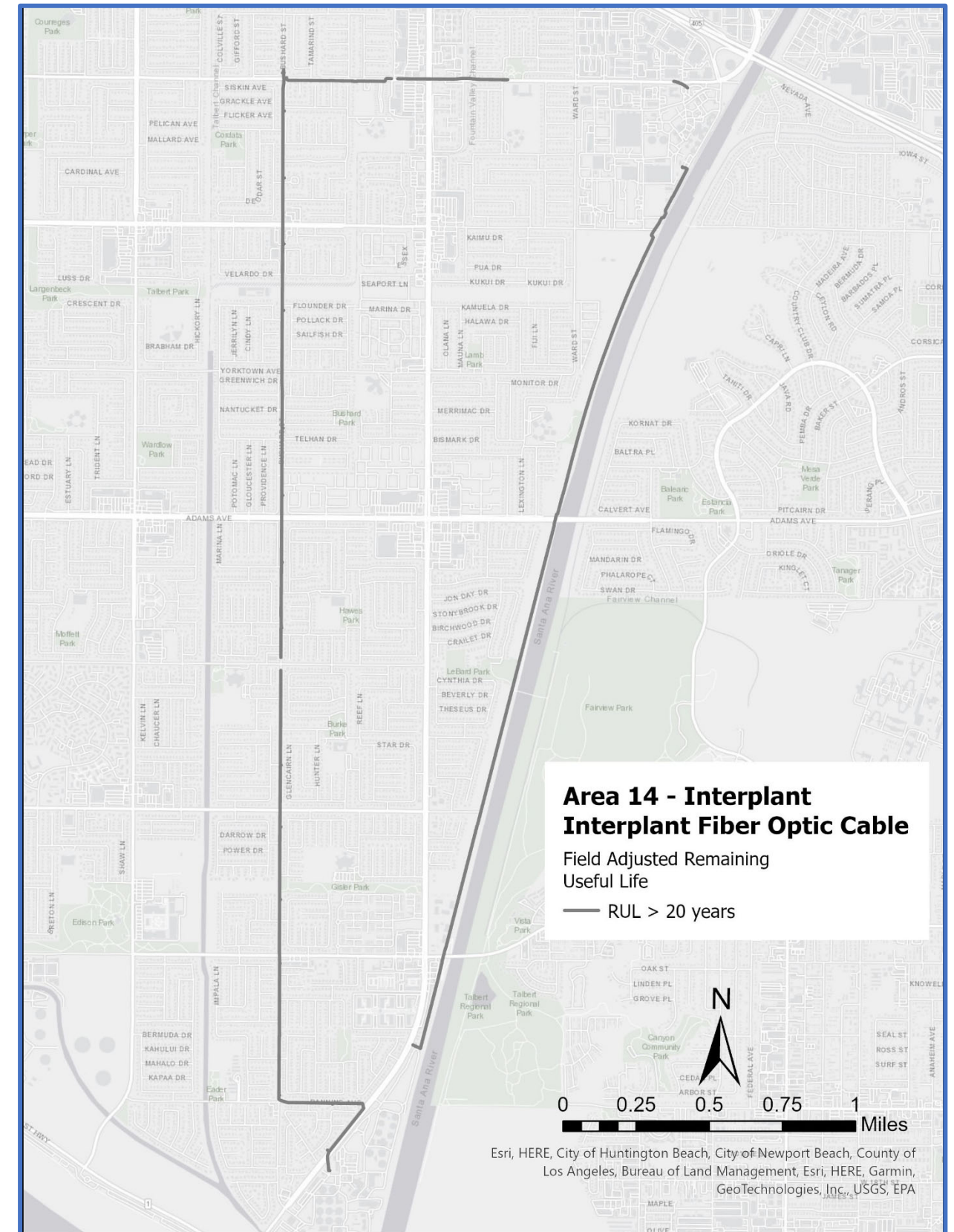
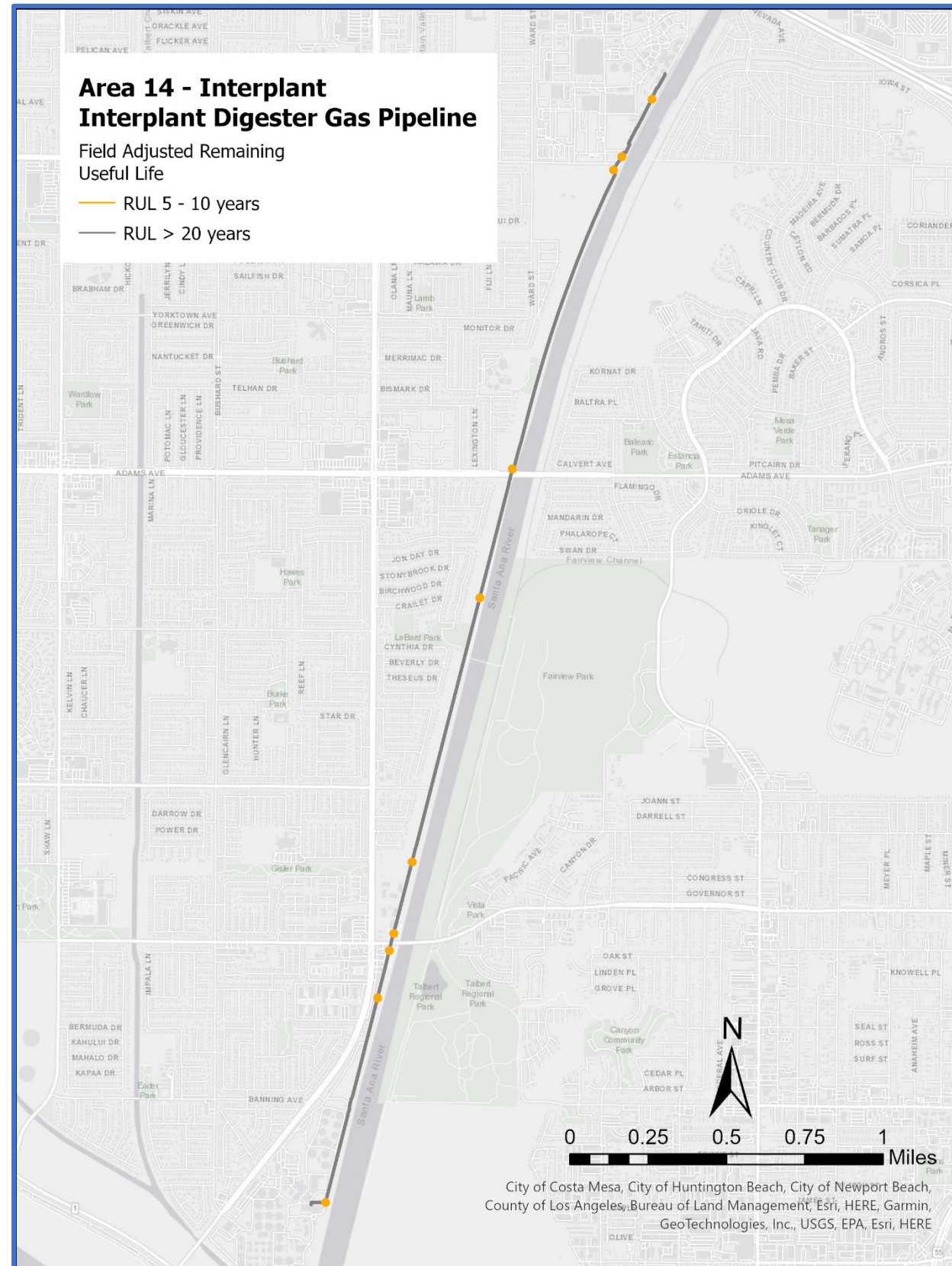
ASSET MANAGEMENT SYSTEM SUMMARY – AREA 14 – PLANT NO. 1 INTERPLANT

Remaining Useful Life Maps



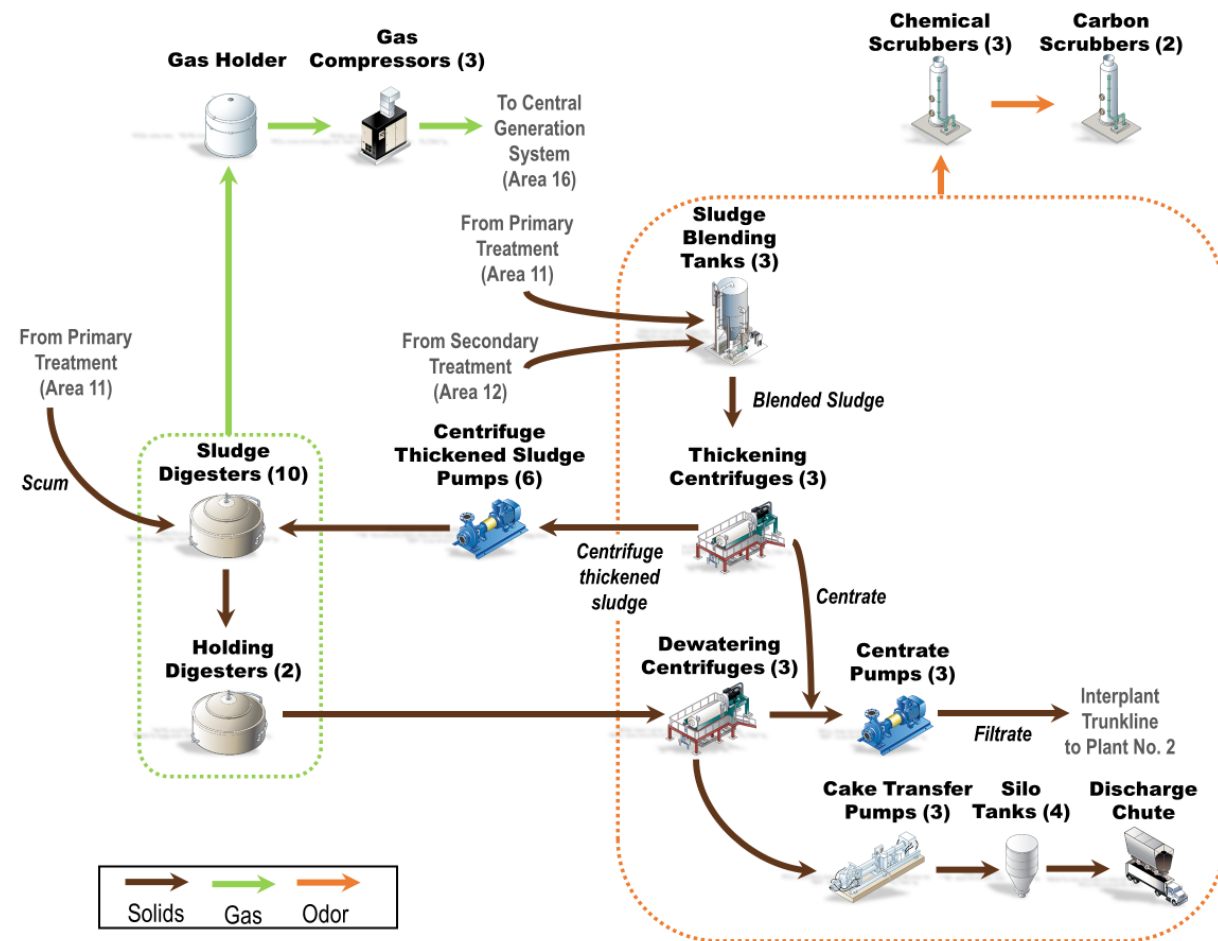
ASSET MANAGEMENT SYSTEM SUMMARY – AREA 14 – PLANT NO. 1 INTERPLANT

Remaining Useful Life Maps



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

Process Schematic



Major Assets Remaining Useful Life

| Asset Type | Digester 5 | Digester 6 | 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 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | - |
| Mechanical | | | | | | | | | | | | | |
| Piping | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 |
| Chemical Pumps | - | - | - | - | - | - | - | - | - | - | - | - | 4 |
| Ferric Control System | - | - | - | - | - | - | - | - | - | - | - | - | 4 |
| 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 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | - |
| Electrical | | | | | | | | | | | | | |
| Motor Control Centers | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | - |
| Instrumentation | | | | | | | | | | | | | |
| PLCs & Flow Meters | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | - |

Asset RUL Legend:

- RUL <5 years
- RUL 5-10 years
- RUL 11-15 years
- RUL 16-20 years
- RUL >20 years

Acronym Key:
 PLC = Programmable Logic Controller;
 RUL = Remaining Useful Life

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 |

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

Key Issues

| Key Issues | Actions and Recommendations |
|--|---|
| <ul style="list-style-type: none"> Ferric Chloride Addition – Piping, pumps, storage tanks, and injection pipes have reached the end of their useful life. The ferric system needs to have the ability to dose ferric to more than one digester at a time. | <ul style="list-style-type: none"> Project P1-135 replaced most of the ferric piping from the pumps to the injection pipe at the digester. Injection system needs to be upsized at the injection point, which will be done when Digesters are taken out of service for cleaning. The ferric pumps and storage tank will be replaced in project P1-105. |
| <ul style="list-style-type: none"> Inadequate Lighting - Safety issue with insufficient lighting around Digesters 8 & 11. | <ul style="list-style-type: none"> FE21-03 will add additional lighting around the digesters. |
| <ul style="list-style-type: none"> Structures – Seismic risk. | <ul style="list-style-type: none"> The 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. There are no projects to address and mitigate lateral spread at this time |

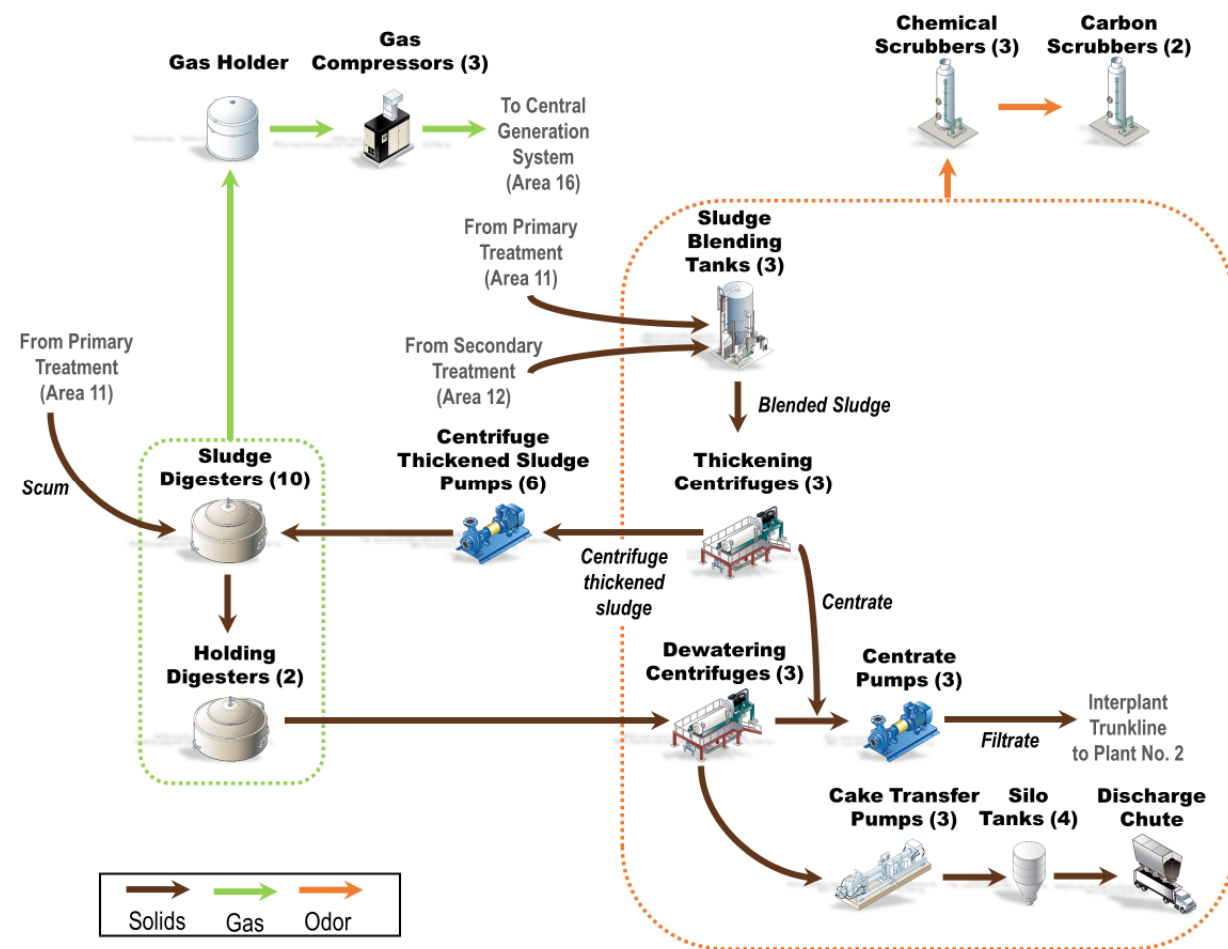
Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 36/36 | FY 36/37 |
|-------------|---|------------------------------|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | | | | | | | | | | | | | | | | | |
| FE21-03 | Plant No. 1 Digesters 8 and 11 Area Lighting Installation | Digesters 8 and 11 | <ul style="list-style-type: none"> Add additional lighting. | | | | | | | | | | | | | | | |
| N/A | Digester Cleaning | Ongoing maintenance activity | <ul style="list-style-type: none"> Clean the digesters and performing preventive condition assessment every 5 to 7 years. | | | | | | | | | | | | | | | |

| | |
|--|---|
| <p>Types of Project Legend:</p> <p> CIP - Planning CIP - Design CIP - Construction Maintenance Project </p> | <p>Acronym Key:</p> <p>CIP = Capital Improvement Program; CP = Control Panel; DIG = Digester; FY = Fiscal Year; LEL= Lower Explosive Limit; N/A = Not Applicable</p> |
|--|---|

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

Process Schematic



Major Assets Remaining Useful Life

| Asset Type | Major Assets Remaining Useful Life | | | | | | | |
|---------------------------|------------------------------------|--------------------------------|-------------------|-------------------|-------------------------|---------------|--------------|------------|
| | Boiler System | Sludge Blending Facility (SBF) | Thickening System | Dewatering System | Dewatering Odor Control | Truck Loading | Gas Handling | Gas Holder |
| Civil | | | | | | | | |
| Effluent Piping | - | 1 | 1 | 1 | - | 1 | - | - |
| Structural | | | | | | | | |
| Structures | - | 1 | - | - | - | 1 | - | 3 |
| Buildings | - | - | 1 | 1 | - | 1 | 4 | - |
| Mechanical | | | | | | | | |
| Piping | 1 | - | 1 | 1 | 1 | 1 | 3 | 3 |
| Pumps-grinders | - | 2 | 2 | 2 | 2 | 1 | - | - |
| Boilers & Heat Exchangers | 2 | - | - | - | - | - | - | - |
| Centrifuges | - | - | 2 | 2 | - | - | - | - |
| Carbon Unit | - | - | - | - | 2 | - | - | - |
| Chemical/Polymer System | - | - | 1 | 1 | 2 | - | - | - |
| Gas Compressors | - | - | - | - | - | - | 4 | - |
| Gas Dryer | - | - | - | - | - | - | 4 | - |
| Gas Flares | - | - | - | - | - | - | 3 | - |
| Silo Cake Conveyors | - | - | - | - | - | 1 | - | - |
| Silo Sliding Frames | - | - | - | - | - | 1 | - | - |
| Electrical | | | | | | | | |
| Variable Frequency Drives | - | 2 | 4 | 4 | - | 2 | - | - |
| Motor Control Centers | 2 | 1 | 1 | 1 | 1 | 1 | 4 | - |
| Instrumentation | | | | | | | | |
| PLCs & Flow Meters | 1 | 1 | 1 | 1 | 1 | 1 | 4 | - |

Asset RUL Legend:

- RUL <5 years
- RUL 5-10 years
- RUL 11-15 years
- RUL 16-20 years
- RUL >20 years

Acronym Key:

RUL = Remaining Useful Life;
 PLC = Programmable Logic Controller; SBF = Sludge Blending Facility

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

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 Wetwell | 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 |

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

| Major Assets | Quantities |
|---------------------------|------------|
| Standby Truck Loading Bay | 1 |
| Gas Handling | |
| Low Pressure Gas Holder | 1 |
| Gas Compressors | 3 |
| Gas Dryer | 1 |
| Gas Flares | 3 |
| Boiler | 1 |

Key Issues

| Key Issues | Actions and Recommendations |
|---|--|
| <ul style="list-style-type: none"> Thickening and Dewatering Maintainability of the Equipment – Improvements are needed for equipment access for maintenance. | <ul style="list-style-type: none"> Most of the improvements will be done by Maintenance. FE21-04 small project for safety improvements. FE22-01 small project regarding equipment access and platform installation. FR1-0018 will replace the diverter gate. |
| <ul style="list-style-type: none"> Gas Handling System – Gas compressor system is aging and needs reliability improvements. | <ul style="list-style-type: none"> Project J-124 Digester Gas Facilities will rehab or replace aging assets. Gas compressors repair overhaul by Maintenance. |
| <ul style="list-style-type: none"> Gas Dryer – Out of service. Currently, gas goes through a heat exchanger and condensate drop out. | <ul style="list-style-type: none"> The gas dryer refrigerator system will be replaced by J-124 Project. |
| <ul style="list-style-type: none"> Pipe Vibration – Co-thickening centrifuge feed and the co-thickened sludge piping vibrates causing pipe support failures. | <ul style="list-style-type: none"> Project FE20-06 will install additional bracing on the thickening centrifuge feed pipe and the co-thickened sludge piping. |
| <ul style="list-style-type: none"> Plant Water Piping – Corrosion from plant water on equipment is causing premature wear on pumps and piping failures. | <ul style="list-style-type: none"> PS20-09 will evaluate the plant water and make recommendations for improvements. |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|---|-------------------------------------|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | | | | | | | | | | | | | | | | | |
| J-124 | Digester Gas Facilities Rehabilitation | Gas compressors, dryers, and flares | <ul style="list-style-type: none"> Replace /rebuild gas compressor. | | | | | | | | | | | | | | | |
| FE18-16 | New Floor and Equipment Drains for the Truckloading Basement | Truckloading Facility | <ul style="list-style-type: none"> Improve the drainage in the basement. | | | | | | | | | | | | | | | |
| FE20-06 | T&D Pipe Support Improvements | Thickening sludge piping | <ul style="list-style-type: none"> Add pipe bracing to address vibration issues on pump discharge piping. | | | | | | | | | | | | | | | |
| FE21-04 | Handrail Installation at the Thickening and Dewatering Building | Thickening and Dewatering Building | <ul style="list-style-type: none"> Improve safety outside of the thickening and dewatering building. | | | | | | | | | | | | | | | |
| FE22-01 | Truckloading silo's slide frame conveyor motor access platform | Truckloading slide frame | <ul style="list-style-type: none"> Improve access to the equipment for maintenance activities. | | | | | | | | | | | | | | | |
| PS20-09 | Thickening and Dewatering Plant Water Study | Thickening and Dewatering Building | <ul style="list-style-type: none"> The study will evaluate the plant water used at the T&D building and determine why the water is causing corrosion on equipment. | | | | | | | | | | | | | | | |
| RE20-06 | Co-thickened Sludge Pump Trial | Co-thickening pumps | <ul style="list-style-type: none"> Field test a rotary lobe pump in place of the progressive cavity CTS pump. | | | | | | | | | | | | | | | |

Types of Project Legend:

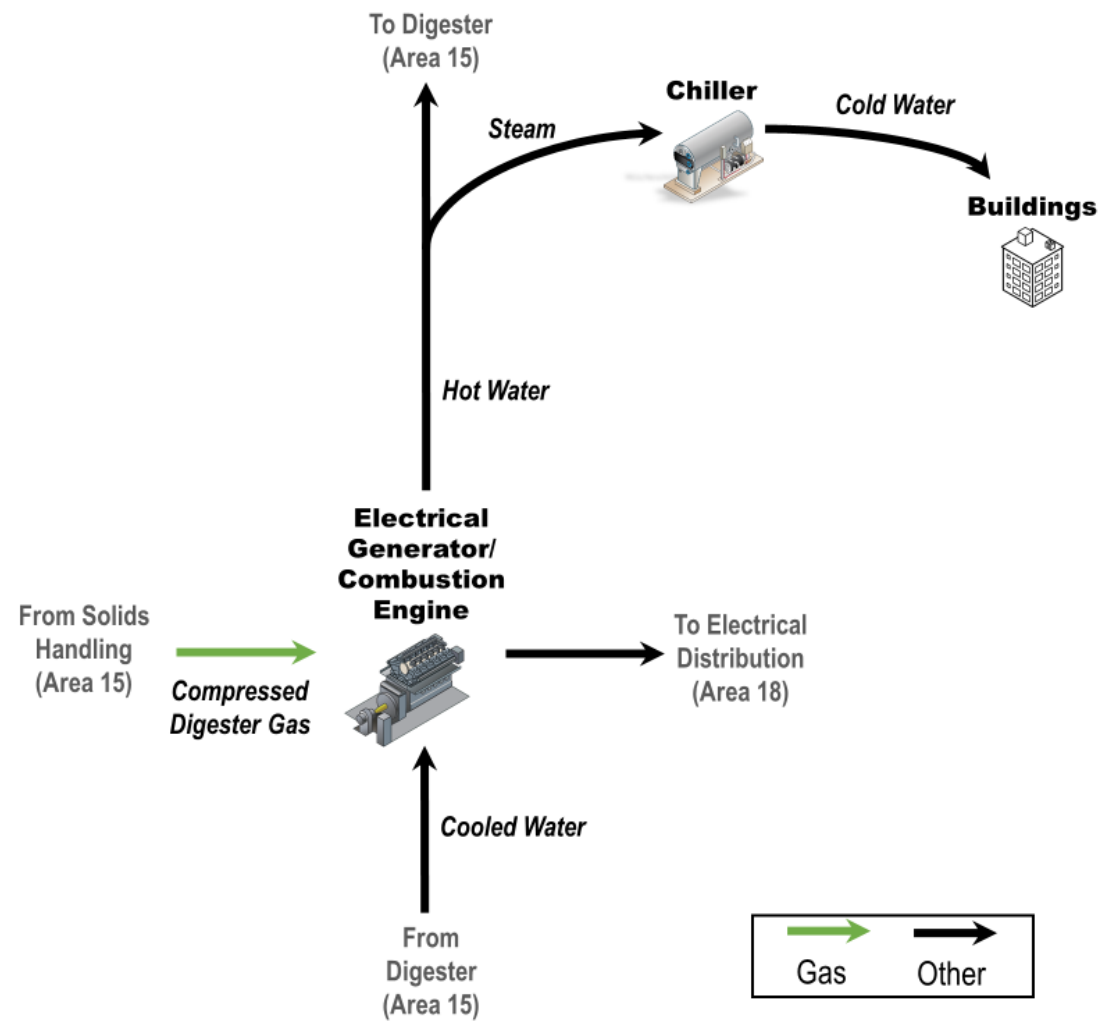
■ CIP - Planning
 ■ CIP - Design
 ■ CIP - Construction
 ■ Maintenance Project

Acronym Key:

CIP = Capital Improvement Program; CTS = Co-thickened sludge; FY = Fiscal Year

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

Process Schematic



Major Assets Remaining Useful Life

| Asset Type | Engine Generator #1 | Engine Generator #2 | Engine Generator #3 | Absorption Chiller #1 | Absorption Chiller #2 | Deaerator Vessel | Heat Recovery Boiler #1 | Heat Recovery Boiler #2 | Heat Recovery Boiler #3 | OXI Catalyst | SCR Catalyst | Urea Injection System | Starting Air Compressor #1 | Starting Air Compressor #2 | Inst. Air Compressor #1 | Inst. Air Compressor #2 | Battery Backup | Building Elevator | Plant Water Piping | Miscellaneous |
|---|---------------------|---------------------|---------------------|-----------------------|-----------------------|------------------|-------------------------|-------------------------|-------------------------|--------------|--------------|-----------------------|----------------------------|----------------------------|-------------------------|-------------------------|----------------|-------------------|--------------------|---------------|
| Structural | | | | | | | | | | | | | | | | | | | | |
| Buildings | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 |
| Mechanical | | | | | | | | | | | | | | | | | | | | |
| General | 3 | 5 | 5 | 3 | 3 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | - | 1 | 5 | - |
| HVAC | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 4 |
| Lube Oil System | 3 | 3 | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Electrical | | | | | | | | | | | | | | | | | | | | |
| General | 5 | 5 | 5 | - | - | - | - | - | - | - | - | 3 | 3 | 3 | 4 | 4 | 5 | 1 | - | - |
| Switchgear | 4 | 4 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Instrumentation | | | | | | | | | | | | | | | | | | | | |
| General | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | - | 1 | - | - |
| RUL Legend: | | | | | | | | | | | | | | | | | | | | |
| ■ RUL <5 years ■ RUL 5-10 years ■ RUL 11-15 years ■ RUL 16-20 years ■ RUL >20 years | | | | | | | | | | | | | | | | | | | | |
| Acronym Key: | | | | | | | | | | | | | | | | | | | | |
| HVAC = Heating, Ventilation, and Air Conditioning; Inst. = Instrument; OXI = Oxidizer; RUL = Remaining Useful Life; SCR = Selective Catalytic Reduction | | | | | | | | | | | | | | | | | | | | |

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 |
| Deaerator Vessel | 1 |

| Major Assets | Quantities |
|--------------------------------|------------|
| Engine Emission Control | |
| OXI Catalyst | 3 |
| SCR Catalyst | 3 |
| Urea Injection System | 3 |
| Heat Recovery System | |
| Heat Recovery Boiler | 3 |

| Major Assets | Quantities |
|--------------------------|------------|
| Building | |
| Elevator | 1 |
| Piping | Various |
| HVAC | |
| Ventilation Exhaust Fans | 5 |
| Air Compressors | |
| Engine Starting Air | 2 |
| Instrument Air | 2 |

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

Key Issues

| Key Issues | Actions and Recommendations |
|---|---|
| <ul style="list-style-type: none"> Gas Engine Generator Set Reliability – Aging components and systems required to operate the Central Generation Engines are creating reliability issues and need to be addressed. | <ul style="list-style-type: none"> Engine #1 overhaul completed. J-135 will overall remaining engines and engine generators. |
| <ul style="list-style-type: none"> Plant Water Piping – The plant water (i.e., cooling water) piping has degraded and needs replacement. | <ul style="list-style-type: none"> Replace all plant water piping in the basement of Central Generation (FE19-02). |
| <ul style="list-style-type: none"> Backup Battery System – The batteries used to provide backup power for switching of the switch gear during loss of power events, has reached the end of its useful life. | <ul style="list-style-type: none"> Replace the lead acid batteries and their respective battery chargers with a suitable backup battery system (FR1-0005). |
| <ul style="list-style-type: none"> Starting Air Compressors – Air compressors are suffering from reliability issues and dependability. | <ul style="list-style-type: none"> Rehabilitate and repair the air compressor system to improve reliability and dependability. |
| <ul style="list-style-type: none"> Pressure Vessel Integrity – The asset integrity of pressure containing vessels needs a detailed assessment. | <ul style="list-style-type: none"> Provide an assessment of pressure vessels to formulate an asset management strategy to ensure safety over time (PS20-05). |
| <ul style="list-style-type: none"> PLC Upgrade – The existing engine PLCs are obsolete. | <ul style="list-style-type: none"> Replace obsolete engine PLCs with new ones. |
| <ul style="list-style-type: none"> Gas Engine Cylinder Pressure Sensing and Diagnostics – Engine diagnostic capability improvement needed. | <ul style="list-style-type: none"> Install cylinder pressure sensors to improve diagnostic capability for operational flexibility (PRN-00697). |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | | | | | | | | | | | | | | | | | |
|-------------|---|------------------------------------|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|--|
| | | | | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 | | |
| P1-127 | Central Generation Rehabilitation at Plant No. 1 | Central Generation | <ul style="list-style-type: none"> Rehabilitation of engine generator support systems. | | | | | | | | | | | | | | | | | |
| FE17-03 | Battery Storage System | Plantwide | <ul style="list-style-type: none"> Install batteries for electricity storage purposes. | | | | | | | | | | | | | | | | | |
| P1-136 | 12.47 kV Switchgear Replacement at Central Generation at Plant No. 1 | Engine Generator | <ul style="list-style-type: none"> Replace existing obsolete electrical equipment. | | | | | | | | | | | | | | | | | |
| FE19-02 | Cen Gen Plant Water Pipe Replacement at Plant No. 1 | Plant Water Piping | <ul style="list-style-type: none"> Replace existing plant water piping with new. | | | | | | | | | | | | | | | | | |
| MP-227 | Starting Air Compressor System Rehabilitation | Starting Air Compressor System | <ul style="list-style-type: none"> Rehabilitation of the air compressors. | | | | | | | | | | | | | | | | | |
| J-135B | Engine and Generator Overhauls at Plant No. 1 and 2 | Engine Generator | <ul style="list-style-type: none"> Perform top/bottom end engine overhauls. | | | | | | | | | | | | | | | | | |
| FR1-0005 | Cen Gen and 12Kv Service Center Switchgear Battery System Upgrades at Plant No. 1 | Battery Backup | <ul style="list-style-type: none"> Replace the existing backup batteries for the 12kV switch gear. | | | | | | | | | | | | | | | | | |
| PRN-00697 | Engine Cylinder Pressure Sensing and Diagnostics | Engine Generator | <ul style="list-style-type: none"> Install pressure sensors onto each Cylinder, incl. software/HMI. | | | | | | | | | | | | | | | | | |
| PS20-05 | Cen Gen Pressure Vessel Integrity Assessment at Plant Nos. 1 and 2 | Pressure Vessels & Heat Exchangers | <ul style="list-style-type: none"> Inspect and report on vessel integrity and next required inspection. | | | | | | | | | | | | | | | | | |

Types of Project Legend:

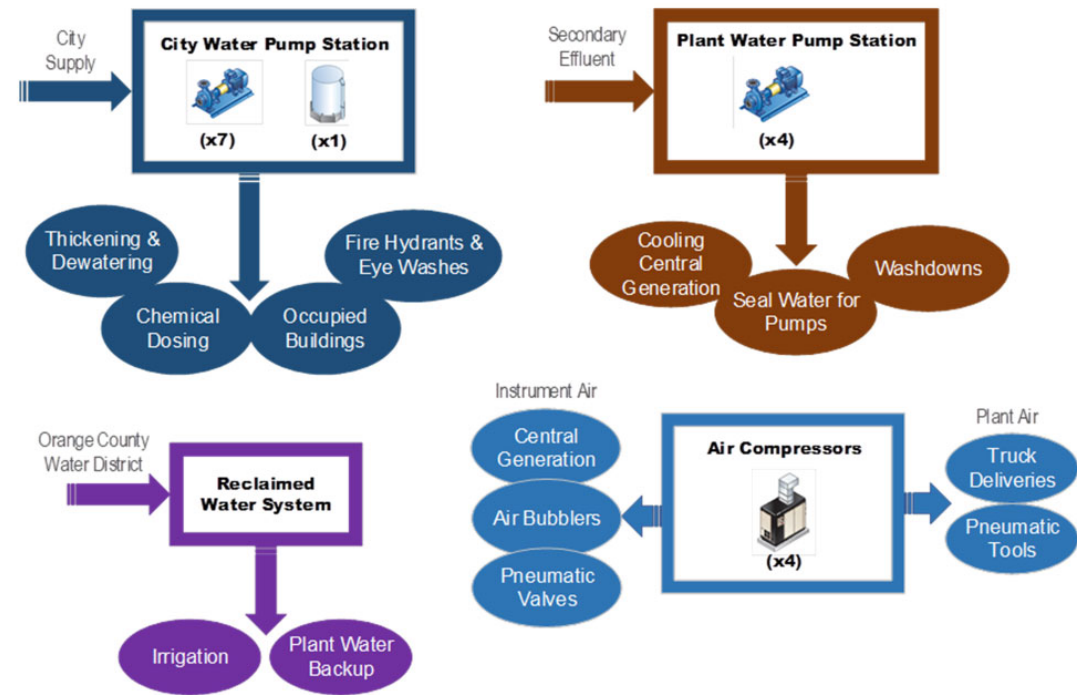
■ CIP - Planning
 ■ CIP - Design
 ■ CIP - Construction
 ■ Maintenance Project

Acronym Key:

CIP = Capital Improvement Program; FY = Fiscal Year; HMI = Human Machine Interface; HVAC = Heating, Ventilation, and Air Conditioning; OXI = Oxidizer; RUL = Remaining Useful Life; PLC = Programmable Logic Controller; SCR = Selective Catalytic Reduction

ASSET MANAGEMENT SYSTEM SUMMARY – AREA 17 – 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 | 3 | - | - |
| Tanks | 2 | - | - | - |
| Mechanical | | | | |
| Pumps | 3 | 3 | - | - |
| Strainers | - | 3 | - | - |
| Compressors | - | - | - | 3 |
| Ventilation System | 2 | 3 | - | - |
| Electrical | | | | |
| Motor Control Centers | 1 | 2 | - | - |
| Variable Frequency Drives | 3 | 1 | - | - |
| Instrumentation | | | | |
| PLCs, Flowmeters | 2 | 2 | - | 2 |

Asset RUL Legend:

- RUL <5 years
- RUL 5-10 years
- RUL 11-15 years
- RUL 16-20 years
- RUL >20 years

Acronym Key:

RUL= Remaining Useful Life;
PLC=Programmable Logic Controller





ASSET MANAGEMENT SYSTEM SUMMARY – AREA 17 – PLANT NO. 1 UTILITIES

Key Issues

| Key Issues | Actions and Recommendations |
|---|---|
| <ul style="list-style-type: none"> • Plant/Instrument Air Lines – Air Quality Impacts to instrumentation. | <ul style="list-style-type: none"> • Future planning study is recommended to address instrument air quality for instruments. |
| <ul style="list-style-type: none"> • City Water – Need to find solution to redundancy after Garfield connection is abandoned. | <ul style="list-style-type: none"> • There are three viable options to providing redundancy to our City water system: <ol style="list-style-type: none"> 1. Work with the city of Fountain Valley to provide an alternate supply line that is off a nearby main of Ellis or Ward. 2. Connect a new supply line off of Garfield and construct smaller pump station with air gap tanks. 3. Use the existing connection off of Garfield on an emergency situation. Install appropriate backflow devices and blind flange existing supply line. Limit access to this connection via lockbox. |
| <ul style="list-style-type: none"> • Plant Water – Piping failures. | <ul style="list-style-type: none"> • Due to the corrosive nature of the plant water, the current ductile iron pipes (DIP) are corroding prematurely and causing failures throughout the plant. FE19-02 will address aging plant water piping at Cen Gen and FE20-05 will address recent plant water pipe failures at the secondary clarifiers. |
| <ul style="list-style-type: none"> • Air Compressors – Plant and Instrument Air supply issues | <ul style="list-style-type: none"> • Air compressors are being replaced and new ones being added to meet increasing plant air demands (FE18-06, FE18-20, P1-105). |

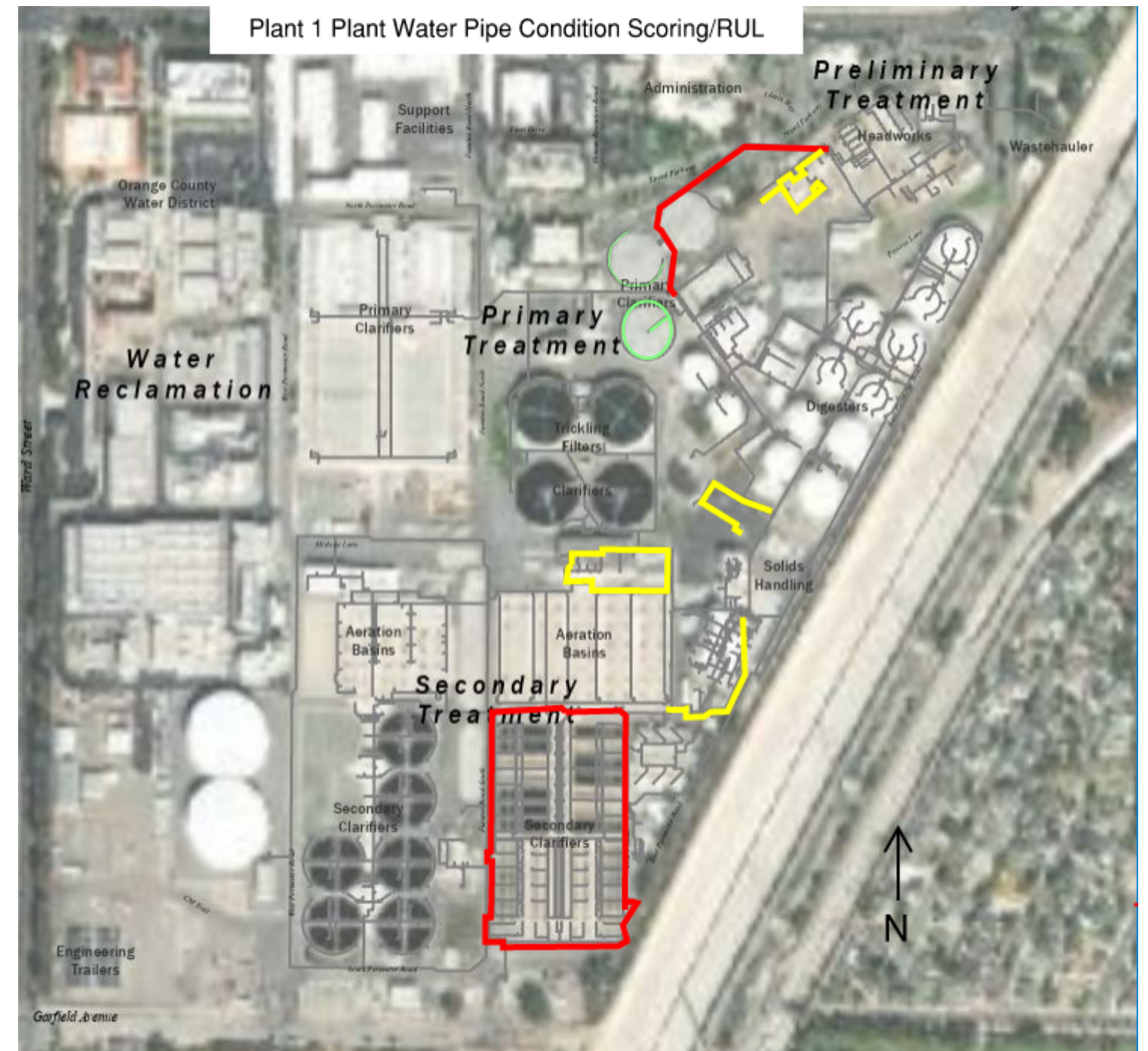
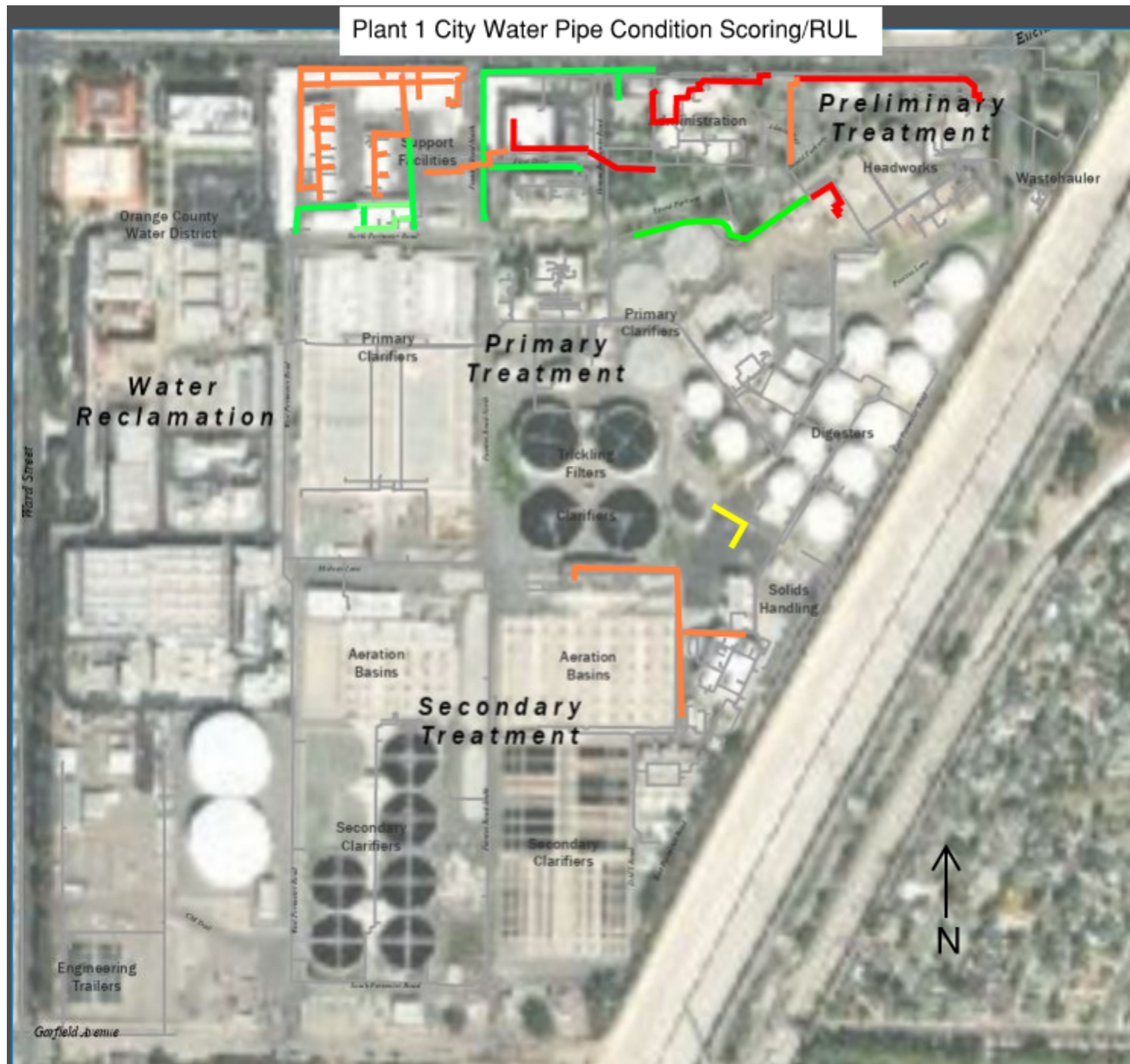
Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | FY22/23 | FY23/24 | FY24/25 | FY25/26 | FY26/27 | FY27/28 | FY28/29 | FY29/30 | FY30/31 | FY31/32 | FY32/33 | FY33/34 | FY34/35 | FY35/36 |
|-------------|--|---|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| FE19-02 | Cen Gen Plant Water Pipe Replacement at Plant No. 1 | Central Generation | <ul style="list-style-type: none"> • Replace approximately 800 feet of plant water pipe within Cen Gen. | | | | | | | | | | | | | | |
| FE18-06 | Instrument Air Compressors at Central Generation | Central Generation | <ul style="list-style-type: none"> • Replace Instrument Air compressors at Central Generation. | | | | | | | | | | | | | | |
| P1-105 | Headworks Rehabilitation at Plant No. 1 | City Water Pump Station, Plant air compressors, plant air lines | <ul style="list-style-type: none"> • Refeed city water pumps from new power building and replace current compressor at headworks with two new compressors. • Replace plant air lines in headworks | | | | | | | | | | | | | | |
| FE18-20 | DAFT Air Compressor Replacement | DAFT | <ul style="list-style-type: none"> • Replace current compressor with two new compressors. | | | | | | | | | | | | | | |
| FE20-05 | Plant Water Piping Replacement at Secondary Clarifiers | Secondary Clarifiers | <ul style="list-style-type: none"> • Replace corroded and failing plant water piping around the AS1 secondary clarifiers. | | | | | | | | | | | | | | |
| P1-126 | Primary Clarifier Replacement and Improvement | Primary Clarifier | <ul style="list-style-type: none"> • Replace aging plant water pipes near primary clarifiers. | | | | | | | | | | | | | | |
| PRN-00743 | Plant No. 1 Plant Water Station Replacement Study | Plant Water Station | <ul style="list-style-type: none"> • Phase 2 of the Plant Water Study will evaluate locations for a new plant water station that use water from AS1 and AS2 for increased reliability. | | | | | | | | | | | | | | |
| X-038 | City Water Pump Station Replacement | City Water Pump Station | <ul style="list-style-type: none"> • Replace City Water Pump Station. | | | | | | | | | | | | | | |
| X-039 | Plant Water Pump Station Rehabilitation | Plant Water Pump Station | <ul style="list-style-type: none"> • Rehabilitate Plant Water Pump Station. | | | | | | | | | | | | | | |
| PRN-00541 | City Water Demand Flow Assessment at Plant No. 1 | City Water Pump Station | <ul style="list-style-type: none"> • Study to determine current and future city water needs. | | | | | | | | | | | | | | |
| PS20-09 | Plant Water Study at T&D Building | T&D Building & Plant Water Station | <ul style="list-style-type: none"> • The study will evaluate plant water quality chemistry, corrosivity and recommend changes or treatment to improve water quality | | | | | | | | | | | | | | |
| X-017 | Primary Sedimentation Basin 6-31 Rehab at Plant 1 | Primary Sedimentation basin | <ul style="list-style-type: none"> • Replace aging plant instrument air piping | | | | | | | | | | | | | | |
| PRN-0743 | Plant and Reclaimed Water Study | Plant Water and Reclaimed Water Facilities | <ul style="list-style-type: none"> • Study to evaluate water demands and system capacity to meet future needs long term. | | | | | | | | | | | | | | |

| | |
|--|---|
| Types of Project Legend:  CIP - Planning  CIP - Design  CIP - Construction  Maintenance Project | Acronym Key: CIP = Capital Improvement Program; FE = Facilities Engineering; FY = Fiscal Year; HDPE = High-Density Polyethylene Resin; HP = Horsepower; OC San = Orange County Sanitation District; OCWD = Orange County Water District |
|--|---|

ASSET MANAGEMENT SYSTEM SUMMARY – AREA 17 – PLANT NO. 1 UTILITIES

Remaining Useful Life of Utility Infrastructure



RUL Legend:

| | | | | |
|---|--|---|--|---|
| ■ RUL <5 years | ■ RUL 5-10 years | ■ RUL 11-15 years | ■ RUL 16-20 years | ■ RUL >20 years |
|---|--|---|--|---|

Acronym Key:

RUL = Remaining Useful Life

ASSET MANAGEMENT SYSTEM SUMMARY – AREA 17 – PLANT NO. 1 UTILITIES

Remaining Useful Life of Utility Infrastructure



RUL Legend:

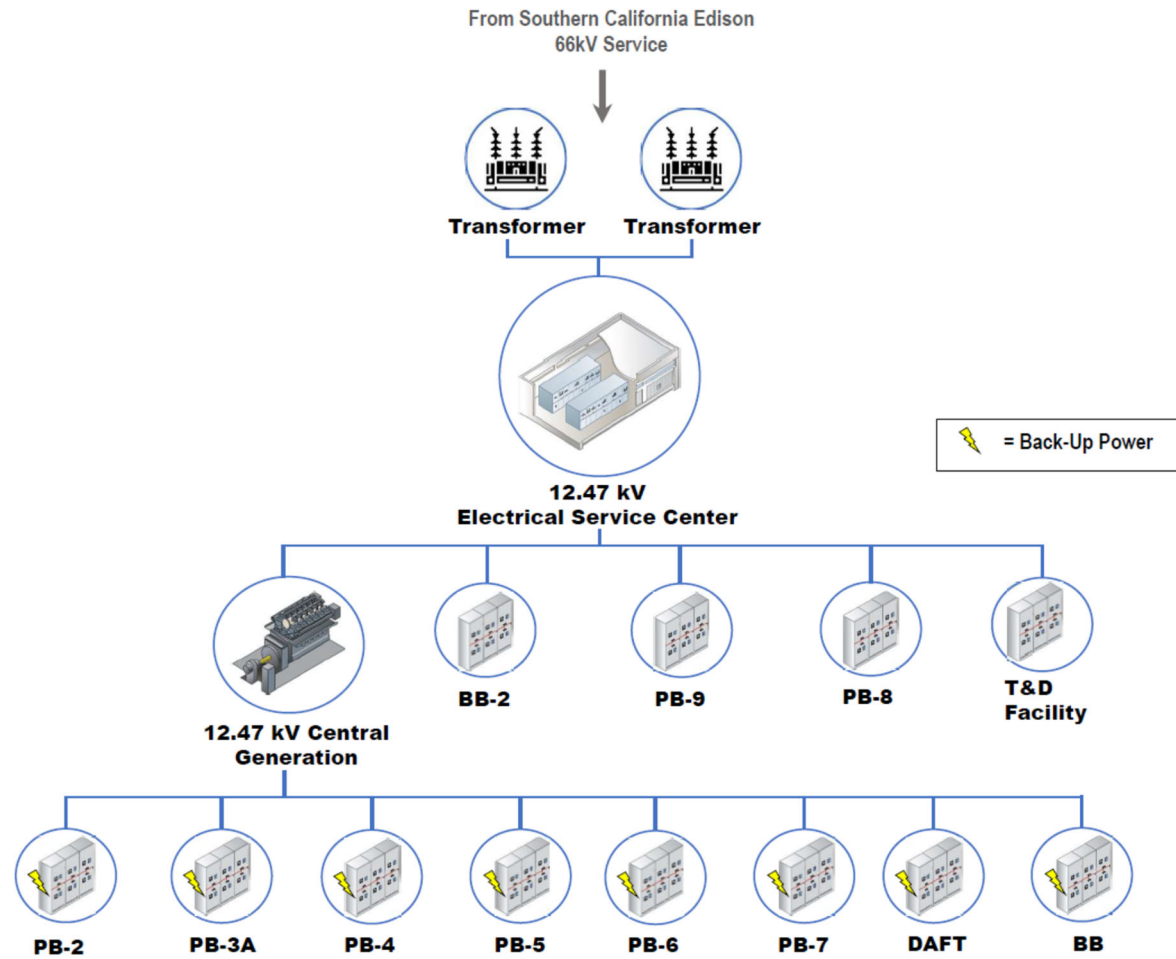
| | | | | |
|--|--|---|---|--|
| ■ RUL < 5 years | ■ RUL 5-10 years | ■ RUL 11-15 years | ■ RUL 16-20 years | ■ RUL > 20 years |
|--|--|---|---|--|

Acronym Key:

RUL = Remaining Useful Life

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

Process Schematic



Major Assets

| Major Assets | Quantities |
|----------------------------------|------------|
| Transformers | 40 |
| Standby Generators | 8 |
| 12KV and 5kV Switchgears | 16 |
| 480V Switchgears | 38 |
| 125VDC and 24VDC Battery Systems | 25 |
| UPS | 24 |

Major Assets Remaining Useful Life

| Asset Type | Service Center | Cen Gen | PB-2 | PB-3A | PB-4 | PB-5 | PB-6 | PB-7 | PB-8 | PB-9 | DAFT | BB-1 | BB-2 | T&D FACILITY |
|---|----------------|---------|------|-------|------|------|------|------|------|------|------|------|------|--------------|
| Tier I – 12.47kV Primary Distribution Level | | | | | | | | | | | | | | |
| Transformers: 12.47/4.16kV | - | - | - | - | - | - | - | - | - | - | - | 3 | 1 | 1 |
| Transformers: 12.47/0.48kV | 4 | 4 | 3 | 3 | 3 | 2 | 3 | 1 | 2 | 1 | 3 | 3 | 1 | 1 |
| 12.47kV Switchgears | 4 | 4 | 4 | 4 | 4 | 4 | 4 | - | - | - | - | - | 3 | 1 |
| 12.47kV Transfer Switches | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 12.47kV Load Interrupter Switches | 3 | - | 4 | 4 | 3 | - | - | 1 | 1 | 1 | 3 | 3 | - | - |
| 12.47kV Feeders | 1 | 4 | 4 | 4 | 4 | 4 | 4 | 1 | 1 | 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 | 3 | 4 | - | 2 | 4 | 1 | 1 | 1 | 3 | 3 | 1 | 1 |
| Transfer Switches | - | - | 2 | 2 | 4 | - | 2 | - | - | - | 4 | 4 | 1 | - |
| Generators | - | - | 5 | 5 | 5 | - | - | 1 | 1 | - | - | 5 | - | - |
| Tier V – Uninterruptible Power Supply | | | | | | | | | | | | | | |
| UPSs Individual | - | 1 | - | 5 | - | - | 4 | - | 3 | 2 | 4 | 3 | 2 | - |
| Tier VI – 125 VDC and 24 VDC Battery Systems | | | | | | | | | | | | | | |
| 125VDC Chargers | 5 | 5 | 5 | 5 | - | 2 | 4 | 3 | 3 | 2 | 3 | - | 3 | 1 |
| 125VDC Batteries | 5 | 5 | 5 | 5 | - | 2 | 4 | 3 | 3 | 2 | 3 | - | 3 | 1 |
| 24VDC Chargers | - | 5 | 5 | 5 | 5 | - | - | 3 | 3 | - | - | 3 | - | 1 |
| 24VDC Batteries | - | 5 | 5 | 5 | 5 | - | - | 3 | 3 | - | - | 3 | - | 1 |
| Generator Controls | | | | | | | | | | | | | | |
| Generator Controls | - | 5 | 5 | 5 | 5 | - | - | 1 | 1 | - | - | 5 | - | - |

Asset RUL Legend:

- RUL <5 years
- RUL 5-10 years
- RUL 11-15 years
- RUL 16-20 years
- RUL >20 years

Acronym Key:

- BB = Blower Building;
- Cen Gen = Central Generation Facility;
- kV = Kilovolt;
- PB = Power Building;
- RUL = Remaining Useful Life;
- T&D = Thickening and Dewatering;
- VDC = Volts of Direct Current;
- UPS = Uninterruptible Power Supply

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

Key Issues

| Key Issues | Actions and Recommendations |
|---|---|
| <ul style="list-style-type: none"> Standby Generators <ul style="list-style-type: none"> - Power Building 2, &3A: Overheating at 75%-80% loading. - Power Building 4: Engine unable to drive the generator at 100% loading. - Blower Building 1: Shut down on high temp. at 100%, cannot synchronize both generators. | <ul style="list-style-type: none"> • P1-105 will install centralized standby system with (4)-2500kW, 12kV diesel generators for Headworks Area, Power Building 2, 5 and Blower Building standby loads. P1-105 will demolish generators at Power Building 3A. P1-126 will demolish Power Building 4 Generator and refeed standby loads from Power Building 8. P1-139 Project will design feeders from new generators to feed the Plant Water Pump Station, Truckloading, and life safety loads at the Thickening and Dewatering Building and Activated Sludge Facilities 1 and 2. |
| <ul style="list-style-type: none"> • Battery Chargers and Batteries – Aging. | <ul style="list-style-type: none"> • Project FR1-0005 will replace critical batteries and chargers at 12kV Service Center and Cen Gen. |
| <ul style="list-style-type: none"> • Cabling – Aging medium voltage cabling infrastructure and damaged or failed power, control, fiber optic cables. | <ul style="list-style-type: none"> • Service Contract (S-2019-1107B) in place for testing aging medium voltage cables to perform Condition Assessment and develop plan for PM. PRN-00890 and PRN-00894 will address cables associated with GWR Meter Vault and Effluent Junction Box. |
| <ul style="list-style-type: none"> • Variable Frequency Drive – Obsolescence. | <ul style="list-style-type: none"> • Developed VFD Replacement Strategy. Plant No. 1 obsolete VFDs will be addressed under FR1-0011 and FR1-0016 Projects. |
| <ul style="list-style-type: none"> • Stand-by Power Policy - No Stand-by Power policy to maintain permit compliance and prevent adverse treatment capability during plant power outages. | <ul style="list-style-type: none"> • PS21-04 will develop a stand-by power policy and plan to maintain OC San operations and permit compliance during loss of power. |
| <ul style="list-style-type: none"> • Load Shedding - Currently some secondary treatment processes do not have backup power from generators. | <ul style="list-style-type: none"> • J-98 Project will provide capability for Plant No. 1 Load shedding to implement this along with Emergency Operation Procedures. |
| <ul style="list-style-type: none"> • Auto Transferring Scheme - Undervoltage Auto Transferring Scheme upgrades at Plant No. 1 Blower Building 2 and Power Building 9 (current auto transferring scheme does not work correctly; must switchover manually). | <ul style="list-style-type: none"> • J-98 will upgrade auto transferring scheme and aging protective relays per latest OC San Standards for Blower Building 2 and Power Building 9 12.47kV, 4.16kV and 480V Switchgears. |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 35/36 | FY 36/37 |
|--------------|---|--|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| FR1-0005 | Cen Gen and 12kV Service Center Switchgear Battery System Upgrades at Plant No. 1 | Plant No. 1 Power Distribution | <ul style="list-style-type: none"> • Replace existing obsolete 125VDC and 24VDC batteries and battery chargers. | | | | | | | | | | | | | | |
| S-2019-1107B | On-call P1 and P2 Medium Voltage Cable Testing Services | Plant No. 1 and Plant No. 2 Power Distribution | <ul style="list-style-type: none"> • Medium voltage cables aging infrastructure assessment. | | | | | | | | | | | | | | |
| FR1-0011 | P1 VFD Replacement at Plant No. 1 | CWPS, RAS, DAFT, TF | <ul style="list-style-type: none"> • Replacement of existing obsolete Plant No. 1 CWPS, RAS, TF VFDs with new VFDs. | | | | | | | | | | | | | | |
| FR1-0016 | Waste Sidestream Pump Station VFD Replacements at Plant No. 1 | WSSPS | <ul style="list-style-type: none"> • Replacement of existing obsolete Plant No. 1 WSSPS with new VFDs. | | | | | | | | | | | | | | |
| FR1-0016 | Waste Sidestream Pump Station VFD Replacements at Plant No. 1 | WSSPS | <ul style="list-style-type: none"> • Replacement of existing obsolete Plant No. 1 WSSPS with new VFDs. | | | | | | | | | | | | | | |

| Project No. | Project Title | Impacted Facilities | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 35/36 | FY 36/37 |
|-------------|---|---|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| P1-105 | Headworks Rehabilitation at Plant No. 1 | Plant No. 1 Headworks, Bars Screen, Metering Structure, Power Buildings | <ul style="list-style-type: none"> Project will rehabilitate/upgrade Plant No. 1 Headworks and will replace most of electrical power distribution systems and equipment in Power Building 3A. Project will construct new Power Building 3 and new Headworks Standby Power Building. | | | | | | | | | | | | | | |
| J-98 | Electrical Power Distribution System Improvements | Various Plant No. 1 and Plant No. 2 condition based electrical distribution systems | <ul style="list-style-type: none"> Project will perform various electrical distribution system improvements at various areas throughout Plant No. 1. The scope covers both 480V and 12kV switchgear, motor control centers, breakers, conductors, load shedding, and arc flash mitigation. | | | | | | | | | | | | | | |
| J-136 | Power Building Structural Seismic Improvements at Plant No. 1 and 2 | Plant No.1 multiple Power Buildings at Plant No. 1 and Headworks Standby Power at Plant 2 | <ul style="list-style-type: none"> Project will mitigate structural deficiencies identified by PS15-06 to comply with latest seismic requirements at multiple Power Buildings at Plant No. 1. | | | | | | | | | | | | | | |
| P1-132 | Uninterruptable Power Supply Improvements at Plant No. 1 | Plant No. 1 multiple UPS Loads | <ul style="list-style-type: none"> This project will provide a new regional UPS at Power Building 8 to provide critical power to facilities in the northwest region of Plant No. 1. | | | | | | | | | | | | | | |
| P1-126 | Primary Sedimentation Basins No. 3-5 Replacement at Plant No. 1 | Plant No. 1 Power Distribution | <ul style="list-style-type: none"> Demolish Power Building 4 diesel generator, refeed standby loads from Power Building 8. | | | | | | | | | | | | | | |
| P1-136 | 12.47kV Switchgear replacement at Plant No. 1 Central Generation and Service Center | Plant No. 1 Power Distribution | <ul style="list-style-type: none"> The project will be replacing existing 12.47kV electrical switchgears at the Plant No. 1 Central Generation facility and Service Center | | | | | | | | | | | | | | |
| PS21-04 | Energy and Digester Gas Master Plan | Plant No.1 and Plant No. 2 Power Generation & Stand-by Power | <ul style="list-style-type: none"> Develop a standby power policy, load shedding and power restart philosophy, and energy resiliency and independence plan. | | | | | | | | | | | | | | |

Types of Project Legend:

CIP - Planning
 CIP - Design
 CIP - Construction
 Maintenance Project

Acronym Key:

CIP = Capital Improvement Program; DC = Direct Current; FE= Facilities Engineering; FY = Fiscal Year; HVAC = Heating, Ventilation, and Air Conditioning; kV = Kilovolt; kW = Kilowatt; MCC = Motor Control Center; P1 = Plant No. 1; P2 = Plant No. 2; RAS = Return Activated Sludge; T&D = Thickening and Dewatering; UPS = Uninterruptible Power Supply; TFs = Trickling Filters; V = Volts; VDC = Volts of Direct Current; VFD = Variable Frequency Drive; WSS = Waste Sidestream

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



Asset RUL Legend:

| | |
|---|-----------------|
| ■ | RUL <5 years |
| ■ | RUL 5-10 years |
| ■ | RUL 11-15 years |
| ■ | RUL 16-20 years |
| ■ | RUL >20 years |

Major Assets Remaining Useful Life

| Plant 1-Infrastructure Non-Process | Building Roof | Electrical | Plumbing | HVAC | Structure/ Seismic Risk | Elevator |
|------------------------------------|---------------|------------|----------|------|-------------------------|----------|
| Building "Shop" A | 1 | 3 | 1 | 4 | 2 | N/A |
| Building "Shop" B | 2 | 4 | 1 | 4 | 4 | N/A |
| Fleet Services | 3 | 2 | 1 | 4 | 4 | N/A |
| Building 4 | 2 | 2 | 1 | 4 | N/A | N/A |
| Building 1 | 2 | 3 | 1 | N/A | N/A | N/A |
| Building 2 | 2 | 3 | 1 | N/A | N/A | N/A |
| Building 3 | 2 | 3 | 1 | N/A | 4 | N/A |
| Building 5 | 2 | 3 | 1 | 4 | 5 | N/A |
| Building 6 | 2 | 3 | 1 | 4 | 5 | 3 |
| Building 7 | 2 | 3 | 1 | 4 | N/A | N/A |
| Building 8 | 2 | 3 | 1 | N/A | N/A | N/A |
| Cart Barn | 4 | 3 | N/A | N/A | TBD | N/A |
| Laboratory | 3 | 4 | 2 | 5 | 5 | 3 |
| Purchasing Building | 4 | 4 | 1 | 5 | N/A | N/A |
| Warehouse Building | 1 | 4 | 1 | 4 | 3 | N/A |
| Purchasing Building Conference Rm | 1 | 2 | N/A | 4 | N/A | N/A |
| Control Center | 3 | 4 | 1 | 5 | 5 | 2 |

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

Key Issues

| Key Issues | Actions and Recommendations |
|--|--|
| <ul style="list-style-type: none"> Seismic Retrofits need – Recent Planning study (PS15-06) recommended seismic retrofits to several buildings. | <ul style="list-style-type: none"> J-136 and P1-137 have been created to address retrofits to buildings, the Administration Building and HR Building will be demolished when new Headquarters is completed, no retrofits are planned for those buildings. |
| <ul style="list-style-type: none"> Aging Elevators - Elevators need to be rehabilitated and modernized. | <ul style="list-style-type: none"> As the building elevators age and are less reliable over time, projects are being created to address modernization and upgrades as needed. |
| <ul style="list-style-type: none"> Aging HVAC Units - Many HVAC units reached the end of their useful life. | <ul style="list-style-type: none"> As units fail or reach the end of their useful life, maintenance projects are being created to replace these units. |
| <ul style="list-style-type: none"> Roof Failures - Roof on most buildings are reaching or have passed their 20 year useful life. | <ul style="list-style-type: none"> Several buildings are being demolished once the new headquarter project is completed. Roofs on other buildings will be replaced as needed. |
| <ul style="list-style-type: none"> Public Announcement System Failure - PA System Plantwide needs to be replaced as its outdated and not functional. | <ul style="list-style-type: none"> PS21-02 study is looking at alternatives to the existing PA system and will make recommendations for new modern systems that will meet the OC San needs. |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | | | | | | | | | | | | | | | | |
|-------------|--|---|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--|
| | | | | FY21/22 | FY22/23 | FY23/24 | FY24/25 | FY25/26 | FY26/27 | FY27/28 | FY28/29 | FY29/30 | FY30/31 | FY31/32 | FY32/33 | FY33/34 | FY34/35 | FY35/36 | |
| FE19-12 | Rebuild Shop Fume Extractor Installation at Plant No. 1 | Rebuild Shop | <ul style="list-style-type: none"> Install fume extraction to capture hexavalent chromium. | | | | | | | | | | | | | | | | |
| FE21-01 | Plasma Cutting Fume Extractor installation at Plant No. 1 Rebuild Shop | Rebuild Shop | <ul style="list-style-type: none"> Install fume extraction specifically for plasma cutting equipment. | | | | | | | | | | | | | | | | |
| PS21-02 | Public Announcement and Fire System at Plant Nos. 1 and 2 | Plantwide | <ul style="list-style-type: none"> Study to provide alternatives and recommend upgrading our existing fire and Public Announcement systems Plantwide. | | | | | | | | | | | | | | | | |
| PRN-00834 | Fleet Facilities Rehab/Replacement Study | Fleet Building | <ul style="list-style-type: none"> Study to determine the feasibility of rehab or replacement of existing Fleet services building due to aging equipment, and new electric and hybrid fleet vehicles replacing gas powered vehicles. | | | | | | | | | | | | | | | | |
| FR1-0012 | Building B Floor Replacement, Jib Crane, and Forklift Pad | Building B | <ul style="list-style-type: none"> Replace Shop floor and install Jib Crane and Forklift Pads. | | | | | | | | | | | | | | | | |
| FR1-0014 | Laboratory Building HVAC Controls Replacement at Plant No. 1 | Laboratory | <ul style="list-style-type: none"> Install automated controls for new HVAC installed for Lab Building. | | | | | | | | | | | | | | | | |
| FRC-0016 | Fleet Services Building Improvements at Plant No. 1 | Fleet Building | <ul style="list-style-type: none"> Resurface and level floors, remove hydraulic lifts, and install ventilation system. | | | | | | | | | | | | | | | | |
| P1-128 | Headquarters Complex | New Headquarters, Admin Building and HR | <ul style="list-style-type: none"> Construct new Headquarters Building on the North side of Ellis Ave. | | | | | | | | | | | | | | | | |

| Project No. | Project Title | Impacted Facilities | Description of Work | FY21/22 | FY22/23 | FY23/24 | FY24/25 | FY25/26 | FY26/27 | FY27/28 | FY28/29 | FY29/30 | FY30/31 | FY31/32 | FY32/33 | FY33/34 | FY34/35 | FY35/36 |
|-------------|--|--|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| X-124 | Electric Vehicle Fleet Services Building | Fleet Building | <ul style="list-style-type: none"> Provide a fleet services building that can service electric vehicles per recommendations of PRN-00834 study. | | | | | | | | | | | | | | | |
| PS19-03 | Laboratory Rehabilitation Feasibility Study | Laboratory | <ul style="list-style-type: none"> Determine feasibility of rehab of existing Lab versus building new facility. | | | | | | | | | | | | | | | |
| P1-137 | Supports Building Seismic Improvements at Plant No. 1 | Fleet, Control Center, Rebuild Shop, Shop A Shop B, 12KV Service Center, Buildings 5 & 6 | <ul style="list-style-type: none"> Seismic retrofits for several support buildings. | | | | | | | | | | | | | | | |
| J-133 | Laboratory Replacement at Plant No. 1 | Laboratory | <ul style="list-style-type: none"> Replace or rehab existing Laboratory per PS19-03 recommendations. | | | | | | | | | | | | | | | |
| P1-141 | Administrative Facilities and Power Building 3A Demolition | Admin Building | <ul style="list-style-type: none"> Demolish existing Admin building, HR Building, and Power Building 3A once staff have moved over to new HQ and P1-105 has abandoned Power Building 3A. | | | | | | | | | | | | | | | |
| PRN-0771 | P1 Building 6 Elevator Modernization | Building 6 | <ul style="list-style-type: none"> Rehab existing elevator to comply with current regulations. | | | | | | | | | | | | | | | |

Types of Project Legend:

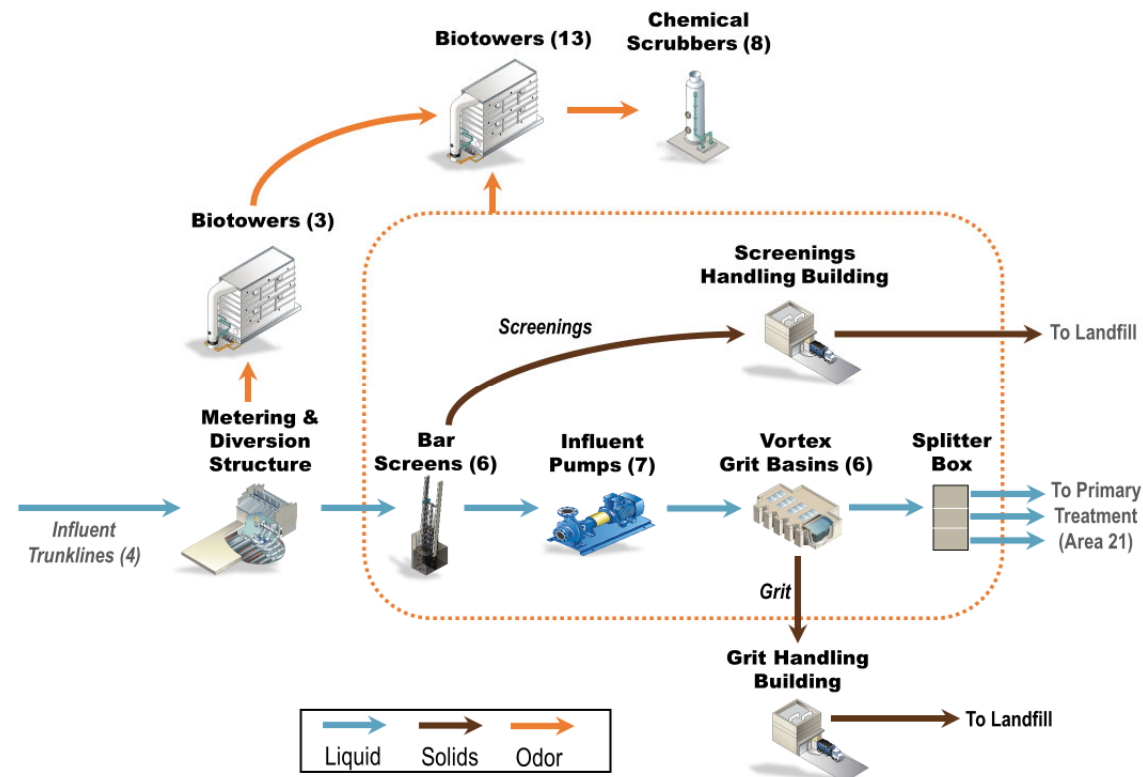
CIP - Planning
 CIP - Design
 CIP - Construction
 Maintenance Project

Plant No. 2 Asset Management Summaries

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

Process Schematic



Major Assets Remaining Useful Life

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

Asset RUL Legend:

- RUL <5 years
- RUL 5-10 years
- RUL 11-15 years
- RUL 16-20 years
- RUL >20 years

Acronym Key:

- HVAC = Heating, Ventilation, and Air Conditioning;
- MCC = Motor Control Center;
- PLC = Programmable Logic Controller;
- RUL = Remaining Useful Life;
- VFD = Variable Frequency Drive

Major Assets

| Major Assets | Quantities |
|---|------------|
| Metering & 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 Compactor | 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 |
| Bleach Pump | 16 |

| Major Assets | Quantities |
|---|------------|
| Headworks Odor Control (Continued) | |
| Acid Tank | 1 |
| Acid Pump | 2 |
| Caustic Tank | 1 |

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

Key Issues

| Key Issues | Actions and Recommendations |
|--|---|
| <ul style="list-style-type: none"> Headworks Low Voltage Cable – Many of Headworks 480 volts cables are failing, triggering ground faults on 480-volt equipment. MP-509 replaced the cables that were initially identified, but more cables continue to fail and are being replaced by projects as they are identified. | <ul style="list-style-type: none"> FR2-0024 Headworks 480V Cable Replacement at Plant No. 2 is currently in warranty period. Project completion by the end of 2022. FR2-0026 Headworks Phase 3 Cable Replacement at Plant No. 2 is in design phase. It is scheduled to be advertised in November of 2022. |
| <ul style="list-style-type: none"> M&D Trunkline and Bar Screen Grit Build-Up – Due to low flow and low velocity, heavy grit build-ups were observed at the lowest point of M&D trunklines. This issue may escalate once P2-122 splits the headworks into two trains. | <ul style="list-style-type: none"> Operations rotate the trunklines monthly and keep only two trunklines in service to help prevent build-up. Maintenance created a biannual PM to have Bar Screen inlets cleaned. PRN-00535 Influent Metering Structure Trunkline Probes Relocation is in progress to relocate probes from the grit build-up. |
| <ul style="list-style-type: none"> Washer Compactor Vulnerability – On August 21, 2021, Plant No. 2 observed a slug of rags that plugged two of Washer Compactors. | <ul style="list-style-type: none"> Initiate a planning study to further investigate the reliability of the Washer Compactor system and provide a feasible solution. |
| <ul style="list-style-type: none"> Plant Water Piping at Influent Pump Station Building – There is a sluiceway control station in the basement of Influent Pump Station Building. This station is critical to provide adequate conveyance of screenings to the Washer Compactors. PW supply and discharge piping to the control station have failed. | <ul style="list-style-type: none"> Maintenance provided a temporary repair to supply 4-in PW to the sluiceway control station. FR2-0029 Influent Pump Station Plant Water Piping Repair at Plant No. 2 is in a bid phase to provide permanent fix to 8-in PW supply and 2x6-in PW discharge piping. |
| <ul style="list-style-type: none"> Main Sewage Pump Vibration Monitoring System – Current vibration monitoring system is obsolete. It needs to be modernized to continue to protect both pumps and motors. | <ul style="list-style-type: none"> Reliability group uses infrared thermometers to measure temperature of the asset and manual vibration readings to cover the deficiency. Coordinate with reliability group who is leading beta testing of Bentley Nevada Orbit 60 on Centrifuge #5 at Plant No. 2. |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | | | | | | | | | | | | | | | | | |
|-------------|---|-------------------------|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|--|
| | | | | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 | | |
| P2-122 | Headworks Modifications at Plant No. 2 for GWRS Final Expansion | Headworks | <ul style="list-style-type: none"> Modify headworks and sidestream routing to create reclaimable and non-reclaimable trains to support GWRS Final Expansion. Replace 3 of 7 MSPs with lower capacity pumps. | | | | | | | | | | | | | | | | | |
| FR2-0026 | Headworks Phase 3 Cable Replacement at Plant No. 2 | Headworks | <ul style="list-style-type: none"> In-house engineering design and bid for service contract for repairs on faulty cables. | | | | | | | | | | | | | | | | | |
| FR2-0029 | Influent Pump Station Plant Water Piping Repair at Plant No. 2 | Influent PS; Bar Screen | <ul style="list-style-type: none"> Restore Plant Water Piping from west side of Influent Pump Station Building. | | | | | | | | | | | | | | | | | |
| PRN-00535 | Influent Metering Structure Trunkline Probes Relocation at Plant No. 2 | M&D Structure | <ul style="list-style-type: none"> Relocate pH and conductivity probes for each trunkline in M&D Structure. | | | | | | | | | | | | | | | | | |
| PRN-00561 | Main Sewage Pump Vibration Monitoring System Modernization at Plant No. 2 | Influent PS | <ul style="list-style-type: none"> Modernize currently obsolete vibration monitoring system | | | | | | | | | | | | | | | | | |
| N/A | Headworks Scrubber Media Replacement at Plant No. 2 | TL & HW Odor Control | <ul style="list-style-type: none"> Replace scrubber media for odor control scrubbers. | | | | | | | | | | | | | | | | | |
| X-030 | Headworks Rehabilitation at Plant No. 2 | Headworks; WSSPS-C | <ul style="list-style-type: none"> Rehabilitate any equipment, electrical, structures, or materials that cannot provide 25 years of useful life. | | | | | | | | | | | | | | | | | |

Types of Project Legend:

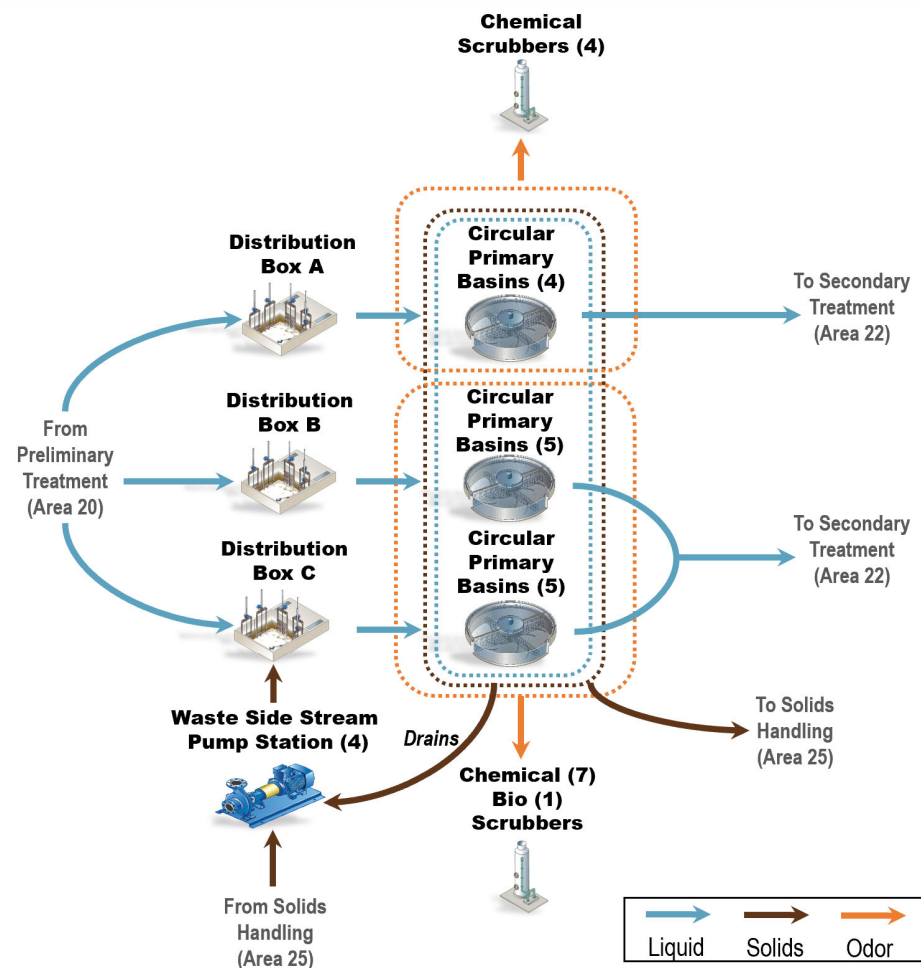
■ CIP - Planning
 ■ CIP - Design
 ■ CIP - Construction
 ■ Maintenance Project

Acronym Key:

CIP = Capital Improvement Program; DC = Distribution Center; FY = Fiscal Year; GWRS = Groundwater Replenishment System; HW = Headworks; M&D = Metering & Diversion; MSP = Main Sewage Pump; N/A = Not Applicable; PM = Preventive Maintenance; SARI = Santa Ana River Interceptor; TL = Trunkline; UPS = Uninterruptible Power Supply; V = Volts; VFD = Variable Frequency Drive

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

Process Schematic



Major Assets Remaining Useful Life

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

Acronym Key:
 HVAC = Heating, Ventilation, and Air Conditioning; MCC = Motor Control Center; NSC = North Scrubber Complex;
 PB = Power Building; PLC = Programmable Logic Controller; RUL = Remaining Useful Life; SSC = South Scrubber Complex;
 VFD = Variable Frequency Drive; WSSPS = Waste Sidestream Pump Station

RUL Legend:
■ 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 |
| 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 |

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

Key Issues

| Key Issues | Actions and Recommendations |
|--|--|
| <ul style="list-style-type: none"> Reliability of A-Side Primary Basins – Aluminum dome supports for A-Side Primary Basin D, E, F, and G are corroded. Currently F & G are not available due to loss of structural integrity. Availability of A-Side basins are critical to process non-reclaimable flow until P2-98A commissions four new primary basins. | <ul style="list-style-type: none"> MP2-003 PSB-F Dome Support Repair will address dome supports for PSB-F by the end of 2022. PSB-G dome supports have been inspected. Will go out for a solicitation after lessons learned from MP2-003. Once the dome supports for PSB-F & G are repaired, dome supports for PSB-D & E need to be assessed. |
| <ul style="list-style-type: none"> Reliability of Primary Sedimentation Basins - A-side, B-side, and C-side primary basins were built in 1960s, 1970s, and 1980s, respectively. These basins are close to the end of their useful life and require major rehabilitation to continue to operate reliably for next 30+ years. | <ul style="list-style-type: none"> P2-98B performed interim repairs to B- and C-sides of primary basins to extend their useful life until a major rehab is performed under P2-133. P2-98A is in the construction phase to replace all four A-side primary basins. For P2-98A, Primary Effluent Junction Box 2 was inspected and identified heavily corroded roof structure. The project will address the immediate issue, but other effluent junction boxes (JB-A to JB-F) need to be assessed since they have pressure manhole covers. Future project P2-133 is in place to perform long-term rehab on B and C sides of primary basins after the P2-98A completion. |
| <ul style="list-style-type: none"> 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. Replacement of the aged system is included in P2-133 scope. | <ul style="list-style-type: none"> The replacement of instrumentation and associated electrical has been added to the P2-135 Chemical Systems Rehabilitation at Plant No. 2 project. |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|------------------|--|------------------------------|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | | | | | | | | | | | | | | | | | |
| P2-98A | A-Side Primary Clarifiers Replacement at Plant No. 2 | A-Side Primary Basins | <ul style="list-style-type: none"> Demolish and replace four existing A-Side Primary Basins, including piping and distribution box. Demolish and replace the South Scrubber Complex. | | | | | | | | | | | | | | | |
| P2-133 | B- and C-Side Primary Clarifiers Rehabilitation at Plant No. 2 | B- and C-Side Primary Basins | <ul style="list-style-type: none"> Long-term full rehab to extend RUL of B- and C-side basins to 40 years or greater. | | | | | | | | | | | | | | | |
| P2-135 | Chemical Systems Rehabilitation at Plant No. 2 | Anionic Polymer System | <ul style="list-style-type: none"> Replace obsolete instrumentation and associated electrical assets within the Anionic Polymer System. | | | | | | | | | | | | | | | |
| MP2-003 | Primary Sedimentation Basin F Dome Support Repair | Primary Basin F | <ul style="list-style-type: none"> Restore structural integrity of dome supports. | | | | | | | | | | | | | | | |
| PRN-00865 | Primary Sedimentation Basin G Dome Support Repair | Primary Basin G | <ul style="list-style-type: none"> Restore structural integrity of dome supports. | | | | | | | | | | | | | | | |

Types of Project Legend:

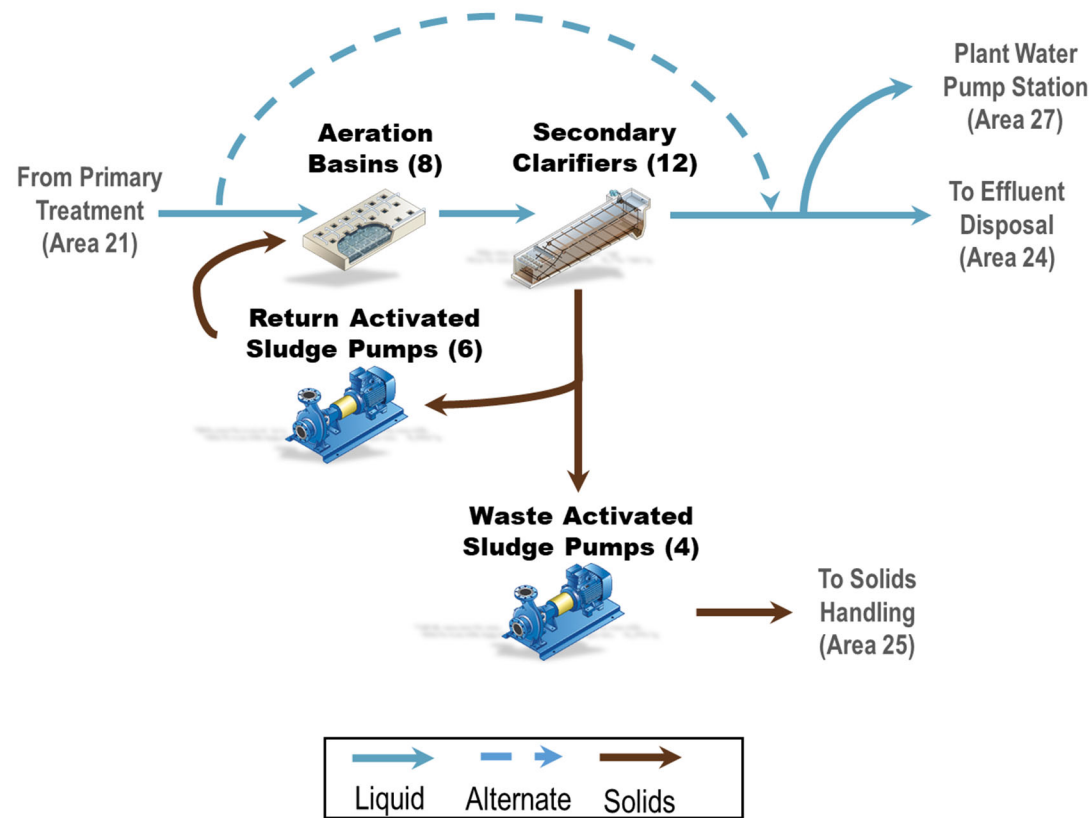
CIP - Planning
 CIP - Design
 CIP - Construction
 Maintenance Project

Acronym Key:

DS = Distribution Structure; CIP = Capital Improvement Program; E&I = Electrical & Instrumentation FY = Fiscal Year; OEM = Original Equipment Manufacturer; RUL = Remaining Useful Life; WSSPS = Waste Sidestream Pump Station

ASSET MANAGEMENT SYSTEM SUMMARY – AREA 22 – PLANT NO. 2 SECONDARY TREATMENT – ACTIVATED SLUDGE

Process Schematic



Acronym Key:
 DAFT = Dissolved Air Flotation Thickener; LOX = Liquid oxygen; MCC = Motor Control Center;
 PEPS = Primary Effluent Pump Station; PLC = Programmable Logic Controller; PS = Pump Station;
 RAS = Return Activated Sludge; RUL = Remaining Useful Life; SEJB = Secondary Effluent Junction Box;
 TWAS = Thickened Waste-activated Sludge; VFD = Variable Frequency Drive; WAS = Waste-activated Sludge; WSS = Waste Sidestream, Waste Secondary Sludge; WSSPS = Waste Sidestream Pump Station

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 |
|---------------------------------|------|-----------------|--------------------------|------|-------------------|------------------|-----------------|-----------|----------------------|--------------------|-------|
| Civil | | | | | | | | | | | |
| Effluent Piping | 2 | - | 3 | 3 | 4 | 4 | - | - | - | - | 4 |
| Structural | | | | | | | | | | | |
| Building | 2 | - | - | - | 2 | 2 | - | 1 | - | - | - |
| Structure | 2 | 4 | 3 | 3 | - | - | - | 1 | 1 | 1 | - |
| Mechanical | | | | | | | | | | | |
| Pump | 4 | - | - | - | 3 | 3 | - | 2 | 2 | - | 3 |
| Aerator | - | 4 | - | - | - | - | - | - | - | - | - |
| Piping and Valve | 3 | 4 | 3 | 3 | 3 | 3 | - | 2 | 2 | 3 | 3 |
| Clarifier/DAFT Moving Mechanism | - | - | 4 | - | - | - | - | 2 | - | - | - |
| Channel Air Blower | - | - | - | - | - | 2 | - | - | - | - | - |
| Control Gate | - | 3 | 2 | 3 | - | - | - | - | - | 2 | 3 |
| LOX Facility | - | - | - | - | - | - | 4 | - | - | - | - |
| HVAC and Ventilation | 2 | - | - | - | 3 | 3 | - | - | - | - | - |
| Crane | 3 | - | - | - | - | - | - | - | - | - | - |
| Electrical | | | | | | | | | | | |
| MCC and VFD | 4 | 3 | 3 | - | 4 | 4 | - | 3 | 3 | 3 | 3 |
| Instrumentation | | | | | | | | | | | |
| PLC and Flow Meter | 3 | 4 | 3 | - | 3 | 3 | 3 | 3 | 3 | - | 3 |

RUL Legend:
■ RUL <5 years
 ■ RUL 5-10 years
 ■ RUL 11-15 years
 ■ RUL 16-20 years
 ■ RUL >20 years

| Major Assets | Quantities |
|--------------------------------------|------------|
| Primary Effluent Pump Station | |
| Building | 1 |
| Structure | 1 |
| Pumps | 4 |
| Aeration Basins | |
| Basins | 8 |
| Surface Aerators | 32 |
| Inlet gates | 8 |

| 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 |
| East RAS/WAS PS | |
| RAS/WAS Pumps | 5 |

| Major Assets | Quantities |
|------------------------|------------|
| West RAS/WAS PS | |
| RAS Pumps | 3 |
| WAS Pumps | 2 |
| Channel air blowers | 2 |
| Sliding Frames | 2 |
| Oxygen Facility | |
| LOX Storage Tanks | 2 |
| Vaporizer | 6 |
| Oxygen Purging Fan | 2 |

| 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 |

ASSET MANAGEMENT SYSTEM SUMMARY – AREA 22 – PLANT NO. 2 SECONDARY TREATMENT – ACTIVATED SLUDGE

Key Issues

| Key Issues | Actions and Recommendations |
|--|---|
| <ul style="list-style-type: none"> • PEPS - Obsolete VFD parts; aged PEPS pumps and corrosion on suction pipes; missing flapper gates on the area drains inlets to the wet well; pump discharge header coating condition. | <ul style="list-style-type: none"> • FE19-08 project will replace the PEPS VFDs. • AI-323 generated to perform condition assessment and repair of the pumps. Pump No. 4 had been removed in August 2021, and is planned to be installed in October 2022 after the refurbishment. All four pumps will be rebuilt or replaced based on the condition assessment findings. • Missing flapper gates added to X-052. • Plan to perform condition assessment during Pump #4 installation. |
| <ul style="list-style-type: none"> • Aeration Basins – Concrete deck structural integrity and oxygen leaking; aerator motor corrosion and oxygen piping corrosion; inlet gates not totally sealed. | <ul style="list-style-type: none"> • P2-136 to replace all oxygen piping, structurally rehab. the aeration basins, replace all aerators, and inlet gates. |
| <ul style="list-style-type: none"> • Clarifiers – Broken clarifier mechanism need to be repaired or replaced; clarifier entry gate not meeting the OSHA requirement; loose handrails at the older portion of the clarifiers. | <ul style="list-style-type: none"> • MP-248 replaced D, L, G, J, C, F, and the remaining six will be replaced by FR2-0018. • FR2-0023 will add safe entry access platform to each secondary clarifier. • AI-375 condition assessment performed and completed temporary repair in April 2022. P2-136 will replace the 10,000 ft of handrail |
| <ul style="list-style-type: none"> • RAS/WAS Pump Stations – Obsolete VFDs; aged pumps. | <ul style="list-style-type: none"> • FE19-08 will replace the RAS and WAS VFDs. • Rebuild pumps under X-052 rehab. |
| <ul style="list-style-type: none"> • Oxygen Facility – LOX Tank A out of service due to leaking flange. | <ul style="list-style-type: none"> • FE21-07 is in bidding phase for tank replacement. Will request Clearinghouse approval for LOX Tank-B replacement. |
| <ul style="list-style-type: none"> • WSSPS Flooding of the pump dry well causing WSSPS pump motor damage. | <ul style="list-style-type: none"> • Maintenance replaced the sump pump at the dry well as a temporary solution. X-007 will replace the pumps with dry pit submersible type. |
| <ul style="list-style-type: none"> • DAFT – Seismic issues; lack of fall protection tie off points. | <ul style="list-style-type: none"> • X-107 Geotechnical improvements to DAFTs A-C, DAFT D and DAFT A-C Gallery, and structural improvements to DAFT D. • FR2-0023 will install fall protection tie off points |
| <ul style="list-style-type: none"> • Current AS facility will be at the end of useful life around 2045. New secondary treatment system will be evaluated as part of planning study. | <ul style="list-style-type: none"> • X-114 will replace the AS Plant. A planning study will study the replacement options and make recommendations. |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|--|----------------------------------|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | | | | | | | | | | | | | | | | | |
| FR2-0018 | Plant No. 2 AS Plant Clarifiers Rehabilitation - Phase 2 | Secondary clarifiers | <ul style="list-style-type: none"> • Replace Clarifiers A, B, E, G, H, and L moving mechanism. | | | | | | | | | | | | | | | |
| FR2-0023 | Activated Sludge Clarifier Entry Improvements at Plant No. 2 | Secondary clarifiers | <ul style="list-style-type: none"> • Add safe entry access platform to each secondary clarifier and DAFT fall protection tie off | | | | | | | | | | | | | | | |
| P2-122 | P2-122 - Headworks Modifications at Plant No. 2 for GWRS Final Expansion | AS plant, WSSPS | <ul style="list-style-type: none"> • Separate the reclaimable and non-reclaimable streams. AS Plant will treat non-reclaimable flow. WSSPS discharge piping to be directed to PEPS. | | | | | | | | | | | | | | | |
| P2-123 | Return-Activated Sludge Piping Replacement at Plant No. 2 | RSS PSs and secondary clarifiers | <ul style="list-style-type: none"> • Replace RAS piping, area lights and fix the concrete cracks and spalling on east aeration basin decks. | | | | | | | | | | | | | | | |
| FE19-08 | Plant No. 1, Plant No. 2, Collections VFD Drives Replacement | PEPS, RSS pump stations | <ul style="list-style-type: none"> • Replace PEPS, RAS and WAS VFDs. | | | | | | | | | | | | | | | |
| P2-136 | Activated Sludge Aeration Basin Rehabilitation at Plant No. 2 | AS Plant aeration basins | <ul style="list-style-type: none"> • Rehabilitate the AS process. | | | | | | | | | | | | | | | |
| X-052 | Activated Sludge RAS/WAS/PEPS/Vaporizers Rehabilitation at Plant No. 2 | AS Plant | <ul style="list-style-type: none"> • Rehabilitate the RAS/WAS/PEPS/LOX vaporizers. | | | | | | | | | | | | | | | |
| FE21-07 | FE21-07 - Liquid Oxygen Tank A Replacement at Plant No. 2 | LOX facility | <ul style="list-style-type: none"> • Replace LOX Tank A | | | | | | | | | | | | | | | |
| X-007 | Waste Sidestream Pump Station A Upgrade at Plant No. 2 | WSSPS A | <ul style="list-style-type: none"> • Replace the WSSPS pumps with dry pit submersible type. | | | | | | | | | | | | | | | |
| X-107 | Seismic Improvements to Dissolved Air Flotation Thickeners Area at Plant No. 2 | DAFTs | <ul style="list-style-type: none"> • Structure seismic improvements. | | | | | | | | | | | | | | | |
| PS21-08 | Pure Oxygen Activated Sludge Operations Study at Plant No. 2 | AS Plant | <ul style="list-style-type: none"> • Evaluate the POAS facility operational strategies to treat non-reclaimable flow after the GWRS final expansion. | | | | | | | | | | | | | | | |
| PS22-02 | Onsite Oxygen Generation Feasibility Study at Plant No. 2 | LOX facility | <ul style="list-style-type: none"> • Evaluate the feasibility of implementing onsite oxygen generation system. | | | | | | | | | | | | | | | |
| PS-XXX | Activated Sludge Facility Replacement Planning Study at Plant No. 2 | AS Plant | <ul style="list-style-type: none"> • Planning study to plan for AS Plant replacement. | | | | | | | | | | | | | | | |
| X-114 | Activated Sludge Facility Replacement at Plant No. 2 | AS Plant | <ul style="list-style-type: none"> • Install new secondary treatment facility based on the recommendations of the planning study. | | | | | | | | | | | | | | | |

Types of Project Legend:

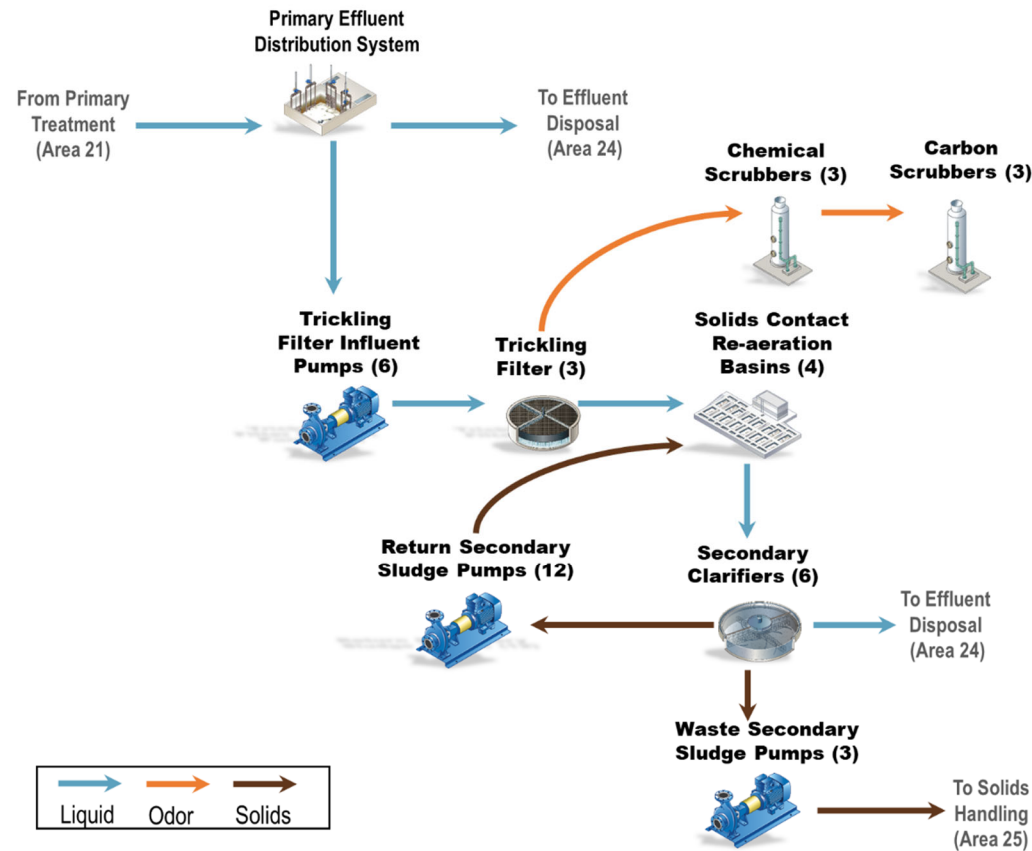
■ CIP - Planning
 ■ CIP - Design
 ■ CIP - Construction
 ■ Maintenance Project

Acronym Key:

AS = Activated Sludge; CIP = Capital Improvement Program; DAFT = Dissolved Air Flotation Thickener; FY= Fiscal Year; GWRS = Groundwater Replenishment System; LOX = Liquid Oxygen; OSHA = Occupational Safety and Health Administration; PEPS = Primary Effluent Pump Station; RAS = Return Activated Sludge; RSS = Return Secondary Sludge; VFD = Variable Frequency Drive; WAS = Waste-activated Sludge; WSSPS=Waste Sidestream Pump Station

ASSET MANAGEMENT SYSTEM SUMMARY – AREA 22 - 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 & ML Channel | Blower/ WSS PS Building | Secondary Clarifiers A-F | RSS PS A | RSS PS B | RSS PS C & Elec. Room | DCJ | 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 | 2 | 2 | 2 | - | 2 | 3 |
| TF Rotary Distributor | - | 4 | - | - | - | - | - | - | - | - | - |
| TF Media | - | 3 | - | - | - | - | - | - | - | - | - |
| Clarifier Sludge Collector | - | - | - | - | 3 | - | - | - | - | - | - |
| Blower & Fan | - | 2 | - | 2 | - | - | - | - | - | 2 | - |
| Control Gate | - | 3 | 3 | 3 | 3 | - | - | - | - | - | - |
| Piping and Valve | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | - | 2 | 2 |
| Diffuser | - | - | 2 | - | - | - | - | - | - | - | - |
| HVAC & Ventilation | 2 | - | - | 2 | - | 2 | 2 | 2 | 2 | - | - |
| Crane | 2 | - | - | 2 | - | 2 | 2 | 2 | - | - | - |
| Electrical | | | | | | | | | | | |
| MCC & VFD | 3 | 3 | - | 3 | 3 | - | - | 3 | 3 | 3 | 3 |
| Instrumentation | | | | | | | | | | | |
| PLCs & Flow Meters | 3 | 3 | - | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

Asset RUL Legend:

- RUL <5 years
- RUL 5-10 years
- RUL 11-15 years
- RUL 16-20 years
- RUL >20 years

Acronym Key:

HVAC = Heating, Ventilation, and Air Conditioning;
 DCJ = Distribution Center J;
 Elec. = Electrical;
 RUL = Remaining Useful Life;
 RSS = Return Secondary Sludge;
 MCC = Motor Control Center;
 ML = Mixed Liquor;
 PLC = Programmable Logic Controller;
 PS = Pump Station;
 TF = Trickling Filter;
 TFPS = Trickling Filter Pump Station;
 VFD = Variable Frequency Drive;
 WSS = Waste Secondary Sludge

Major Assets

| Major Assets | Quantities |
|--------------------------------------|------------|
| Trickling Filter Pump Station | |
| Building | 1 |
| Pumps | 6 |
| Trickling Filters A-C | |
| Basins | 3 |
| Rotary Distributor | 3 |
| Recirculation Fans | 6 |

| Major Assets | Quantities |
|--|-----------------------|
| Solids Contact & ML Channel | |
| Structures | 4 SCRs, 4 SRRs, 2 MLs |
| Control gates | multiple |
| Diffusers | multiple |
| Blower/WSS PS Building | |
| Building | 1 |
| SR Blowers | 3 |
| SC Blowers | 3 |
| WSS Pumps | 3 |

| Major Assets | Quantities |
|---------------------------------|------------|
| Secondary Clarifiers A-F | |
| SC 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 & Electrical Room | |
| Buildings | 1 |
| RSS Pumps | 4 |
| Distribution Center J | |
| Building | 1 |

| Major Assets | Quantities |
|------------------------------|------------|
| Odor Control Facility | |
| Foul Air Fans | 3 |
| Chemical scrubbers | 3 |
| Carbon Units | 3 |
| Chemical System | |
| Bleach Storage Tanks | 2 |
| Caustic Storage Tank | 1 |
| Bleach Pumps | 7 |
| Caustic Pumps | 6 |

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

Key Issues

| Key Issues | Actions and Recommendations |
|--|--|
| <ul style="list-style-type: none"> TFPS – No backup power to TFPS; pump failure could result in primary effluent to ocean outfall; C1 pump VFD failure, other five pump VFDs parts obsolete. | <ul style="list-style-type: none"> J-117B will provide a plantwide load shedding system to power critical DC-J loads from Cen Gen. PRN-00820 for C1 pump VFD replacement and PRN-00780 for remaining pump VFD replacement. |
| <ul style="list-style-type: none"> TFs –TF-A distribution arm gears damaged in 2020 after the 2019 major repair, and center mast structural damage found during the gears repair in 2022; TF-B and TF-C corroded motor, drive, cable and conduits; reliability while TF-A out of service; TF-B top bearing damage. | <ul style="list-style-type: none"> Center mast removed and condition assessment done. MP2-005 purchasing new center assembly, Board approved, P.O. issued, scheduled for Spring 2023 installation. Urgent repair and replacement of TF-B top bearing done; PRN-00886 TF-C repair and installation of TF-A new parts (PRN-00643) done in Aug. 2022; TF-B repair scheduled in Sep. 2022; TF-B center assembly purchasing added to PRN-00866, P.O. issued, and planned to follow the TF-A center assembly schedule; Maintenance monthly PM by contractor. |
| <ul style="list-style-type: none"> Secondary Clarifiers - Corroded parts on the clarifier moving mechanism; scum is currently flowing to WSSPS-A, and therefore will be recirculating back to AS Plant with the WSSPS-A discharging route changed to PEPS by P2-122. Scum accumulation could cause operations problem. | <ul style="list-style-type: none"> Coating Program is working on coating the parts. Asset engineer is developing a conceptual design to route scum to DAFTs and will request a Clearinghouse project to implement the design and construction. |
| <ul style="list-style-type: none"> Snail control – Signs of snail shell accumulation at process area and excessive wearing on RSS and WSS pipes. Shells found in long outfall pipeline. | <ul style="list-style-type: none"> Changed from 25% caustic injection to 50%. PS18-10 recommended to change back to original design of flooding with 50% caustic at shorter duration. Will do flooding test after TF-A is back to service. |
| <ul style="list-style-type: none"> Site piping – Deficiency of cathodic protection on some underground piping. | <ul style="list-style-type: none"> Condition assessment and survey is complete and the team is developing solutions which may include replacing the existing cathodic protection system. |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|---|---------------------|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | | | | | | | | | | | | | | | | | |
| MP2-005 | TF- A & B Center Assemblies Replacement | TF-A, TF-B | <ul style="list-style-type: none"> Replace the TF-A & B center rotating assemblies. | | | | | | | | | | | | | | | |
| PRN-00820 | TFPS C1 VFD replacement | TFPS | <ul style="list-style-type: none"> Replace TFPS C1 VFD. | | | | | | | | | | | | | | | |
| PRN-00780 | TFPS A1, A2, B1, B2, C2 VFDs replacement | TFPS | <ul style="list-style-type: none"> Replace TFPS A1, A2, B1, B2, C2 VFDs. | | | | | | | | | | | | | | | |
| J-117B | Outfall Low Flow Pump Station | DCJ, TFPS | <ul style="list-style-type: none"> New PWPS to draw flow from TFSC secondary effluent (SE). Provide a plantwide load shedding system to power critical DC-J loads from Cen Gen. | | | | | | | | | | | | | | | |
| P2-122 | Headworks Modifications at Plant No. 2 for GWRS Final Expansion | TFSC | <ul style="list-style-type: none"> TFSC to treat the reclaimable stream. | | | | | | | | | | | | | | | |
| J-36-2 | GWRS Final Expansion Coordination | TFSC | <ul style="list-style-type: none"> New diversion structure and weir box to divert the TFSC effluent to OCWD equalization tanks and pump station at P2. | | | | | | | | | | | | | | | |
| X-031 | Plant No. 2 TFSC Rehabilitation | TFSC facility | <ul style="list-style-type: none"> Overall rehabilitation of TFSC. Replace the TF media. | | | | | | | | | | | | | | | |

Types of Project Legend:

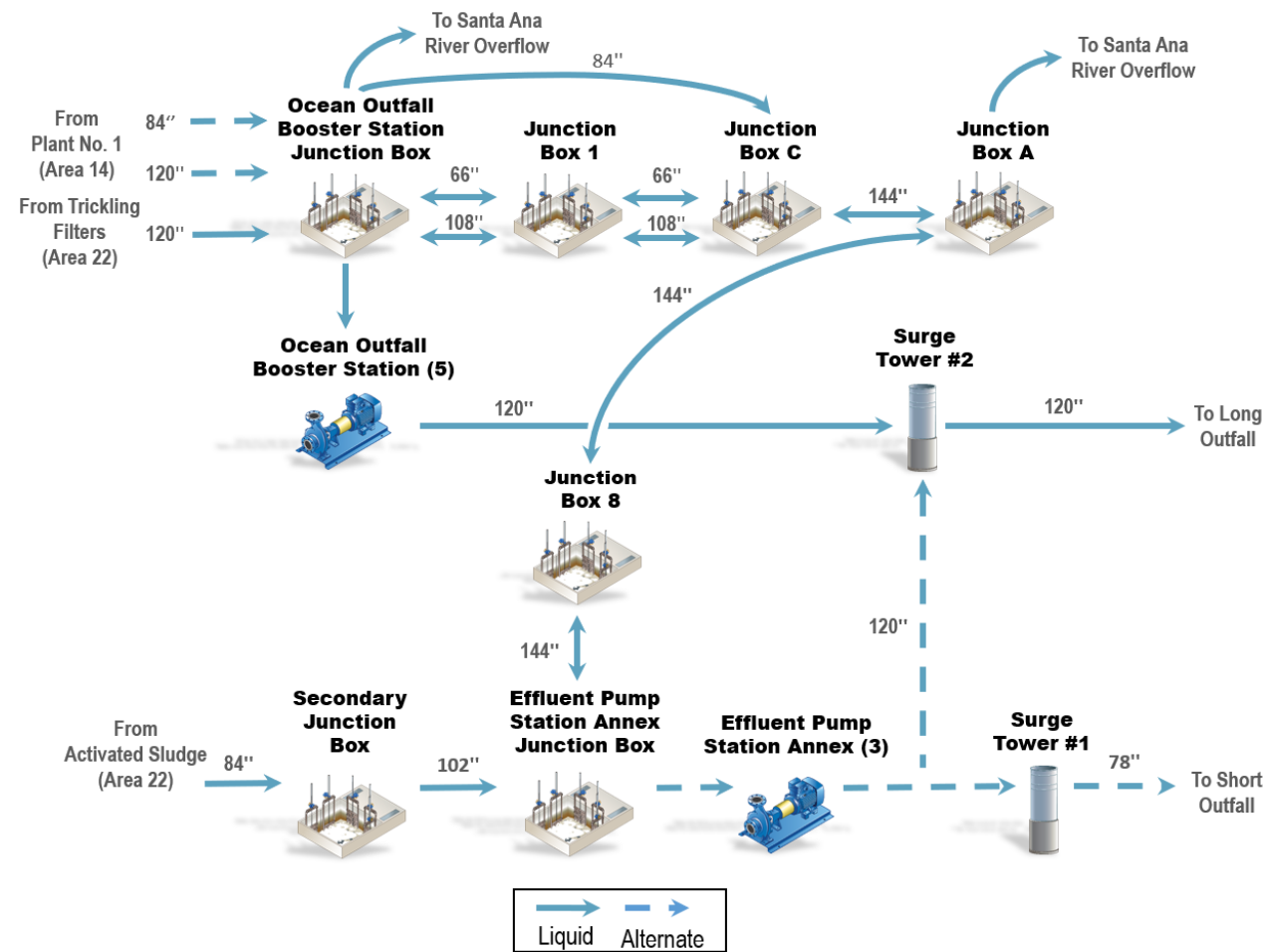
- CIP - Planning
- CIP - Design
- CIP - Construction
- Maintenance Project

Acronym Key:

CIP = Capital Improvement Program; DCJ = Distribution Center J; FY = Fiscal Year; GWRS =Groundwater Replenishment System; OCWD = Orange County Water District; PWPS = Plant Water Pump Station; RSS = Return Secondary Sludge; SC = Secondary Clarifier; SCADA = Supervisory Control and Data Acquisition; SE = Secondary Effluent; TF = Trickling Filter; TFPS = Trickling Filter Pump Station; TFSC = Trickling Filter Secondary Clarifier

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

Process Schematic



Major Assets Remaining Useful Life

| Asset Type | Junction Boxes | | | | EPESA | Disinfection System | Land Outfalls | | | | 120" Ocean Outfall | 78" Ocean Outfall |
|---------------------------|----------------|------|------|------|-------|---------------------|---------------|----------------|----------------|-----------------|--------------------|-------------------|
| | O OBS | JB-1 | JB-C | JB-A | | | JB-8 | Surge Tower #1 | Surge Tower #2 | Sample Building | | |
| Civil | | | | | | | | | | | | |
| Effluent Piping | 1 | 2 | 2 | 2 | 2 | - | 1 | 2 | 1 | 2 | - | - |
| Structural | | | | | | | | | | | | |
| Structures, Buildings | 4 | 2 | 2 | 4 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 1 |
| Mechanical | | | | | | | | | | | | |
| Pumps, Fans | 5 | - | - | - | - | 2 | 4 | - | - | - | - | - |
| Gates | 5 | 3 | 3 | 3 | 3 | 3 | - | - | - | - | 3 | - |
| Valves | 2 | - | - | - | - | 3 | - | 3 | 3 | - | - | - |
| Pipes | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 1 | 2 | 1 | 1 | - |
| Tank | - | - | - | - | - | - | 5 | - | - | - | - | - |
| Manhole Covers | - | - | - | - | - | - | - | - | - | - | TBD | TBD |
| Monel Parts | - | - | - | - | - | - | - | - | - | - | 5 | TBD |
| Ballast | - | - | - | - | - | - | - | - | - | - | TBD | TBD |
| Electrical | | | | | | | | | | | | |
| Process – Motor, MCC, VFD | 5 | - | - | - | - | 3 | 4 | 2 | 3 | 2 | - | - |
| Instrumentation | | | | | | | | | | | | |
| PLC, Flow Meters | 5 | - | - | - | - | 3 | 4 | 2 | 5 | 2 | - | - |

Asset RUL Legend:

- RUL <5 years
- RUL 5-10 years
- RUL 11-15 years
- RUL 16-20 years
- RUL >20 years

Acronym Key:

- EPESA = Effluent Pump Station Annex;
- JB = Junction Box;
- MCC = Motor Control Center;
- O OBS = Ocean Outfall Booster Station;
- PLC = Programmable Logic Controller;
- RUL = Remaining Useful Life;
- TBD = To Be Determined;
- VFD = Variable Frequency Drive

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 |
| 120" Ocean Outfall | |
| Port hole | 500 |
| Manhole cover | 47 |

| Major Assets | Quantities |
|--------------------------|------------|
| 78" Ocean Outfall | |
| Port hole | 125 |
| Manhole cover | 14 |

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

Key Issues

| Key Issues | Actions and Recommendations |
|---|---|
| <ul style="list-style-type: none"> Reliability of Disinfection System– OC San no longer discharges primary effluent to the ocean, and in 2015, OC San received an approval to stop disinfection for the Long Outfall. The Bleach Station is minimally used to disinfect plant water, but the Sodium Bisulfite Station was inactive since then. The sodium bisulfite tanks are not operable today due to crystallization of chemicals inside the tanks. Both systems need to be available in case the Short Outfall is used during emergencies or planned maintenance. | <ul style="list-style-type: none"> OC San will install a temporary 4,000 gallon tank to replace existing tote system. The tank will be in service until P2-135 Chemical Systems Rehabilitation at Plant No. 2 rehabilitates the overall system. P2-98A will demolish the existing Bleach Station and build a new Bleach Station that primarily serves the odor control for new primary sedimentation basins. The new station has a provision to disinfect effluent if needed. |
| <ul style="list-style-type: none"> Ocean Outfall Capacity and Maintainability Strategy- After J-117B completion, Low Flow Pump Station will be the main mode of operation, and OOBS and EPSA will stay standby and used during peak wet weather flows. Due to low flow and low probability of high flow events, assets required for high flow will be difficult to exercise and maintain. | <ul style="list-style-type: none"> OC San will start a planning study to evaluate future required outfall capacity and develop a comprehensive plan, such as defining a minimum runtime and frequency required for large capacity pumps, such as OOBS and EPSA, to maintain these pumps, and whether the maintainability can be achieved based on the current outfall configuration. |
| <ul style="list-style-type: none"> Reliability of Long Ocean Outfall– PS18-09 Ocean Outfall Condition Assessment and Scoping Study is in progress to develop a detailed scope of work for the J-137 Ocean Outfalls Rehabilitation. The project identified few critical parts, such as tie rods, that have corroded and need to be repaired immediately. | <ul style="list-style-type: none"> Immediately required repairs are being executed as a part of PS18-09 amended scope. J-137 Ocean Outfalls Rehabilitation is scheduled to start in 2023. |
| <ul style="list-style-type: none"> Short Ocean Outfall Assessment – Short outfall was last used in 2012 to support J-112A construction. Inspection was not part of compliances until new NPDES permit was renewed in 2021. The outfall was built in 1952 and requires a thorough assessment to ensure its availability and reliability. | <ul style="list-style-type: none"> OC San will start a planning study for the Short Outfall similar to the PS18-09 Ocean Outfall Condition Assessment and Scoping Study. |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|--|----------------------------------|--|-------------|------------------------------------|--------------------|---|----------|-------------|----------|----------|-------------|----------|-------------|----------|----------|-------------|-------------|
| | | | | PS18-09 | Ocean Outfall Condition Assessment | 120" Ocean Outfall | <ul style="list-style-type: none"> Determine condition of Ocean Outfall and provide recommendations to extend its useful life. | Planning | | | | | | | | | | |
| J-117B | Outfall Low Flow Pump Station | OOBS & New Low Flow Pump Station | <ul style="list-style-type: none"> Rehabilitate the OOBS and construct a new Low Flow Pump Station. Replace the Plant Water Pump Station. | Design | Design | Design | | | | | | | | | | | | |
| P2-135 | Chemical Systems Rehabilitation at Plant No. 2 | Sodium Bisulfite Station | <ul style="list-style-type: none"> Downsize existing sodium bisulfite facility to address new design conditions and rehabilitate to extend the useful life. | Design | Design | Design | Design | Design | | | | | | | | | | |
| J-137 | Ocean Outfalls Rehabilitation | 120" Ocean Outfall | <ul style="list-style-type: none"> Rehabilitate marine portion of 120-inch Ocean Outfall per PS18-09 recommendations. | | Design | Design | Design | Design | Design | Design | Design | Design | Design | Design | | | | |
| PRN-00868 | Short Ocean Outfall Condition Assessment | 78" Ocean Outfall | <ul style="list-style-type: none"> Determine condition of Short Outfall and provide recommendations to extend its useful life. | Planning | Planning | Planning | | | | | | | | | | | | |
| FE19-06 | EPSA Motor Cooling Improvement | EPSA | <ul style="list-style-type: none"> Modify motor cooling system to provide adequate cooling to the motor at a lower design speed. | Design | Design | | | | | | | | | | | | | |
| P2-139 | Santa Ana River Wingwall Rehabilitation | OOBS & JB-A | <ul style="list-style-type: none"> Rehabilitate wingwalls by OOBS and JB-A per PS17-10 final report recommendations. | Design | Design | Design | Design | Design | | | | | | | | | | |
| N/A | Outfall External Inspection | 120" & 78" Ocean Outfalls | <ul style="list-style-type: none"> Ocean outfall external inspection every 2.5 years per the NPDES permit and lease agreement with the California State Lands Commission. | Maintenance | | | Maintenance | | Maintenance | | | Maintenance | | Maintenance | | | Maintenance | |
| N/A | Outfall Structural Integrity Report | 120" & 78" Ocean Outfalls | <ul style="list-style-type: none"> Ocean outfall structural integrity report every 5 years per the NPDES Permit. | Maintenance | | | | | Maintenance | | | | | Maintenance | | | | Maintenance |

Types of Project Legend:

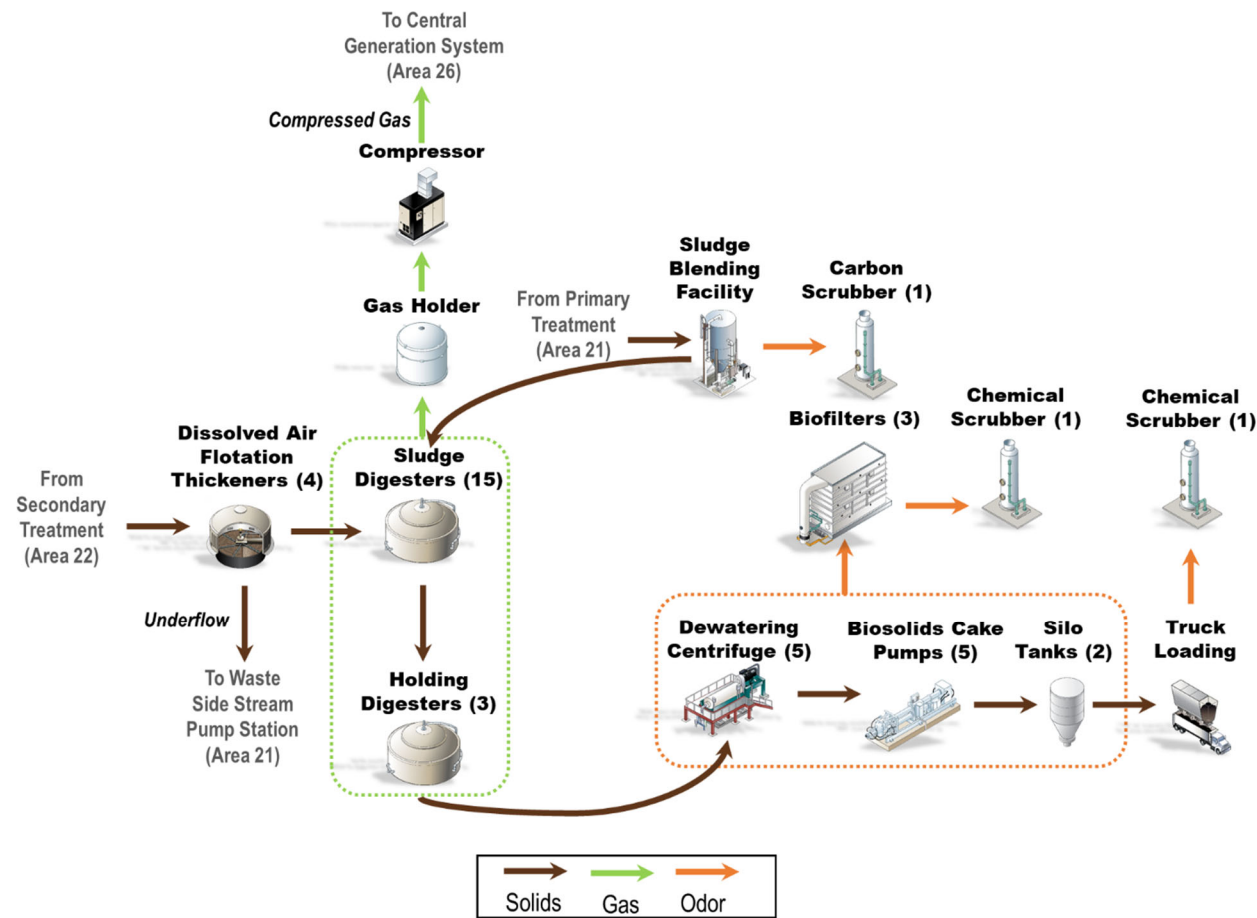
■ CIP - Planning
 ■ CIP - Design
 ■ CIP - Construction
 ■ Maintenance Project

Acronym Key:

CIP = Capital Improvement Program; EPSA = Effluent Pump Station Annex; FY = Fiscal Year; JB = Junction Box; N/A = Not Applicable; NPDES = National Pollutant Discharge Elimination System; OOBS = Ocean Outfall Booster Station; TO = Task Order; VFD = Variable Frequency Drive

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

Process Schematic



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 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 |
| Structural | | | | | | | | | | | | | | | | | | | |
| Structure | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 2 |
| Digester Dome | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | - |
| Mechanical | | | | | | | | | | | | | | | | | | | |
| Sludge Mixing Pumps/Jet Mixing | 4 | 4 | 2 | 4 | 4 | 2 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 2 | 2 | 2 | - |
| Sludge Recirculation and Heating System | 4 | 4 | 3 | 4 | 4 | 3 | 2 | 2 | - | 3 | 4 | 4 | 4 | 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 | | 2 | 2 | 4 | 4 | | 4 | | 4 | | 4 | | 4 | | 4 | |
| Piping & Valve | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 2 |
| Chemical Pump | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 |
| Electrical | | | | | | | | | | | | | | | | | | | |
| MCC & VFD | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 2 |
| Instrumentation | | | | | | | | | | | | | | | | | | | |
| PLC & Flow Meter | 4 | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 2 |

RUL Legend:
■ 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 Digesters (K) | 1 |
| Sludge Mixing Pumps | 15+1+4 (1 each Digester + 1 in 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 |

Acronym Key:
 MCC = Motor Control Center;
 RUL = Remaining Useful Life;
 PLC = Programmable Logic Controller;
 VFD = Variable Frequency Drive

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

Key Issues

| Key Issues | Actions and Recommendations |
|---|---|
| <ul style="list-style-type: none"> Reliability of Digesters – Digesters are aging and approaching end of useful life Digester K – This is a dedicated holding tank. Dome is leaking and contains massive cracks and will be out of service for a long time pending for the repair path forward. Backup holder needed to keep the biosolids storage and truck loading facility smoothly operating. | <ul style="list-style-type: none"> We performed condition assessment after digester cleaning and made incidental repairs found from condition assessment. Digester K condition assessment done, and structural evaluation in progress. FE20-02 Digester C, D, F & G Rehabilitation to replace high-rate mixing pumps, heat exchangers, sludge recirculation pumps, bottom sludge transfer pumps, and hot water pumps and piping. P2-137 Digesters Rehabilitation at Plant No. 2 to repair domes, walking bridges, digester walls, handrails, hot water piping and, and replace MCCs. PRN-00684 P2 Digester Maintenance Projects to replace heat exchangers, sludge recirculation pumps and bottom sludge transfer pumps. Digester K structural engineering service to evaluate the feasibility for dome repair. FR2-0030 will convert Digester O from working to a holding tank. |
| <ul style="list-style-type: none"> Digester Replacement – Digesters are at end of the useful life and have seismic risk. | <ul style="list-style-type: none"> Building new digester complex as recommended by Biosolids Master Plan to replace the aging digesters. Series of projects identified by Biosolids Master Plan and 2017 Facility Master Plan to replace the digesters with TPAD facility and improve the site, including, P2-128 TPAD Digester Facility; P2-129 – Digester P, Q, R, and S Replacement; XP2-131 – Digester I, J, and K Replacement; XP2-130 – Food Waste Receiving Facility; XP2-132 – Digester Demolition. |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | | | | | | | | | | | | | | | | |
|-------------|---|--|--|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|
| | | | | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 | |
| FR2-0022 | Digester O Structural Repairs | Dig. O | <ul style="list-style-type: none"> Repair corroded penetration pipes, walkway, pipe supports and concrete spalling. | | | | | | | | | | | | | | | | |
| FR2-0025 | Digester O-T and Q-R Bridge Repair | Dig. O, T, Q, R | <ul style="list-style-type: none"> Repair walking bridges between Digester O-T and Q-R that have structural deficiencies. | | | | | | | | | | | | | | | | |
| FE19-10 | Digesters C, D, F, G, and I Gas Balance Lines Replacement | Dig. C, D, F, G, I | <ul style="list-style-type: none"> Replaces digester gas balance lines from polyvinyl chloride (PVC) to Stainless Steel (C to D, D to I, and F to G), and repair bridges D-I and F-G. | | | | | | | | | | | | | | | | |
| PRN-00684 | P2 Digester Maintenance Projects | Dig. E, H, L, M, N, O, P, Q, R, S, T | <ul style="list-style-type: none"> Replace major mechanical equipment in kind including heat exchangers, sludge recirculation and transfer pumps. | | | | | | | | | | | | | | | | |
| FR2-0030 | Converting Digester O from Working to a Holding Digester | Dig. O, K, I, J | <ul style="list-style-type: none"> Converting Digester O from working to a holding Digester. | | | | | | | | | | | | | | | | |
| FE20-02 | Digester C, D, F, and G Rehabilitation | Dig. C, D, F, G | <ul style="list-style-type: none"> Replace major mechanical equipment including high-rate mixing pumps, heat exchangers, sludge recirculation, and transfer pumps, hot water pumps and piping. | | | | | | | | | | | | | | | | |
| P2-137 | Digesters Rehabilitation at Plant No. 2 | Dig. C, D, F, G, H, L, M, N, O, P, Q, R, S, T | <ul style="list-style-type: none"> Digester domes, walls, large pipe penetration, hot water piping, handrails, walking bridges and MCC rehabilitation. | | | | | | | | | | | | | | | | |
| P2-124 | Interim Food Waste Receiving Facility | All Digesters, gas treatment facilities and Central Generation | <ul style="list-style-type: none"> Receive 150 wet ton per day of source separated and processed organic food waste to digesters for Co-digestion. | Design completed. Construction is pending food waste contract. | | | | | | | | | | | | | | | |
| P2-128 | TPAD Digester Facility | New TPAD Digester Facility | <ul style="list-style-type: none"> Build five new thermophilic digesters, batching and cooling facilities and use the existing digesters as the mesophilic phase to treat the sludge by TPAD process. | | | | | | | | | | | | | | | | |
| P2-129 | Digester P, Q, R, and S Replacement | Digester P, Q, R, S | <ul style="list-style-type: none"> Replace digester P, Q, R, S as the new mesophilic digesters. | | | | | | | | | | | | | | | | |
| XP2-130 | Food Waste Receiving Facility | All Digesters, gas treatment facilities and Central Generation | <ul style="list-style-type: none"> 500 wet tons of preprocessed food waste receiving facility. (Pending on food waste decision) | | | | | | | | | | | | | | | | |
| XP2-131 | Digester I, J, and K Replacement | Digesters I, J, K, T, M, N, O | <ul style="list-style-type: none"> Build three new digesters/holders and demolish existing digesters related. | | | | | | | | | | | | | | | | |
| XP2-132 | Digester Demolition | Digesters C, D, E, F, G, H | <ul style="list-style-type: none"> Demolish exiting digesters after all new digesters built. | | | | | | | | | | | | | | | | |

Types of Project Legend:

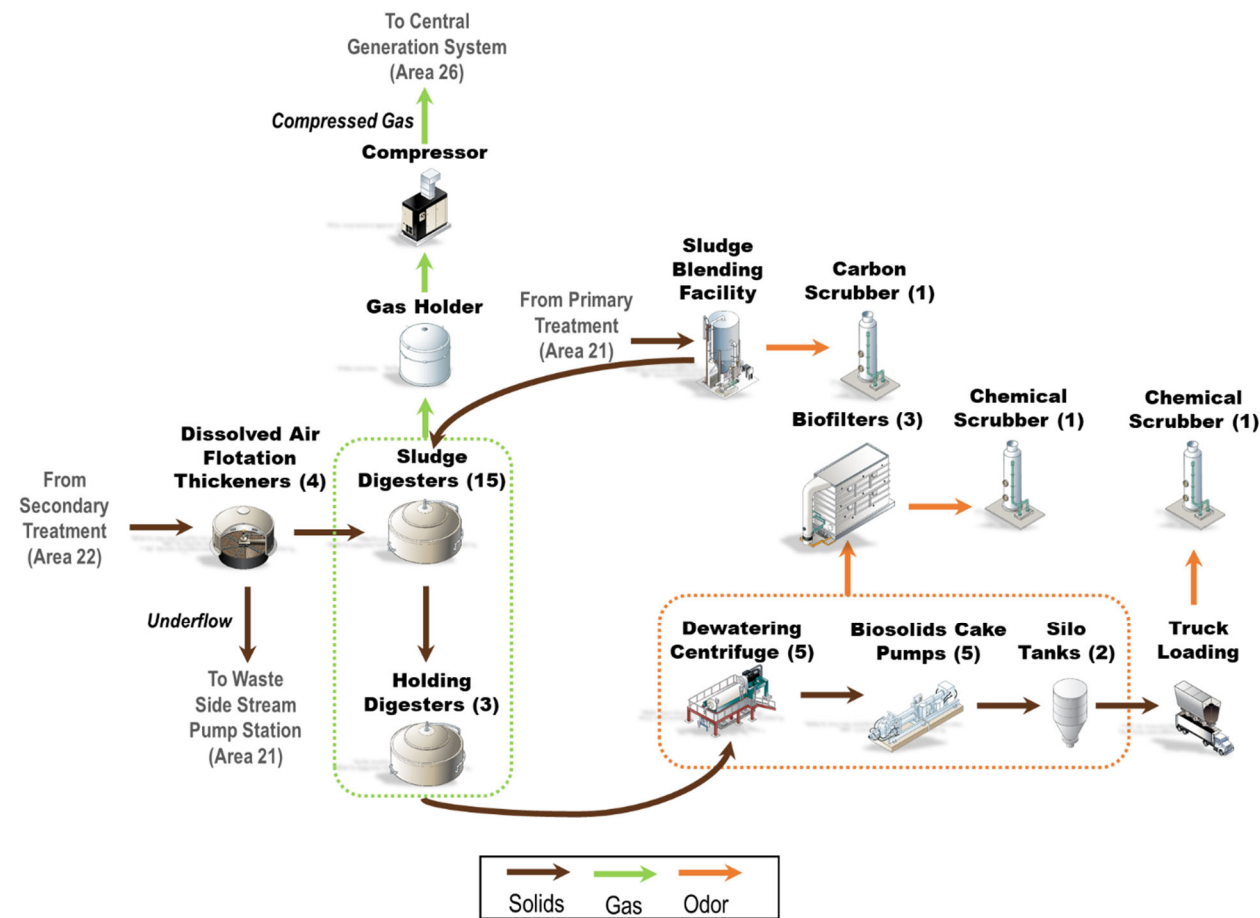
CIP - Planning
 CIP - Design
 CIP - Construction
 Maintenance Project

Acronym Key:

CIP = Capital Improvement Program; FY = Fiscal Year; MCC = Motor Control Center; N/A = Not Applicable; PVC = Polyvinyl Chloride; TPAD = Temperature Phased Anaerobic Digestion; SPD = Small Project Delivery

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

Process Schematic



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 |
|-------------------------|--------------------------|--------------|-----------------------|---------------------------------------|--------------------------------|---------------|--------------|------------|
| Civil | | | | | | | | |
| Effluent Piping | 2 | - | - | - | - | - | - | - |
| Structural | | | | | | | | |
| Structure | 2 | - | 1 | 1 | 1 | 1 | - | 3 |
| Building | 1 | 3 | 1 | - | - | - | 3 | - |
| Mechanical | | | | | | | | |
| Pump | 3 | - | 1 | - | - | - | - | - |
| Fan | - | - | - | 2 | 2 | - | - | - |
| Boiler & Heat Exchanger | - | 2 | - | - | - | - | - | - |
| Centrifuge | - | - | 1 | - | - | - | - | - |
| Polymer System | - | - | 1 | - | - | - | - | - |
| Biofilter | - | - | - | 1 | - | - | - | - |
| Chemical System | - | - | - | 2 | 2 | - | - | - |
| Gas Compressor | - | - | - | - | - | - | 4 | - |
| Gas Dryer | - | - | - | - | - | - | 3 | - |
| Gas Flare | - | - | - | - | - | - | 4 | - |
| Screw Conveyor | - | - | - | - | - | 2 | - | - |
| Sliding Frame | - | - | - | - | - | 2 | - | - |
| Piping & Valve | 3 | 3 | 1 | 1 | 1 | 2 | 3 | 3 |
| Scale | - | - | - | - | - | 4 | - | - |
| Electrical | | | | | | | | |
| MCC & VFD | 2 | 2 | 2 | 2 | 2 | 3 | 4 | - |
| Instrumentation | | | | | | | | |
| PLC & Flow Meter | 2 | 2 | 2 | 2 | 2 | 3 | 3 | - |

Asset RUL Legend:

- RUL <5 years
- RUL 5-10 years
- RUL 11-15 years
- RUL 16-20 years
- RUL >20 years

Acronym Key:

- MCC = Motor Control Center;
- PLC = Programmable Logic Controller;
- RUL = Remaining Useful Life;
- VFD = Variable Frequency Drive

Major Assets

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

| Major Assets | Quantities |
|---------------------|------------|
| Dewatering | |
| Centrifuges | 5 |
| Sludge Feed Pumps | 5 |
| Cake Transfer Pumps | 5 |
| Polymer System | 1 |

| Major Assets | Quantities |
|---|------------|
| Centrifuge Building & Silos Odor Control | |
| Biofilters | 3 |
| Ammonia Scrubber | 1 |
| Gas Handling | |
| Gas Compressors | 3 |
| Gas Dryer | 1 |

| Major Assets | Quantities |
|----------------------|------------|
| Gas Flares | 3 |
| Gas Holder | |
| Gas Holder Tank | 1 |
| Truck Loading | |
| Cake Storage Silos | 2 |
| Sliding Frames | 2 |
| Screw Conveyors | 12 |

| Major Assets | Quantities |
|---------------------------------------|------------|
| Truck Loading Bay Odor Control | |
| 2-stage Chemical Scrubbers | 2 |

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

Key Issues

| Key Issues | Actions and Recommendations |
|---|---|
| <ul style="list-style-type: none"> Boilers and Heat Exchangers – Aging equipment and facility that has reliability and seismic vulnerabilities. | <ul style="list-style-type: none"> FR2-0021 – P2 Boiler Re-tubing and FE18-15 – Plant Boiler System Relief projects completed in 2022. P2-128 included a Boiler Building with a third boiler to cover exiting boiler capacity. Existing boiler facility demolition will be added to XP2-132 P2 Digester Demolition. PS21-04 to evaluate the backup heat demand currently from the hot water loop generated from Cen Gen cooling. |
| <ul style="list-style-type: none"> Gas Handling System – Gas compressor system is aging and needs reliability improvements. | <ul style="list-style-type: none"> J-124 – Digester Gas Facilities rehabilitation. Gas compressors repair and overhaul by Maintenance. |
| <ul style="list-style-type: none"> Truck Loading – Aged hydraulic power units; truck loading bay fugitive odors escaping; aged and corroded scales. | <ul style="list-style-type: none"> Maintenance purchase order to overhaul the HPU. HPU at Silo B completed. HPU at Silo A is in progress. PS20-03 Final report completed and made recommendations for truck bay odor control improvements, P2-140 will implement recommendations. PRN-00891 approved for sole source direct replacement of scales by OEM. |
| <ul style="list-style-type: none"> Centrifuge – Hinged cover needed to support Maintenance activities; switching polymer mixing water from City Water to Plant Water. | <ul style="list-style-type: none"> PRN-00885 (AI-390) approved to OEM to change to hinged covers. Maintenance in-house modification of polymer feed water piping modification. |
| <ul style="list-style-type: none"> Sludge Blending Facility | <ul style="list-style-type: none"> SBF to be demolished after P2-128 completion. SBF demolition will be added to XP2-132 P2 Digester Demolition. |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | | | | | | | | | | | | | | | | |
|--------------------|---|---------------------------------|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---------|--|
| | | | | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY36/37 | |
| Maintenance | HPU Overhaul | Truck Loading Station | <ul style="list-style-type: none"> Overhaul the hydraulic power units and replace the hydraulic hose. | | | | | | | | | | | | | | | | |
| PS20-03 | PS20-03 Truck Loading Bay Odor Control Improvement Study at Plant No. 2 | Truck Loading Station | <ul style="list-style-type: none"> Plan CIP project to modify existing facility to better capture odor. | | | | | | | | | | | | | | | | |
| PRN-00891 | Truck Loading Scales Replacement | Truck Loading Station | <ul style="list-style-type: none"> Replace two scales in kind. | | | | | | | | | | | | | | | | |
| J-124 | Digester Gas Facilities Rehabilitation | Gas compressors, dryers, flares | <ul style="list-style-type: none"> Rehabilitate existing compressor building and replace the electrical and instrumentation, replace the flares. | | | | | | | | | | | | | | | | |
| P2-140 | Truck Loading Bay Odor Control Improvements | Truck Loading Station | <ul style="list-style-type: none"> Truck loadout facility improvements from PS20-03, and minor concrete repair. | | | | | | | | | | | | | | | | |
| P2-128 | TPAD Digester Facility | Boiler facility | <ul style="list-style-type: none"> Add new boiler to replace the existing boilers. | | | | | | | | | | | | | | | | |
| XP2-132 | Digester Demolition | Boiler facility and SBF | <ul style="list-style-type: none"> Demolish Boiler Facility and SBF with digesters demolition. | | | | | | | | | | | | | | | | |

Types of Project Legend:

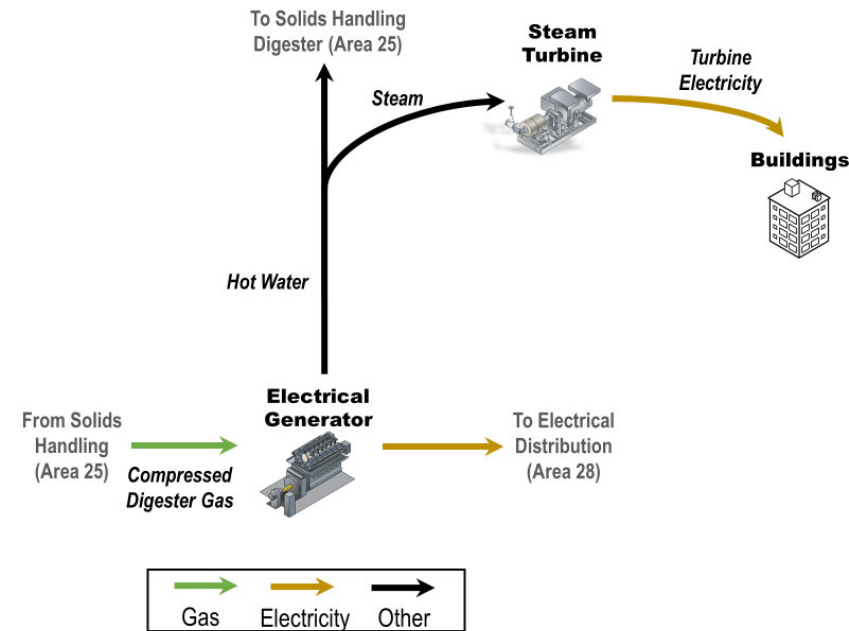
- CIP - Planning
- CIP - Design
- CIP - Construction
- Maintenance Project

Acronym Key:

AQMD = Air Quality Management District; CIP = Capital Improvement Program; FY = Fiscal Year; HPU = Hydraulic Power Unit; N/A = Not Applicable; NTP= Notice to Proceed; PM = Preventive Maintenance; SBF = Sludge Blending Facility

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

Process Schematic



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 | Steam Condenser | Deaerator Vessel | Heat Recovery Boiler #1 | Heat Recovery Boiler #2 | Heat Recovery Boiler #3 | Heat Recovery Boiler #4 | Heat Recovery Boiler #5 | OXI Catalyst | SCR Catalyst | Urea Injection System | Starting Air Compressor #1 | Starting Air Compressor #2 | Starting Air Compressor #3 | Inst. Air Compressor #1 | Inst. Air Compressor #2 | Battery Backup | Plant Water Piping | Miscellaneous |
|------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|-------------------------|-----------------|------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|--------------|--------------|-----------------------|----------------------------|----------------------------|----------------------------|-------------------------|-------------------------|----------------|--------------------|---------------|
| Structural | | | | | | | | | | | | | | | | | | | | | | | | |
| Building | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 |
| Mechanical | | | | | | | | | | | | | | | | | | | | | | | | |
| General | 5 | 5 | 5 | 5 | 5 | 3 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 5 | 5 | - | 5 | - |
| HVAC | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 4 |
| Lube Oil System | 4 | 4 | 4 | 4 | 4 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Electrical | | | | | | | | | | | | | | | | | | | | | | | | |
| General | 5 | 5 | 5 | 5 | 5 | 3 | - | - | - | - | - | - | - | - | - | 3 | 3 | 3 | 3 | 4 | 4 | 5 | - | - |
| Switchgear | 4 | 4 | 4 | 4 | 4 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Instrumentation | | | | | | | | | | | | | | | | | | | | | | | | |
| General | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | - | - | - |

RUL Legend:

■ RUL <5 years
 ■ RUL 5-10 years
 ■ RUL 11-15 years
 ■ RUL 16-20 years
 ■ RUL >20 years

Acronym Key:

HVAC = Heating, Ventilation, and Air Conditioning; Inst. = Instrument; OXI = Oxidizer; RUL = Remaining Useful Life; SCR = Selective Catalytic Reduction

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 |

| 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 |

| Major Assets | Quantities |
|--------------------------|------------|
| HVAC | |
| Ventilation Supply Fans | 5 |
| Ventilation Exhaust Fans | 6 |
| Air Compressors | |
| Engine Starting Air | 3 |
| Instrument Air | 2 |

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

Key Issues

| Key Issues | Actions and Recommendations |
|--|--|
| <ul style="list-style-type: none"> Gas Engine Generator Set Reliability – Aging components and systems required to operate the five Central Generation Engines are creating reliability issues and need to be addressed. | <ul style="list-style-type: none"> Execute major Engine overhauls (J-135B). Replace obsolete systems (e.g., battery backup, switchgear, motor control centers, ignition system, PLC upgrade, etc.) (J-117B, PRN-00627, PRN-00697, AI-225). |
| <ul style="list-style-type: none"> Engine Lube Oil System – Lube Oil Centrifuges instrumentation and controls (I&C) need to be upgraded. | <ul style="list-style-type: none"> Install new instrumentation and controls onto the existing two units (PRN-00211). |
| <ul style="list-style-type: none"> Plant Water Piping – Plant water (i.e., Cooling Water) piping has degraded and needs replacement. | <ul style="list-style-type: none"> Replace all plant water piping in the basement of Central Generation (FE20-04). |
| <ul style="list-style-type: none"> Emission Control System – Housings on the Oxidizer Catalysts are failing prematurely. | <ul style="list-style-type: none"> Analyze and design new Catalyst Housings (PRN-00427). |
| <ul style="list-style-type: none"> Instrument Air Compressors – Air Compressors are no longer operational. | <ul style="list-style-type: none"> Replace the entire Instrument Air System, installing new compressors and appurtenances (PRN-00536). |
| <ul style="list-style-type: none"> Pressure Vessel Integrity – The asset integrity of pressure containing vessels needs a detailed assessment. | <ul style="list-style-type: none"> Provide an assessment of pressure vessels to formulate an asset management strategy to ensure safety over time (PS20-05). |
| <ul style="list-style-type: none"> PLC Upgrade – The existing engine PLCs are obsolete. | <ul style="list-style-type: none"> Replace obsolete engine PLCs with new ones. |
| <ul style="list-style-type: none"> Gas Engine Cylinder Pressure Sensing and Diagnostics – Engine diagnostic capability improvement needed. | <ul style="list-style-type: none"> Install cylinder pressure sensors to improve diagnostic capability for operational flexibility (PRN-00697). |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|---|---|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--|--|--|--|--|--|--|--|--|
| | | | | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 | | | | | | | | | |
| P2-119 | Central Generation Rehabilitation at Plant No. 2 | Central Generation | Rehabilitation of engine generator support systems. | | | | | | | | | | | | | | | | | | | | | | | | |
| J-117B | Outfall Low Flow Pump Station | Battery Backup, Switchgear, Motor Control Centers | Replace legacy Battery systems, switchgear, and motor control center equipment. | | | | | | | | | | | | | | | | | | | | | | | | |
| FE20-04 | Cen Gen Cooling Water Pipe Replacement at Plant No. 2 | Plant Water Piping | Replace existing plant water piping with new. | | | | | | | | | | | | | | | | | | | | | | | | |
| PRN-00536 | Instrument Air Compressor Replacement | Instrument Air Compressor System, Urea Injection System | Install two new instrument air compressors and appurtenances. | | | | | | | | | | | | | | | | | | | | | | | | |
| PRN-00211 | Engine Lube Oil System Controls Upgrade | Engine Generator | Install new instrumentation and controls onto the existing units. | | | | | | | | | | | | | | | | | | | | | | | | |
| PS18-08 | Plant 2 Cen Gen Engine Exhaust Oxidizer Catalyst Cracking Root Cause Analysis | OXI/SCR Catalyst | Analyze and design new Catalyst Housings. | | | | | | | | | | | | | | | | | | | | | | | | |
| J-135B | Engine and Generator Overhauls at Plant No. 1 and 2 | Engine Generator | Overhaul the Engine Generators #1, 3 and 5 | | | | | | | | | | | | | | | | | | | | | | | | |
| PRN-00697 | Engine Cylinder Pressure Sensing and Diagnostics | Engine Generator | Install pressure sensors onto each cylinder, incl. software/HMI. | | | | | | | | | | | | | | | | | | | | | | | | |
| PS20-05 | Cen Gen Pressure Vessel Integrity Assessment at Plant Nos. 1 and 2 | Pressure Vessels & Heat Exchangers | Inspect and report on vessel integrity and next required inspection. | | | | | | | | | | | | | | | | | | | | | | | | |

Types of Project Legend:

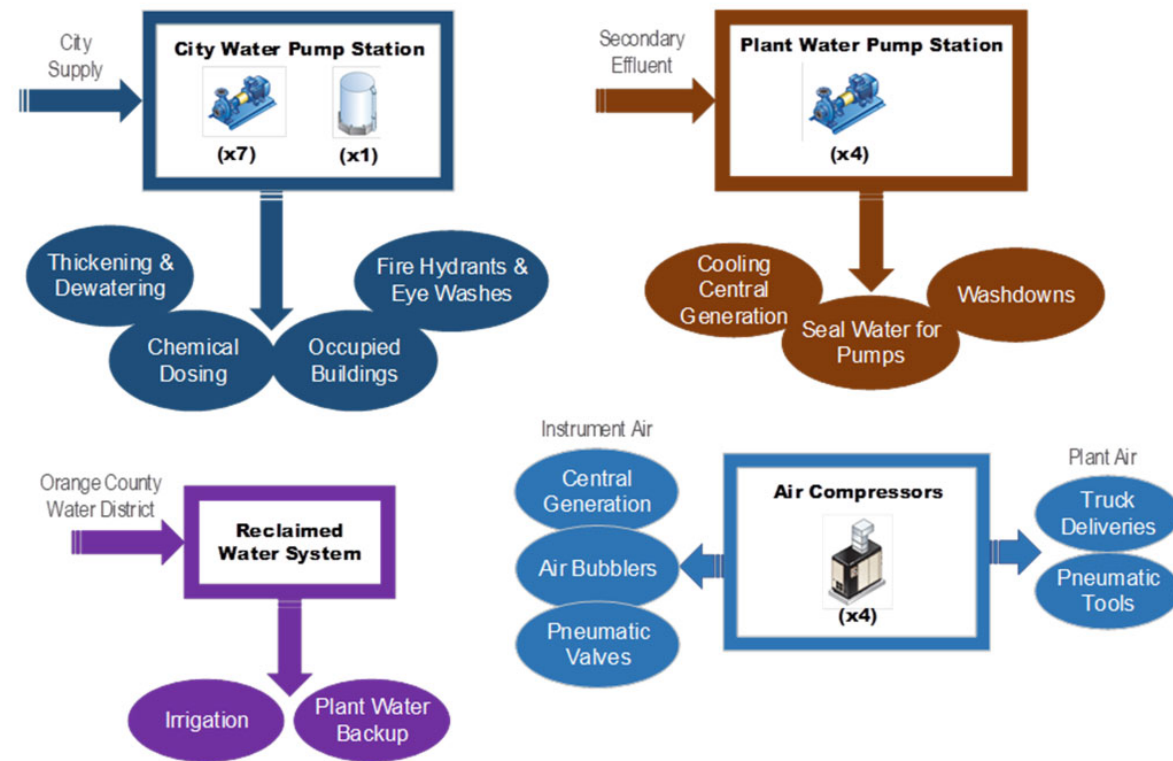
CIP - Planning
 CIP - Design
 CIP - Construction
 Maintenance Project

Acronym Key:

CIP = Capital Improvement Program; FY = Fiscal Year; HMI = Human Machine Interface; HVAC = Heating, Ventilation, and Air Conditioning; I&C = Instrumentation and Controls; OXI = Oxidizer; RUL = Remaining Useful Life; PLC = Programmable Logic Controller; SCR = Selective Catalytic Reduction

ASSET MANAGEMENT SYSTEM SUMMARY – AREA 27 – 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 | 2 | 3 | 2 | 3 |
| Structural | | | | |
| Pump Station | 3 | 3 | - | - |
| Tanks | 3 | - | - | - |
| Mechanical | | | | |
| Pumps | 3 | 3 | - | - |
| Strainers | - | 3 | - | - |
| Compressors | - | - | - | 3 |
| Ventilation System | 2 | 2 | - | - |
| Electrical | | | | |
| MCC | 2 | 2 | - | - |
| VFD | 3 | 3 | - | - |
| Instrumentation | | | | |
| PLC, Flowmeter | 2 | 2 | - | 2 |

Asset RUL Legend:

- RUL <5 years
- RUL 5-10 years
- RUL 11-15 years
- RUL 16-20 years
- RUL >20 years

Acronym Key:

- MCC = Motor Control Center;
- RUL = Remaining Useful Life;
- PLC = Programmable Logic Controller;
- VFD = Variable Frequency Drive

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 |

ASSET MANAGEMENT SYSTEM SUMMARY – AREA 27 – PLANT NO. 2 UTILITIES

Key Issues

| Key Issues | Actions and Recommendations |
|---|---|
| <ul style="list-style-type: none"> • Plant/Instrument Air Lines – Air Quality Impacts to instrumentation. | <ul style="list-style-type: none"> • Future planning study to address instrument air quality for plants. |
| <ul style="list-style-type: none"> • Plant Water Piping - is corroding and some failures have occurred. | <ul style="list-style-type: none"> • Due to the corrosive nature of the plant water, the current ductile iron pipes are corroding prematurely and causing failures throughout the plant. FE18-14 will address aging plant water piping in the tunnels and PRN-00740 will replace a small portion of plant water piping with HDPE. Overall goal for these and future projects is to replace ductile iron pipes with either Fiberglass Reinforced or HDPE piping material. |
| <ul style="list-style-type: none"> • Air Compressors- Instrument Air Compressors failures. | <ul style="list-style-type: none"> • Air compressors at Cen Gen are being replaced due to multiple failures (PRN-00536). |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | | | | | | | | | | | | | | | |
|-------------|---|------------------------------|--|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|--|
| | | | | FY22/23 | FY23/24 | FY24/25 | FY25/26 | FY26/27 | FY27/28 | FY28/29 | FY29/30 | FY30/31 | FY31/32 | FY32/33 | FY33/34 | FY34/35 | FY35/36 | |
| FE18-14 | Plant Water Pipeline Rehabilitation | Piping in tunnels | <ul style="list-style-type: none"> • Replace 1600 feet of piping in the tunnels. | | | | | | | | | | | | | | | |
| J-117B | Outfall Low Flow Pump Station | Plant Water Pump Station | <ul style="list-style-type: none"> • Replace Plant Water Pump Station and plant water piping near project. | | | | | | | | | | | | | | | |
| P2-133 | B- and C-Side Primary Clarifiers Rehabilitation | Primary Clarifiers | <ul style="list-style-type: none"> • Replace City water piping near project. | | | | | | | | | | | | | | | |
| P2-98A | Primary Treatment Rehabilitation | City Water Pump Station | <ul style="list-style-type: none"> • Refeed City Water Pump Station directly from DC-F 480 switchgear. | | | | | | | | | | | | | | | |
| X-036 | Plant No. 2 City Water Pump Station | City Water Pump Station | <ul style="list-style-type: none"> • Rehabilitation of City Water Pump Station. | | | | | | | | | | | | | | | |
| X-037 | Plant No. 2 Plant Water Pump Station Demolition | Plant Water Pump Station | <ul style="list-style-type: none"> • Demo Plant Water Pump Station as a new Plant Water Station will be built by J-117B. | | | | | | | | | | | | | | | |
| P2-136 | AS Aeration Basins at Plant No. 2 | AS Aeration Basins | <ul style="list-style-type: none"> • Replace potable water lines. | | | | | | | | | | | | | | | |
| PRN-00740 | 6 in DIP Plant Water Pipe Replacement | Primary Sedimentation Basin | <ul style="list-style-type: none"> • Replacing 100 feet of DIP near PSB-P & Q by Maintenance Project. | | | | | | | | | | | | | | | |
| PRN-00536 | IA Compressors at Plant No. 2 Cen Gen | Central Generation (Cen Gen) | <ul style="list-style-type: none"> • Replace instrument air compressors. | | | | | | | | | | | | | | | |
| PRN-00230 | City Water Assessment at Plant No. 2 | City Water Pump Station | <ul style="list-style-type: none"> • Study to evaluate future demands and capacity improvements to accommodate those demands. | | | | | | | | | | | | | | | |
| PRN-00880 | Ella Tunnel Plant Water Pipe Replacement | Plant water Piping | <ul style="list-style-type: none"> • Replace approximately 300 feet of corroded plant water piping in Ella Tunnel. | | | | | | | | | | | | | | | |
| PRN-00743 | Plant and Reclaimed Water Study | Plantwide | <ul style="list-style-type: none"> • Study to evaluate water demands and system capacity to meet future needs long term. | | | | | | | | | | | | | | | |

Types of Project Legend:

CIP - Planning
 CIP - Design
 CIP - Construction
 Maintenance Project

Acronym Key:

Cen Gen = Central Generation Facility; CIP = Capital Improvement Program; DIP = Ductile Iron Pipe; DC-F = Distribution Center F; FY = Fiscal Year; HP = Horsepower; IA = Instrument Air, PSB = Primary Sedimentation Basin

ASSET MANAGEMENT SYSTEM SUMMARY – AREA 27 – PLANT NO. 2 UTILITIES

Remaining Useful Life of Utility Infrastructure



RUL Legend:

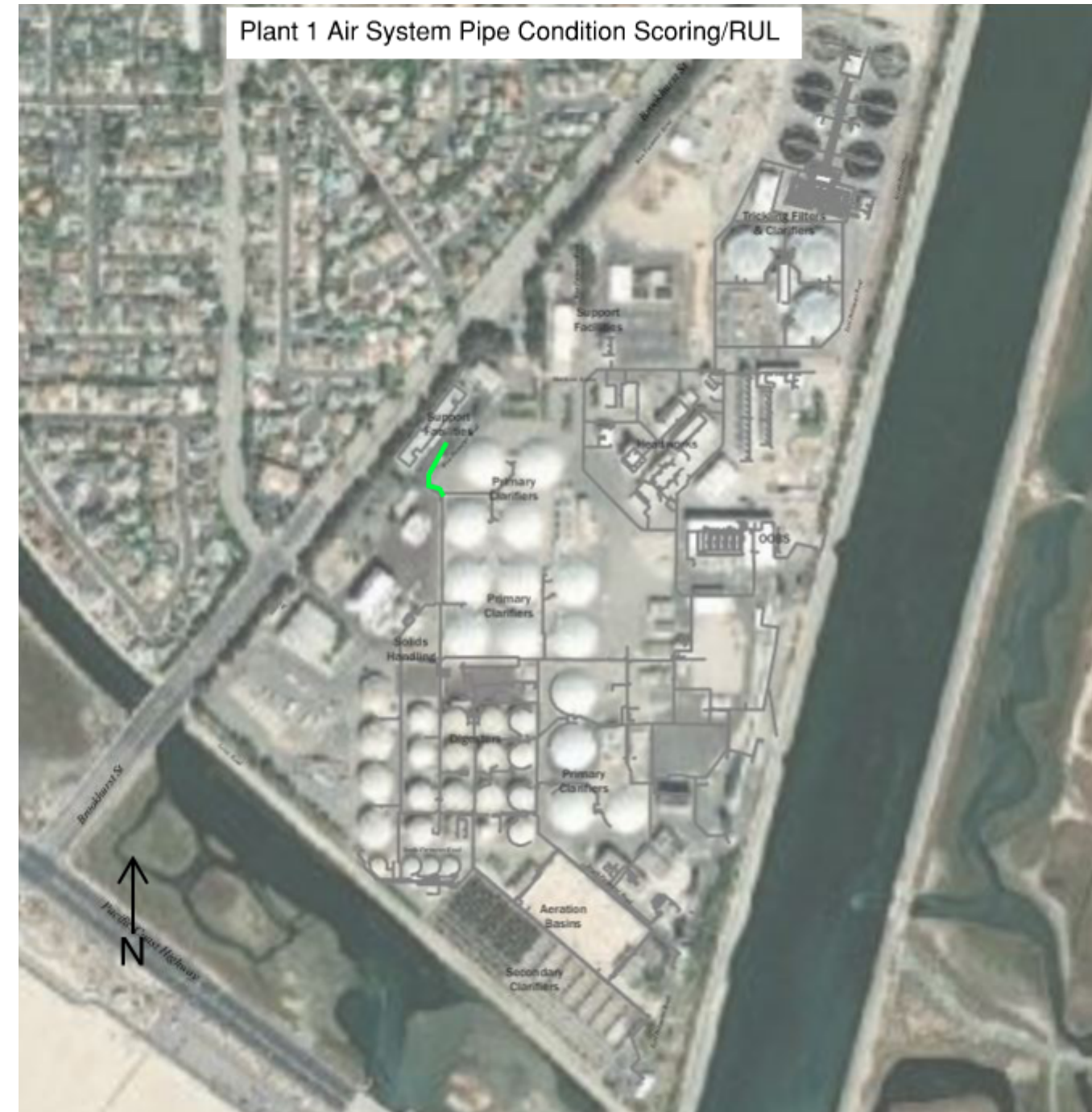
| | | | | |
|---|--|---|--|---|
| ■ RUL <5 years | ■ RUL 5-10 years | ■ RUL 11-15 years | ■ RUL 16-20 years | ■ RUL >20 years |
|---|--|---|--|---|

Acronym Key:

RUL = Remaining Useful Life

ASSET MANAGEMENT SYSTEM SUMMARY – AREA 27 – PLANT NO. 2 UTILITIES

Remaining Useful Life of Utility Infrastructure



RUL Legend:

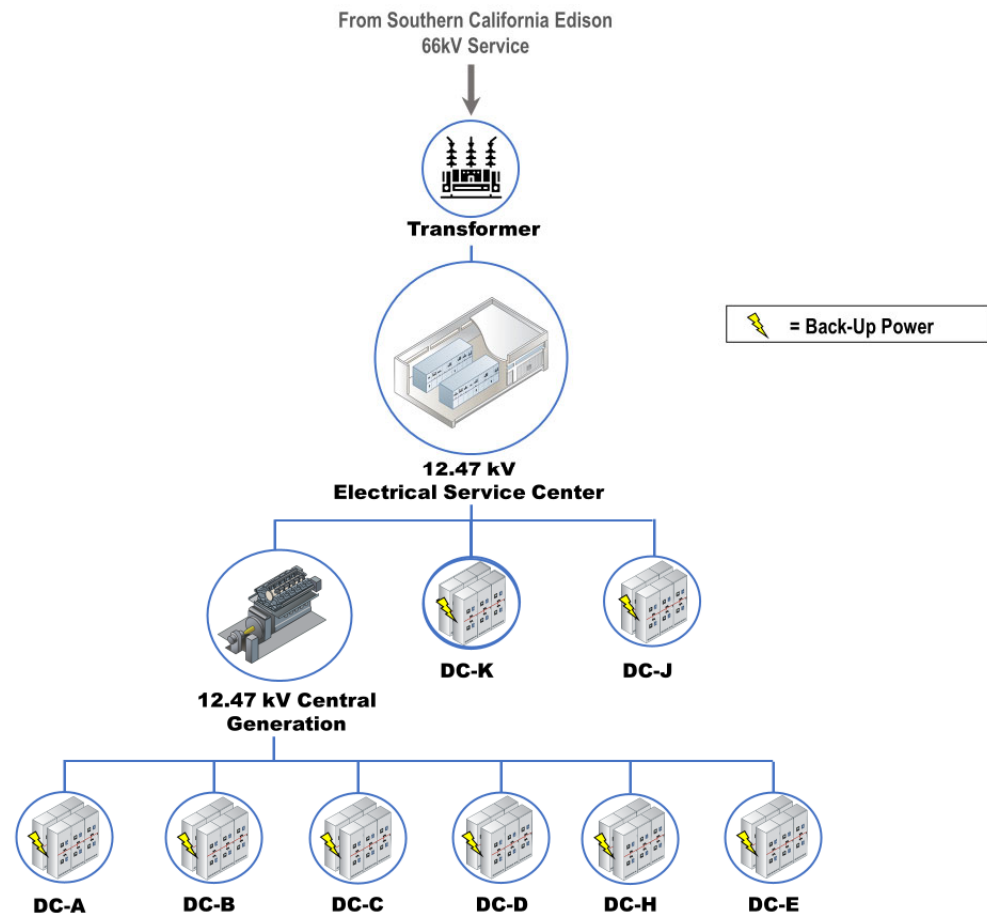
| | | | | |
|---|--|---|---|---|
| ■ RUL <5 years | ■ RUL 5-10 years | ■ RUL 11-15 years | ■ RUL 16-20 years | ■ RUL >20 years |
|---|--|---|---|---|

Acronym Key:

RUL = Remaining Useful Life

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

Process Schematic



Major Assets

| Major Assets | Quantities |
|----------------------------------|------------|
| Transformers | 58 |
| Standby Generators | 9 |
| 12kV Switchgears | 27 |
| 480V Switchgears | 32 |
| 125VDC and 24VDC Battery Systems | 38 |
| UPS | 27 |

Acronym Key:

Cen Gen = Central Generation Facility;
 DC = Distribution Center;
 EPSA = Effluent Pump Station Annex;
 kV = Kilovolt;
 PB = Power Building;
 SPF = Standby Power Facility;
 RUL = Remaining Useful Life;
 VDC = Volts of Direct Current;
 UPS = Uninterruptible Power Supply;
 V = Volts

Major Assets Remaining Useful Life

| Asset Type | Service Center | Cen Gen | DC-A | DC-B | DC-C | DC-D | DC-E (EPSA) | EPSA SPF | DC-H (Headworks) | Headworks Standby Building | DC-J | DC-K | PB-A | PB-B | PB-C | PB-D |
|---|----------------|---------|------|------|------|------|-------------|----------|------------------|----------------------------|------|------|------|------|------|------|
| Tier I – 12.47KV Primary Distribution Level | | | | | | | | | | | | | | | | |
| Transformers: 12.47/2.4kV | - | - | - | - | 4 | - | - | - | - | - | - | - | - | - | - | - |
| Transformers: 12.47/0.48kV | 3 | 4 | 3 | 3 | 4 | 3 | 3 | - | 2 | - | 2 | 1 | 4 | 4 | 4 | 4 |
| 12.47kV Switchgears | 3 | 5 | 3 | 3 | 4 | 4 | 4 | 3 | 2 | 2 | 2 | 1 | - | - | - | - |
| 12.47 kV Load Interrupter Switches | - | - | - | 3 | - | - | - | - | - | - | - | 1 | 4 | 4 | 4 | 4 |
| 12.47kV Feeders | 4 | 4 | 1 | 1 | 4 | 4 | 4 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 4 | 4 |
| 12.47kV Generators | - | - | - | - | - | - | - | 3 | - | 3 | - | - | - | - | - | - |
| 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 | - | 2 | 1 | 4 | 4 | 4 | 4 |
| Transfer Switches | - | - | - | - | - | - | - | - | - | - | - | - | 4 | 4 | 4 | 4 |
| Generators | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 4 | 4 |
| Tier V – UPS | | | | | | | | | | | | | | | | |
| UPSs Individual | - | 5 | - | - | 5 | 4 | - | - | 4 | - | - | 4 | - | 4 | - | - |
| UPSs Regional | - | - | - | 1 | - | - | 1 | - | - | - | 4 | - | - | - | - | - |
| Tier VI – 125 VDC and 24 VDC Battery Systems | | | | | | | | | | | | | | | | |
| 125VDC Chargers | 4 | 5 | 5 | 5 | - | - | - | 4 | 4 | 4 | 4 | 2 | 4 | 4 | - | - |
| 125VDC Batteries | 4 | 5 | 5 | 5 | - | - | - | 4 | 4 | 4 | 4 | 2 | 4 | 4 | - | - |
| 24VDC Chargers | - | 5 | - | - | - | - | - | 4 | - | 4 | - | - | - | - | 4 | 4 |
| 24VDC Batteries | - | 5 | - | - | - | - | - | 4 | - | 4 | - | - | - | - | 4 | 4 |
| Generator Controls | | | | | | | | | | | | | | | | |
| Generator Controls | - | 5 | - | - | - | - | - | 3 | - | 3 | - | - | - | - | 4 | 4 |

RUL Legend:

■ RUL <5 years
 ■ RUL 5-10 years
 ■ RUL 11-15 years
 ■ RUL 16-20 years
 ■ RUL >20 years

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

Key Issues

| Key Issues | Actions and Recommendations |
|---|--|
| <ul style="list-style-type: none"> • Edison Substation - Southern California Edison Substation is aging; currently only a single 66kV Feeder Service. | <ul style="list-style-type: none"> • X-095 Project will install new 66kV Switchyard; Additional 66kV Line; Additional Transformer with automatic Load tap changes, new Electrical Service Center. |
| <ul style="list-style-type: none"> • Variable Frequency Drive – Obsolescence. | <ul style="list-style-type: none"> • Developed VFD replacement strategy: FE19-08 is replacing obsolete VFDs at the Pure Oxygen Activated Sludge Facility. |
| <ul style="list-style-type: none"> • Aging Cabling- Aging Medium Voltage Cabling Infrastructure. | <ul style="list-style-type: none"> • Service Contract (S-2019-1107B) in place for testing aging medium voltage cables to perform Condition Assessment and develop plan for PM. |
| <ul style="list-style-type: none"> • Headworks Cabling 480V cables failing in the Headworks area. | <ul style="list-style-type: none"> • FR2-0026 and MP2-001 are addressing these failing cables. |
| <ul style="list-style-type: none"> • 12kV Cen Gen Switchgear - Obsolescence. | <ul style="list-style-type: none"> • J-117B Project will replace 12kV Switchgear. |
| <ul style="list-style-type: none"> • Standby Power Policy - No Stand-by Power policy to maintain permit compliance and prevent adverse treatment capability during plant power outages. | <ul style="list-style-type: none"> • PS21-04 will develop a stand-by power policy and plan to maintain OC San operations and permit compliance during loss of power. |

Acronym Key:

DC = Direct Current; kV = Kilovolt; PEPS = Primary Effluent Pump Station; PM = Preventive Maintenance; V = Volt

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

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|--------------|---|---|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| S-2019-1107B | On-Call Plant No. 1 and Plant No. 2 Medium Voltage Cable Testing Services | Plant No. 1 and Plant No. 2 Power Distribution and Cabling Infrastructure | <ul style="list-style-type: none"> Condition assessment and Testing of Plant No. 1 and Plant No. 2 Medium Voltage Cabling Infrastructure. | | | | | | | | | | | | | | |
| FR2-0026 | Headworks Phase 3 Cable Replacement at Plant No. 2 | Headworks | <ul style="list-style-type: none"> Project will replace damaged low voltage power and control wiring in headworks and trickling filters area of Plant No. 2. | | | | | | | | | | | | | | |
| J-117B | Outfall Low Flow PS | Power Distribution | <ul style="list-style-type: none"> Project will replace LOFLO/PWPS 480V Switchgear, 12.47kV Switchgears (Main and Generators) at Cen Gen, OOBS/DC-C 12.47kV and 480V Switchgear, replace electromechanical relays with solid state relays for Service Center and Distribution Center B, add new SCADA Points and Load Shedding System. | | | | | | | | | | | | | | |
| FE19-08 | Secondary Treatment VFD Replacements at Plant No. 2 | Power Distribution | <ul style="list-style-type: none"> This project will replace six 125HP Return-Activated Sludge VFD's, four 50HP Waste-activated Sludge VFD's, four 300HP Primary Effluent Pump Station VFDs, and associated cables and conductors at Plant No. 2. | | | | | | | | | | | | | | |
| SC19-06 | EPSA Standby Power Generator Control Upgrades at Plant No. 2 | Plant No. 2 Power Distribution | <ul style="list-style-type: none"> This project will upgrade 12.47kV EPSA Generator Switchgear and Generator controls. | | | | | | | | | | | | | | |
| P2-98A | A-Side Primary Basins Replacement at Plant No. 2 | Plant No. 2 Primary Basins, Power Distribution System | <ul style="list-style-type: none"> This project will demolish existing electrical distribution equipment at Primary Clarifiers D,E,F,G Electrical Buildings, Power Buildings A, B, C, City Water Pump station, Plant Water Strainers, and other facilities. The Project will provide new electrical services to existing power buildings and new Distribution Center F. | | | | | | | | | | | | | | |
| J-124 | Digesters Gas Facility Replacement | Plants No. 1 and Plant No. 2 Compressors, Flares, Power Distribution | <ul style="list-style-type: none"> This Project will upgrade electrical equipment and control systems inside Gas Compressor Building. | | | | | | | | | | | | | | |
| J-98 | Electrical Power Distribution System Improvements | Various Plant No. 1 and Plant No. 2 condition based electrical distribution systems | <ul style="list-style-type: none"> Project will perform various Electrical Distribution System Improvements at various areas throughout Plant No. 2. The scope covers both 480V and 12kV Switchgear, Motor Control Centers, breakers, conductors, load shedding and arc flash mitigation. | | | | | | | | | | | | | | |
| J-136 | Power Building Structural Seismic Improvements at Plant No.1 and 2 | Plant No.1 12-kV Service Center and multiple Power Buildings at Plant No. 2 | <ul style="list-style-type: none"> Project will mitigate structural deficiencies identified by PS15-06 to comply with latest seismic requirements at Headworks PB-B, Headworks Standby PB, and PB-D as well as boiler building at Plant No. 2. | | | | | | | | | | | | | | |
| P2-128 | TPAD Digester Facility at Plant No. 2 | Plant No. 2 Digesters, Electrical and Mechanical Systems | <ul style="list-style-type: none"> This project will include 2-story Electrical Power Building consisting of electrical distribution equipment to support new TPAD Digester Facility. The Project will decommission Power Building C. | | | | | | | | | | | | | | |
| P2-133 | Plant No. 2- B/C-Side Basins Rehabilitation | Plant No. 2 Primary Basins, Mechanical and Electrical Systems | <ul style="list-style-type: none"> New B- and C-Side Primary Scrubber Complex construction including relocating the electrical feed to new Distribution Center F and demolition of Power Building D. | | | | | | | | | | | | | | |

| Project No. | Project Title | Impacted Facilities | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|---|--|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| X-095 | Warehouse, Electrical Substation and 12kV Service Center Replacement at Plant No. 2 | Power Distribution | <ul style="list-style-type: none"> This Project will add a second 66 kV feed to Plant No. 2, replace Southern California Edison Substation, replace the Electrical Service Center and Warehouse. The Project will also relocate a major power distribution duct bank to clear space for future Operations and Maintenance Building. | | | | | | | | | | | | | | |
| PS21-04 | Energy and Digester Gas Master Plan | Plant No.1 and Plant No. 2 Power Generation & Stand-by Power | <ul style="list-style-type: none"> Develop a standby power policy, load shedding and power restart philosophy, and energy resiliency and independence plan. | | | | | | | | | | | | | | |

Types of Project Legend:

CIP - Planning
 CIP - Design
 CIP - Construction
 Maintenance Project

Acronym Key:

CIP = Capital Improvements Program; FY = Fiscal Year; kV = Kilovolt; LOFLO = Low Flow; NFPA = National Fire Protection Association; OOBS = Ocean Outfall Booster Station; SCADA = Supervisory Control and Data Acquisition; TPAD = Temperature-Phased Anaerobic Digester; UPS = Uninterruptible Power Supply; V = Volt; VFD = Variable Frequency Drive; EPSA = Effluent Pump Station Annex;

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



Major Assets Remaining Useful Life

| Asset | Building Roof | Electrical | Plumbing | HVAC | Structure/Seismic Risk | Elevator |
|-------------------------|---------------|------------|----------|------|------------------------|----------|
| Cart Building | 4 | N/A | N/A | N/A | TBD | |
| Maintenance Building | 2 | 2 | 3 | 5 | 5 | 2 |
| Operations Center Bldg. | 3 | 4 | 2 | 5 | 4 | 4 |

Asset RUL Legend:

- RUL <5 years
- RUL 5-10 years
- RUL 11-15 years
- RUL 16-20 years
- RUL >20 years

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

Key Issues

| Key Issues | Actions and Recommendations |
|--|--|
| <ul style="list-style-type: none"> Seismic Retrofits Needed – Recent Planning study (PS15-06) recommended seismic retrofits to several buildings. | <ul style="list-style-type: none"> Maintenance building will be retrofitted with seismic upgrades, existing Operation Center will be demolished after new Operations Complex is built via P2-138 |
| <ul style="list-style-type: none"> Aging Elevators - All elevators need to be modernized and ADA compliant. | <ul style="list-style-type: none"> As these elevators fail projects are being created to address modernization and upgrades as needed. Some buildings are being replaced by new buildings and therefore no upgrade/replacement is scheduled for those building. |
| <ul style="list-style-type: none"> Aging HVAC Units- HVAC units have shorter RUL due to coastal environment. | <ul style="list-style-type: none"> As units fail or reach the end of their useful life, projects are being created to replace these units. |
| <ul style="list-style-type: none"> Public Announcement System Failure - PA System Plantwide needs to be replaced as its outdated and not functional. | <ul style="list-style-type: none"> PS21-02 study is looking at alternatives to the existing PA system and will make recommendations for new modern systems that will meet the district needs. |

Current and Future Projects

| Project No. | Project Title | Impacted Facilities | Description of Work | FY21/22 | FY22/23 | FY23/24 | FY24/25 | FY25/26 | FY26/27 | FY27/28 | FY28/29 | FY29/30 | FY30/31 | FY31/32 | FY32/33 | FY33/34 | FY34/35 | FY35/36 |
|-------------|--|--|--|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| FE21-05 | Warehouse Stations and Demolition at Plant No. 2 | Warehouse Building | Demo Warehouse Building. Provide equipment storage for fleet services and warehouse laydown area. | | | | | | | | | | | | | | | |
| P2-138 | Operations and Maintenance Complex at Plant No. 2 | Operations and Maintenance Building | Construct new Operations Building and make improvements to existing Maintenance Building. | | | | | | | | | | | | | | | |
| PS21-02 | Fire and PA System Study at Plants 1 and 2 | Plantwide | Study to provide alternatives and recommend upgrading our existing fire and public announcement systems plantwide. | | | | | | | | | | | | | | | |
| SC22-01 | Plant 2 EPSA and 12KV Distribution Center H HVAC Replacement | EPSA Electrical Building and Distribution Center H | Replace HVAC systems on both building as they have reached the end of their useful life. | | | | | | | | | | | | | | | |
| PRN-0805 | Plant 2 Operations Center Emergency Power Back Up | Operations Center | Provide backup power to Operations Center. | | | | | | | | | | | | | | | |

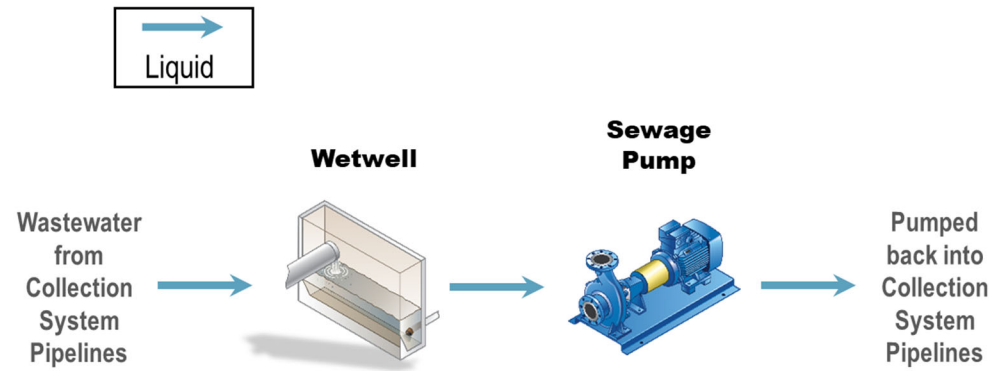
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|--|--|--|--|
| Types of Project Legend: | | | |
| ■ CIP - Planning | ■ CIP - Design | ■ CIP - Construction | ■ Maintenance Project |

Collection System Pump Station and Forcemain Asset Management Summaries

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ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – PUMP STATIONS

Process Schematic



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 | 4 | 2 | 3 | 3 | 5 | 5 | 5 | 5 | 1 | 4 | 3 | 3 | 3 | 1 |
| Structural | | | | | | | | | | | | | | | | |
| Pump Station | 4 | 4 | 3 | 4 | 1 | 4 | 3 | 4 | 5 | 2 | 4 | 3 | 4 | 2 | 4 | - |
| Wet Well | 3 | 3 | 4 | 1 | 5 | 3 | 4 | 4 | 3 | 4 | 3 | 4 | 4 | 3 | 3 | - |
| Mechanical | | | | | | | | | | | | | | | | |
| Pumps | 5 | 3 | 5 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 2 | 5 | 5 | 4 | 4 | - |
| 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 | 4 | 3 | 5 | 3 | 2 | - |
| Emergency Generator | - | - | 3 | 1 | - | 3 | - | - | - | 2 | 2 | 3 | - | 2 | - | - |
| Electrical | | | | | | | | | | | | | | | | |
| Motor Control Center | 2 | 2 | 4 | 1 | 1 | 4 | 4 | 3 | 4 | 3 | 2 | 3 | 5 | 2 | 4 | - |
| Variable Frequency Drive | 4 | 4 | 5 | 3 | 2 | - | - | 4 | 4 | 4 | 3 | 3 | 5 | 2 | - | - |
| Motors | 3 | 3 | 4 | 2 | 2 | 3 | 3 | 4 | 3 | 3 | 2 | 3 | 4 | 3 | 3 | - |
| Transformer | 2 | 2 | 4 | 1 | 1 | 4 | 4 | 3 | 4 | 2 | 2 | 2 | 4 | 2 | 3 | - |
| Instrumentation | | | | | | | | | | | | | | | | |
| Programmable Logic Controller | 1 | 1 | 4 | 2 | 2 | 2 | 3 | 5 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | - |
| Flowmeter | 3 | 3 | 1 | 2 | 1 | 4 | 4 | 2 | - | 4 | 2 | 3 | 4 | 3 | 3 | - |

Asset RUL Legend:

- RUL < 5 years
- RUL 5-10 years
- RUL 11-15 years
- RUL 16-20 years
- RUL > 20 years

Acronym Key:

RUL = Remaining Useful Life

| Pump Station | Major Assets – Quantities | | | | |
|---------------------|---------------------------|-----------|-------------|------------|----------------------------|
| | Wet Wells | Pumps | Force Mains | Valves | Emergency Generators (Y/N) |
| 15th Street | 1 | 3 | 2 | 22 | N |
| A Street | 1 | 3 | 2 | 19 | N |
| Bay Bridge | 1 | 5 | 2 | 17 | Y |
| Bitter Point | 1 | 5 | 2 | 23 | Y |
| College | 1 | 3 | 2 | 18 | N |
| Crystal Cove | 1 | 2 | 2 | 13 | Y |
| Edinger | 1 | 2 | 1 | 8 | N |
| Lido | 1 | 3 | 2 | 17 | N |
| MacArthur | 1 | 2 | 1 | 8 | N |
| Main Street | 2 | 10 | 3 | 38 | Y |
| Rocky Point | 1 | 4 | 2 | 18 | Y |
| Slater | 1 | 5 | 2 | 17 | Y |
| Seal Beach | 2 | 8 | 2 | 24 | N |
| Westside | 1 | 4 | 1 | 16 | Y |
| Yorba Linda | 1 | 3 | 1 | 11 | N |
| Newport Force Mains | -- | -- | 2 | -- | -- |
| Total | 17 | 62 | 29 | 269 | - |

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – PUMP STATIONS

| Key Issues | Actions and Recommendations |
|---|--|
| <p>Safety – Currently, four of OC San’s older pump stations do not have atmospheric monitoring (for hydrogen sulfide gases) or standard safety indication lighting. Also, pump station infrastructure is often located in the public right of way making safe access to these facilities an ongoing issue.</p> | <p>An ongoing planning study (PS18-06) is reviewing and interpreting electrical code and will establish OC San design standards to address this issue. Practicing ongoing safety measures and traffic control when working in the public right of way will continue to be of the utmost importance. In the meantime, efforts are being made to find interim solutions to address this issue until the project implements the permanent solutions.</p> |
| <p>Natural Phenomenon – Edinger pump station is located immediately adjacent to an undersized flood control channel. Crystal Cove pump station is experiencing gradual site settlement. Both natural hazards present a risk to normal operation of the pump stations.</p> | <p>A capital project (11-33) has been established to replace and relocate Edinger pump station. A future capital project (5-66) has been established to determine the necessary mitigation measures to remediate site settlement at Crystal Cove pump station.</p> |
| <p>Increased Methane Gas Levels – Methane gas accumulation has become a safety concern at some pump stations. The amount of gas seems to increase during summer months and presents a unique challenge because of the short response time necessary to address the safety concerns of increased ignition risk.</p> | <p>A CIP project (5-68), currently in bid and award phase, will address the ventilation issues that cause odorants to migrate to unwanted areas at the OC San Newport Beach pump stations including Bitter Point, Lido, Rocky Point, 15th Street, A Street, and Crystal Cove Pump Stations. The project will add ventilation and pressure relief dampers to the wet wells to prevent pressurization (positive and negative) and add odor scrubbing/polishing systems at the pump stations to treat the air released from the wet wells. Additionally, a chemical dosing station will be added at 15th Street Pump Station for downstream odor control. Finally, an operation strategy for venting the force main system will be established separately.</p> |
| <p>Corrosion – Corrosion is an ongoing problem in this very harsh environment. In places where the system has been kept from venting and mixing of wastewater is prevalent, such as wet wells, the degree of corrosion has (or will soon) require the replacement/rehabilitation of the assets.</p> | <p>Visual assessments of known corrosion issues are performed on an ongoing basis. When necessary, cameras are used to evaluate the spreading of corrosion impacts and confined space entry may be performed to gather additional information to determine when the facility needs to be rehabilitated. At College Pump Station, visual assessment found delaminated liner and soft concrete underneath the damage liner in the wet well; a planning study (PS20-07) was established to perform more detailed assessment of the wet well and provide rehabilitation or replacement recommendation. At Slater Pump Station, visual assessment found damaged T-lock liner in both West and East sides of the wet well; a repair has been scheduled to address the West side which has more significant damages, East side to follow. At A and 15th Street Pump Stations, visual assessment found bubbling liner and some soft concrete underneath damaged liner in the wet wells; cores were taken at A Street Pump Station to determine whether there are further damages to the structure, 15th Street Pump Station cores to follow.</p> |
| <p>Groundwater Intrusion – Groundwater has penetrated four of the newly constructed pump stations in the coastal region of the service area including 15th Street, A Street, Bitter Point and Rocky Point Pump Stations. Groundwater is notoriously corrosive and may compromise the strength of the rebar within the concrete structure walls.</p> | <p>Execute a planning study (XPS0065) to identify possible mitigation measures.</p> |
| <p>Maintenance Access – In some cases, such as venting of the Newport Beach force main system, access to critical facilities is limited by safety and public impact concerns. In other cases, such as MacArthur Pump Station force main, access to critical facilities is not possible because redundancy was not considered when the pump station was designed. In case of Slater Pump Station, the West and East wet wells are isolated by slide gates access via a 48” ID manhole; however, due the curvature of the manhole, installation of the slide gate is difficult which has resulted in staff injuries.</p> | <p>OC San continues to improve planned maintenance processes and inter-agency coordination that allow crews to minimize impacts to the community during necessary maintenance operations. A capital project (7-68) has been established to construct a redundant force main to serve MacArthur Pump Station. A small project (FRC-0017) will modify the wet well access at Slater Pump Station to provide a safer working environment for staff.</p> |
| <p>Valve Operability and Reliability – In many aging pump stations isolation valves, check valves and force main valves are starting to fail or becoming difficult to operate due to age, debris and corrosion. These valves are critical to the operability and reliability of OC San pump stations and will require replacement.</p> | <p>Multiple valve replacement projects have been identified and efforts are being made to prioritize these projects (FRC-0017, FRC-0018) so they can be executed in a timely manner to ensure OC San pump stations can continue to operate reliably.</p> |
| <p>Force Main Operability and Reliability – Force mains are some of OC San’s highest-risk assets. While these assets have been replaced and rehabilitated in a timely manner, there are many that are not yet inspected and analysis has relied on theoretical useful life. Accessing these assets to perform condition assessments is often a challenging endeavor. For example, the Lido pump station force mains have been partially inspected using CCTV in 2015 and then again in 2020; however, portions of the force mains, closer to the pump station, were not assessed because the camera was not able to maneuver over offsets in the piping. Another example is the Crystal Cove pump station force mains (spanning over 2,000 feet along Pacific Coast Highway (PCH)) with only one point of access at the end of the force mains in the middle of PCH; CCTV assessment was performed for approximately 600 feet on both force mains in 2015 and external assessment was performed on excavated pipe. Of the two Slater pump station force mains, the older forcemain (constructed in 1981) was assessed in 2015. The rest of the force mains conditions are unknown.</p> | <p>Lido pump station east force main experienced a failure in November 2022 during final production of this document. The failure occurred in the unlined section closer to the pump station. Once Lido pump station east force main is repaired, the West force main will be inspected. Plans are also underway to inspect Crystal Cove and Slater pump station force mains to validate the condition of these assets. Bay Bridge pump station force mains are also identified as one of the higher priority force mains to be assessed in the near future. Based on the pump station and force main layouts, it is anticipated that the majority of the force mains can be inspected without bypassing. Thus, it is planned to use Condition Assessment program resources along with Collections CCTV program resources to complete these efforts understanding that additional coordination with Operations, Maintenance, and execution may be required to complete these efforts. Any force mains inspections that can’t be executed with in-house resources will be added to a planning study (XPS0066) which shall consider ways to assess the force mains, perform condition assessment on these force mains and develop bypass plans for any of the force mains that require it.</p> |
| <p>Property Acquisition – Many of OC San pump stations are located in tight spaces with limited access. This present challenges for crew to perform routine maintenance or execute projects.</p> | <p>OC San continues to evaluate suitable sites to acquire properties for pump stations that will soon be rehabilitated or replaced, such as Slater and College pump stations.</p> |

Acronym Key: OC San=Orange County Sanitation District

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – PUMP STATIONS

Current and Future Projects

| Project No. | Location | Project Title | Impacted Facilities | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|------------------------------------|---|---|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 5-68 | Newport Beach | Newport Beach Pump Station Odor Control Improvements | 15th Street, A Street, Bitter Point, Crystal Cove, Lido and Rocky Point Pump Stations | <ul style="list-style-type: none"> Installation of venting equipment; phased implementation of chemical use | | | | | | | | | | | | | | | |
| 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 | <ul style="list-style-type: none"> Installation of standard portable generator connectors | | | | | | | | | | | | | | | |
| PS18-06 | Multiple | Go/No-Go Lights and Signage | 15th Street, A Street, Baybridge, Bitter Point, College, Crystal Cove, Edinger, Lido, MacArthur, Main Street, Rocky Point, Seal Beach, Slater, Westside and Yorba Linda Pump Stations | <ul style="list-style-type: none"> Standardize safety lights and signage | | | | | | | | | | | | | | | |
| FRC-0017 | Newport Beach and Huntington Beach | Valve Replacements at Slater, A, and 15th St. Pump Stations | 15th Street, A Street and Slater Pump Stations | <ul style="list-style-type: none"> Replacement of multiple valves at each station Modify wet well manhole access at Slater pump station | | | | | | | | | | | | | | | |
| XPS0065 | Newport Beach | Pump Station Groundwater Intrusion Study | 15th Street, A Street, Bitter Point and Rocky Point Pump Stations | <ul style="list-style-type: none"> Comprehensive study of groundwater management solutions | | | | | | | | | | | | | | | |
| XPS0066 | Multiple | Force Main Condition Assessment and Bypassing | 15th Street, A Street, Baybridge, Bitter Point, College, Crystal Cove, Rocky Point, Slater and Westside Pump Stations | <ul style="list-style-type: none"> Comprehensive study of pump station force mains condition and bypassing | | | | | | | | | | | | | | | |
| XPS0009 | Newport Beach | A Street and 15th Street Pump Station and Force Main Study | 15th Street and A Street Pump Stations | <ul style="list-style-type: none"> Comprehensive study of pump station condition | | | | | | | | | | | | | | | |
| X-022 | Newport Beach | 15th Street Pump Station and Force Main Project | 15th Street Pump Station | <ul style="list-style-type: none"> Comprehensive rehabilitation of pump station and force mains | | | | | | | | | | | | | | | |
| X-041 | Newport Beach | A Street Pump Station and Force Main Project | A Street Pump Station | <ul style="list-style-type: none"> Comprehensive rehabilitation of pump station and force mains | | | | | | | | | | | | | | | |
| 5-67 | Newport Beach | Bay Bridge Pump Station Replacement | Bay Bridge Pump Station | <ul style="list-style-type: none"> Comprehensive rehabilitation of pump station and force mains | | | | | | | | | | | | | | | |
| XPS0004 | Newport Beach | Bitter Point Pump Station Rehabilitation Study | Bitter Point Pump Station | <ul style="list-style-type: none"> Comprehensive study of pump station condition | | | | | | | | | | | | | | | |
| X-025 | Newport Beach | Bitter Point Pump Station Rehabilitation Project | Bitter Point Pump Station | <ul style="list-style-type: none"> Comprehensive rehabilitation of pump station | | | | | | | | | | | | | | | |
| PS20-07 | Costa Mesa | College Pump Station Wet Well Condition Assessment Study | College Pump Station | <ul style="list-style-type: none"> Perform detailed condition assessment of the pump station wet well and recommend repair strategy | | | | | | | | | | | | | | | |
| NEW | Costa Mesa | College Pump Station Wet Well Rehabilitation | College Pump Station | <ul style="list-style-type: none"> Rehabilitate the pump station wet well per PS20-07 recommendations | | | | | | | | | | | | | | | |

| Project No. | Location | Project Title | Impacted Facilities | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|------------------|--|--|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| XPS0010 | Costa Mesa | College Pump Station Rehabilitation Study | College Pump Station | <ul style="list-style-type: none"> Comprehensive study of pump station condition | | | | | | | | | | | | | | | |
| X-040 | Costa Mesa | College Pump Station Replacement and Force Main Rehabilitation | College Pump Station | <ul style="list-style-type: none"> Reconstruction of pump station Comprehensive rehabilitation of force mains | | | | | | | | | | | | | | | |
| 5-66 | Newport Beach | Crystal Cove Pump Station Upgrade and Rehabilitation Project | Crystal Cove Pump Station | <ul style="list-style-type: none"> Comprehensive rehabilitation of pump station | | | | | | | | | | | | | | | |
| FRC-0018 | Newport Beach | Valve Replacements at Lido and Crystal Cove Pump Stations | Crystal Cove Pump Station Lido Pump Station | <ul style="list-style-type: none"> Replacement of multiple valves in the valve pit at Crystal Cove Pump Station Replacement of multiple valves and reconfiguration of the wet well return piping at Lido Pump Station Reconfigure Lido Pump Station bathroom and replumb piping to bypass existing corroded vent pipe | | | | | | | | | | | | | | | |
| 11-33 | Huntington Beach | Edinger Pump Station Rehabilitation Project | Edinger Pump Station | <ul style="list-style-type: none"> New pump station located at Sunset Channel | | | | | | | | | | | | | | | |
| X-023 | Newport Beach | Lido Pump Station Rehabilitation Project | Lido Pump Station | <ul style="list-style-type: none"> Comprehensive rehabilitation of pump station | | | | | | | | | | | | | | | |
| XPS0017 | Newport Beach | Lido Pump Station Rehabilitation Study | Lido Pump Station | <ul style="list-style-type: none"> Comprehensive study of pump station condition | | | | | | | | | | | | | | | |
| 7-63 | Newport Beach | MacArthur Pump Station Rehabilitation Project | MacArthur Pump Station | <ul style="list-style-type: none"> Comprehensive rehabilitation of pump station | | | | | | | | | | | | | | | |
| 7-68 | Newport Beach | MacArthur Force Main Improvements | MacArthur Pump Station | <ul style="list-style-type: none"> Installation of second force main and rehabilitation of existing force main | | | | | | | | | | | | | | | |
| 7-65 | Irvine | Gisler-Redhill Interceptor Rehabilitation | Main Street Pump Station | <ul style="list-style-type: none"> Rehabilitation of pump station force mains and replacement of pump suction, discharge and check valves | | | | | | | | | | | | | | | |
| XPS0048 | Irvine | Main Street Pump Station Rehabilitation Study | Main Street Pump Station | <ul style="list-style-type: none"> Comprehensive study of pump station condition | | | | | | | | | | | | | | | |
| 7-64 | Irvine | Main Street Pump Station Rehabilitation Project | Main Street Pump Station | <ul style="list-style-type: none"> Comprehensive rehabilitation of pump station | | | | | | | | | | | | | | | |
| XPS0005 | Newport Beach | Rocky Point Pump Station Rehabilitation Study | Rocky Point Pump Station | <ul style="list-style-type: none"> Comprehensive study of pump station condition | | | | | | | | | | | | | | | |
| X-024 | Newport Beach | Rocky Point Pump Station Rehabilitation Project | Rocky Point Pump Station | <ul style="list-style-type: none"> Comprehensive rehabilitation of pump station | | | | | | | | | | | | | | | |
| 11-34 | Huntington Beach | Slater Pump Station Rehabilitation Project | Slater Pump Station | <ul style="list-style-type: none"> Comprehensive rehabilitation of pump station | | | | | | | | | | | | | | | |
| MP-207 | Huntington Beach | Slater Pump Station Link Seal Repair | Slater Pump Station | <ul style="list-style-type: none"> Replace leaking link seal | | | | | | | | | | | | | | | |
| 3-67 | Seal Beach | Seal Beach Pump Station Replacement | Seal Beach Pump Station | <ul style="list-style-type: none"> Reconstruction of pump station | | | | | | | | | | | | | | | |

| Project No. | Location | Project Title | Impacted Facilities | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|---------------------------|--|---|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| FE19-13 | Seal Beach | VFD Replacement at Seal Beach pump Station | Seal Beach Pump Station | <ul style="list-style-type: none"> Replacement of VFDs and feeders from the VFDs to the motors | | | | | | | | | | | | | | | |
| 3-62 | Seal Beach | Westminster Boulevard Force Main Replacement | Seal Beach Pump Station | <ul style="list-style-type: none"> Replacement of force mains, force main valves, and addition of bypass piping | | | | | | | | | | | | | | | |
| 2-73 | Fullerton and Yorba Linda | Yorba Linda Pumping Station Removal | Yorba Linda Pump Station Yorba Linda Spur Odor Station | <ul style="list-style-type: none"> Abandonment of pump station and force main Demolition of Yorba Linda Spur Odor Station | | | | | | | | | | | | | | | |

Types of Project Legend:

CIP - Planning
 CIP - Design
 CIP - Construction
 Maintenance Project

Acronym Key:

CIP=Capital Improvement Project; FY=Fiscal Year; N/A = Not Applicable; PM = Preventive Maintenance; OC San=Orange County Sanitation District; UPS = Uninterruptable Power Supply; VFD = Variable Frequency Drive

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Collection System Pipeline Asset Management Summaries

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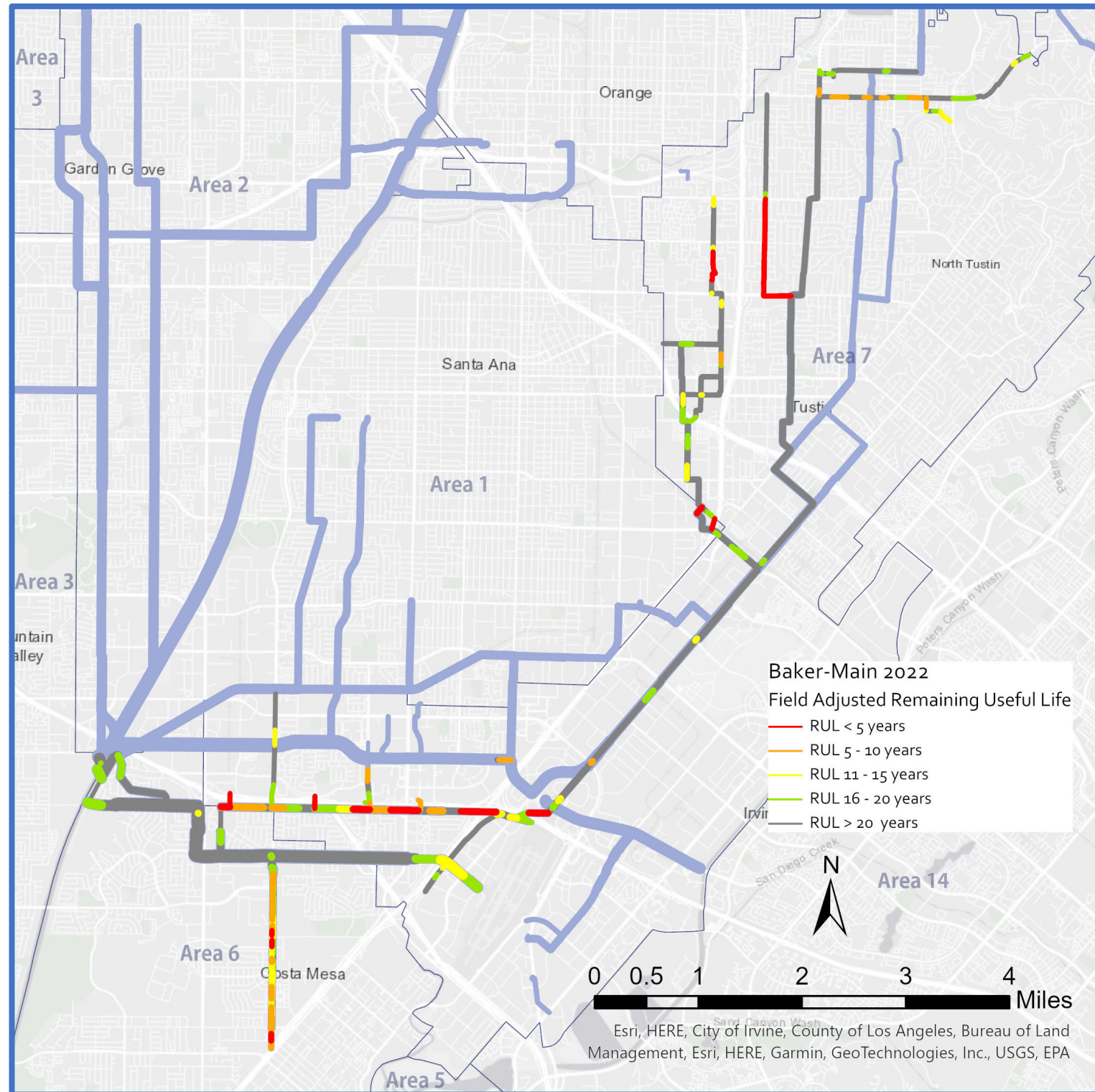
ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – ALL TRUNKS

Key Issues

| Key Issues | Actions & Recommendations |
|---|---|
| <ul style="list-style-type: none"> • Cleaning of Inverted Siphons and Large Diameter Pipelines – Large diameter pipe (> 42”) are not cleaned and CCTV footage does not identify sediment or debris below the waterline. OC San staff has identified potential risks in the large RCP Baker-Main Trunk sewers near the Santa Ana River, the 108” Bushard Trunk pipelines near Plant No. 2, the 84-inch Coast Trunk pipelines immediately upstream of Plant No. 2 headworks, the 54-inch Euclid Trunk pipelines immediately upstream of Plant No. 1 headworks and 48-inch pipelines in Fullerton, Miller-Holder Trunk pipelines downstream of the Wintersburg Channel inverted siphon, the Newhope Trunk connection to the Euclid Trunk near Plant No. 1, a northern branch of the SARI system, and upstream of the Talbert Trunk’s Santa Ana River inverted siphon. | <ul style="list-style-type: none"> • OC San staff reviewed sonar inspection data that identified the amount of debris in select large diameter pipelines and performed additional hydraulic analysis to recommend additional sonar inspections. Select large diameter pipelines are recommended for sonar inspection in the Baker-Main, Bushard, Coast, Euclid, Knott, Ellis Avenue, Miller-Holder, Newhope, SARI, Sunflower and Talbert Trunks are expected to be completed by Spring 2023. |
| <ul style="list-style-type: none"> • Condition Assessment of Inverted Siphons – Inverted siphons are regularly cleaned but are not inspected because they are typically inaccessible using CCTV equipment. High priority inspections have been identified for 2 single barrel VCP inverted siphons in Costa Mesa and Irvine, a dual barrel VCP inverted siphon in Cypress, 3 DIP air jumpers in Buena Park, a single barrel VCP inverted siphon in Fullerton, a dual barrel VCP inverted siphon in the Coast Highway Trunk, 3 inverted siphons in the SARI Trunk, and a dual barrel VCP inverted siphon in the Talbert Trunk based on theoretical RUL. | <ul style="list-style-type: none"> • OC San staff are reviewing all inverted siphon locations to determine which inspection methods are feasible and cost effective (i.e. hydraulic modeling to determine bypass or no bypass) to create a new condition assessment program. Given the potential complexity (i.e. bypassing, traffic control, etc.) for inverted siphon inspections, variety in inspection methods that may be required, and different asset priorities based on asset RUL, the condition assessment program would likely be phased into separate projects with similar work and priorities. |
| <ul style="list-style-type: none"> • Uninspected Gravity Pipelines – Seventy-eight (78) gravity sewers have never been inspected in the Collection system between the Coast, Knott, Newhope, Newport, SARI, and Sunflower trunk systems. There is no condition data for these reaches to determine field adjusted RUL. | <ul style="list-style-type: none"> • See key issue tables for the Coast, Knott, Newhope, Newport, SARI, and Sunflower trunk systems for more details. |
| <ul style="list-style-type: none"> • Manhole Access – OC San staff has 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. OC San staff has identified specific locations where manholes are difficult to access for maintenance, such as an easement area on Caltrans property near I-5 and SR-91, an easement area encroached upon by residents near the Wintersburg Channel in Huntington Beach, Crystal Cove, the southern portion of the Santa Ana River, Orange Park Acres, and North Tustin. | <ul style="list-style-type: none"> • OC San staff will track and prioritize access issues to address key concerns. High priority access improvements will be recommended as a small project or addition to an existing project. |
| <ul style="list-style-type: none"> • 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. For example, two (2) DIP gravity sewers in the Newhope Trunk system do not have protective linings and need to be monitored closely. | <ul style="list-style-type: none"> • It is recommended that the frequency of monitoring of pipelines with RUL scores of 4 or 5 be increased from every 5 years to every 2.5 years. |

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – BAKER-MAIN TRUNK

System Overview



Major Assets and Condition Information

| Asset Type | Total Length (miles) | # of Pipes | Average Age (years) | # of Pipes with RUL Score of 5 | # of Pipes with RUL Score of 4 |
|----------------------------|----------------------|------------|---------------------|--------------------------------|--------------------------------|
| Vitrified Clay | | | | | |
| ≤ 18" Ø | 18.8 | 341 | 54 | 32 | 24 |
| 21" - 33" Ø | 15.9 | 246 | 40 | 7 | 21 |
| Reinforced Concrete | | | | | |
| 48" - 66" Ø | 1.2 | 16 | 30 | - | - |
| ≥ 72" Ø | 3.7 | 34 | 28 | - | - |
| Ductile Iron | | | | | |
| 42" Ø | 0.5 | 2 | 31 | - | - |
| Polyvinyl Chloride | | | | | |
| 10" - 21" Ø | 0.04 | 2 | 20 | - | - |

Acronym Key:
Ø = Diameter; RUL = Remaining Useful Life

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – BAKER-MAIN TRUNK

Key Issues

| Key Issues | Actions & Recommendations |
|--|--|
| <ul style="list-style-type: none"> Capacity – The Collections Capacity Evaluation Study completed in 2019 conducted a detailed capacity analysis to identify the location of capacity deficiencies during dry and peak wet weather flows. During peak wet weather flows, capacity issues were identified in a portion of the North Trunk and Tustin Avenue sewers. | <ul style="list-style-type: none"> Project 7-69 will upsize a portion of the North Trunk and Project X-084 will upsize a portion of the Tustin Avenue sewer to address existing capacity issues. |
| <ul style="list-style-type: none"> Pipeline Fracturing – CCTV identified several areas with significant fracturing of VCP pipelines. The largest concentration of fractures is concentrated in the Fairview Trunk. | <ul style="list-style-type: none"> Project 6-20 will rehabilitate the entire Fairview Trunk to address pipeline fractures. Projects 7-65, and X-068 will also address fracturing with rehabilitation work. OC San staff will validate the creation of the Bear Street and Flower Street Sub-Trunk Repairs and West Trunk and West Relief Trunk Rehabilitation projects to address sags and other major fractures. 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 point repairs together for 7-pack task orders. |
| <ul style="list-style-type: none"> Groundwater Infiltration – CCTV identified significant areas experience significant groundwater infiltration, primarily concentrated parallel to the I-405 corridor. | <ul style="list-style-type: none"> Project 7-65 will address the majority of areas with significant groundwater infiltration. Four (4) other pipelines with severe infiltration that were not included in CIP projects are suitable for chemical grouting. OC San staff are developing the scope of work for a new blanket contract for chemical grouting. |
| <ul style="list-style-type: none"> Root Intrusion – CCTV identified significant root intrusion in numerous segments of the sewer trunks in Orange and Tustin. Some blockages in OC San sewer mains may have contributed to a local sanitary sewer overflow in 2021. | <ul style="list-style-type: none"> OC San staff are in the process of selecting a Contractor for a new blanket contract for root treatment. In the future, Project X-068 will address the permanent rehabilitation of pipeline segments damaged by root intrusion. |
| <ul style="list-style-type: none"> Missing Air Jumpers – One (1) out of 10 inverted siphon / reduction locations in the Baker-Main Trunk system do not have air jumpers. | <ul style="list-style-type: none"> OC San staff to evaluate if new air jumper construction to be added to existing or future project. |

Current and Future Projects

| Project No. | Project Title | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|---|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 7-65 | Gisler-Redhill Interceptor Rehabilitation | <ul style="list-style-type: none"> Rehabilitation of sewer facilities in the City of Costa Mesa | | | | | | | | | | | | | | | |
| 6-20 | Fairview Trunk Sewer Rehabilitation | <ul style="list-style-type: none"> Rehabilitation of sewer facilities in the City of Costa Mesa | | | | | | | | | | | | | | | |
| 7-69 | North Trunk Improvements | <ul style="list-style-type: none"> Upsizing of pipe segments to increase capacity in the City of Tustin | | | | | | | | | | | | | | | |
| X-068 | North Trunk / Panorama Heights / Tustin-Orange Rehabilitation | <ul style="list-style-type: none"> Rehabilitation of sewer facilities in the City of Orange | | | | | | | | | | | | | | | |
| X-084 | Tustin Avenue Sewer Improvements | <ul style="list-style-type: none"> Upsizing of pipe segments to increase capacity in the City of Santa Ana | | | | | | | | | | | | | | | |

Types of Project Legend:

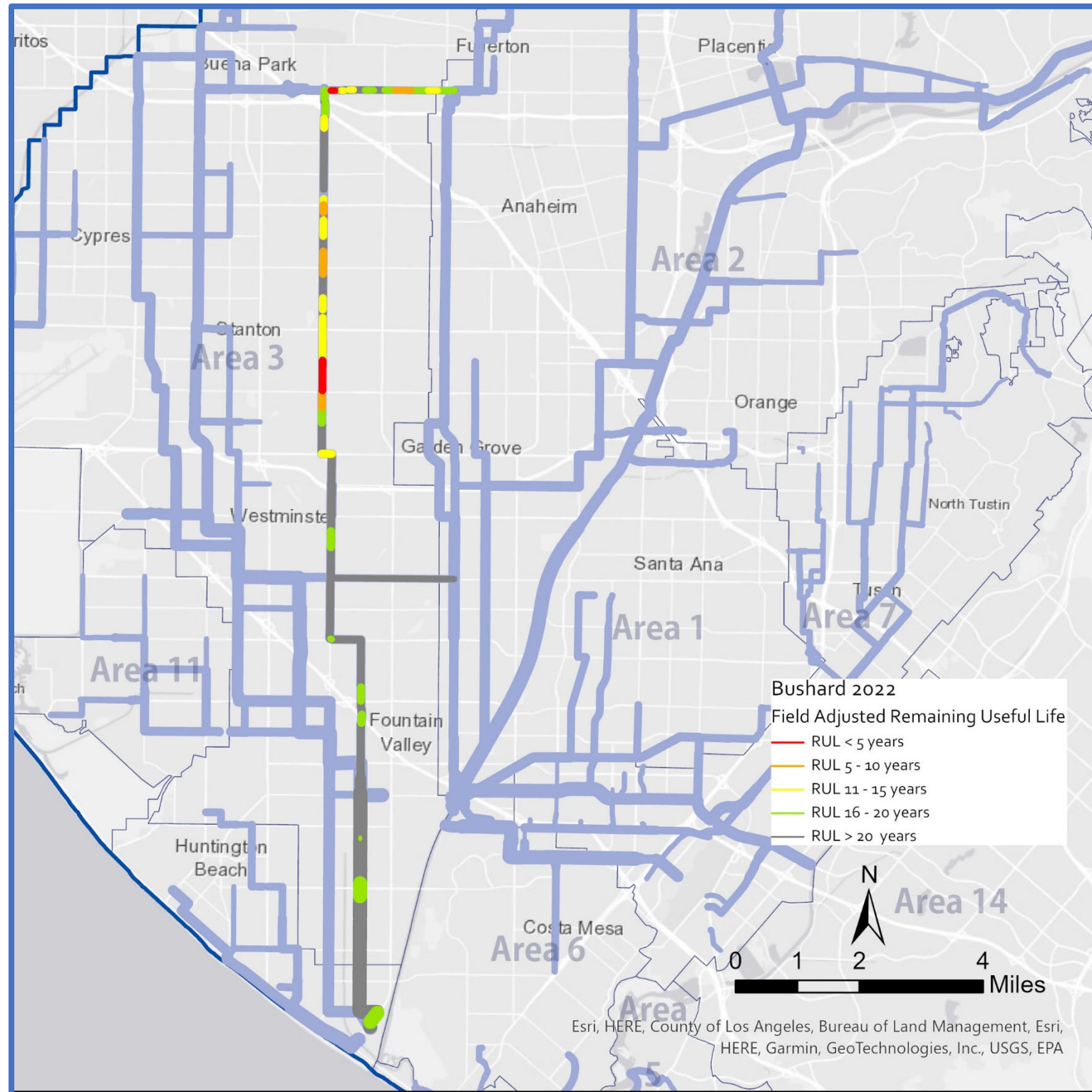
- CIP - Planning
- CIP - Design
- CIP - Construction
- Maintenance Project

Acronym Key:

CCTV = Closed-Circuit Television; CIP = Capital Improvement Program; FY = Fiscal Year; I-405 = Interstate 405; OC San = Orange County Sanitation District; RCB = Reinforced Concrete Box; RUL = Remaining Useful Life; VCP = Vitrified Clay Pipe

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – BUSHARD TRUNK

System Overview



Major Assets and Condition Information

| Asset Type | Total Length (miles) | # of Pipes | Average Age (years) | # of Pipes with RUL Score of 5 | # of Pipes with RUL Score of 4 |
|---|----------------------|------------|---------------------|--------------------------------|--------------------------------|
| Vitrified Clay | | | | | |
| ≤ 18" Ø | 0.03 | 3 | 38 | - | - |
| 24" - 27" Ø | 5.1 | 73 | 50 | 1 | 2 |
| 39" Ø | 4.6 | 29 | 53 | 3 | 4 |
| Reinforced Concrete | | | | | |
| ≤ 48" Ø | 2.5 | 19 | 54 | - | 1 |
| 60" - 66" Ø | 0.2 | 7 | 20 | - | - |
| ≥ 72" Ø | 4.5 | 33 | 22 | - | - |
| Fiberglass | | | | | |
| 36" - 42" Ø | 4.4 | 26 | 56 | - | - |
| 48" Ø | 0.3 | 1 | 72 | - | - |
| High-Density Polyethylene (HDPE) | | | | | |
| 22" Ø | 0.1 | 2 | 24 | - | - |
| Polyvinyl Chloride | | | | | |
| ≤ 16" Ø | 0.2 | 6 | 18 | - | - |
| 24" Ø | 0.1 | 2 | 20 | - | - |
| Steel | | | | | |
| 12" Ø | 0.04 | 3 | 13 | - | - |
| 26" Ø | 0.02 | 1 | 13 | - | - |

Acronym Key:

Ø = Diameter; HDPE = High-Density Polyethylene Resin; RUL = Remaining Useful Life

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – BUSHARD TRUNK

Key Issues

| Key Issues | Actions & Recommendations |
|--|--|
| <ul style="list-style-type: none"> Pipeline Fracturing – CCTV identified an area with significant fracturing of VCP pipelines primarily in Magnolia Street and Orangethorpe Avenue in the cities of Anaheim, Garden Grove, Fullerton, and Stanton. | <ul style="list-style-type: none"> OC San staff will validate the creation of the Magnolia Street Trunk Rehabilitation and Orangethorpe Avenue Trunk Rehabilitation projects to address all of the major fractures by rehabilitating the pipelines. |
| <ul style="list-style-type: none"> Groundwater Infiltration – CCTV identified one are experiencing significant groundwater infiltration in Garden Grove. | <ul style="list-style-type: none"> OC San staff will validate the creation of the Magnolia Street Trunk Rehabilitation project which includes addressing the one pipeline with significant groundwater infiltration. |
| <ul style="list-style-type: none"> Improperly Abandoned Manhole Under I-5 – In 2017 CCTV discovered a manhole in the Magnolia Street sewer that had a partially abandoned manhole underneath the I-5 travel lanes. Subsequent investigations in 2022 confirmed the manhole structure had significant liner delamination and aggregate visible. | <ul style="list-style-type: none"> Project FRC-0014 will complete the abandonment of the manhole under I-5. |
| <ul style="list-style-type: none"> Bushard Diversion Box – Due to corrosion and ragging issues, the Bushard Diversion Box is not able to operate as originally intended. | <ul style="list-style-type: none"> MP-307 will provide short-term repairs to this box. Future improvements that are included in project X-096. |
| <ul style="list-style-type: none"> Missing Air Jumpers – One (1) out of 8 inverted siphon / reduction locations in the Bushard Trunk system do not have air jumpers. | <ul style="list-style-type: none"> OC San staff to evaluate if new air jumper construction to be added to existing or future project. |

Current and Future Projects

| Project No. | Project Title | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|---|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| MP-307 | Bushard Diversion Structure Repair | <ul style="list-style-type: none"> Repair of structural assets and replacement of electrical, instrumentation, and control components. | | | | | | | | | | | | | | | |
| FRC-0014 | Magnolia Sewer Manhole Abandonment at I-5 | <ul style="list-style-type: none"> Complete abandonment of manhole under I-5. | | | | | | | | | | | | | | | |
| X-096 | Bushard Diversion Structure Improvements | <ul style="list-style-type: none"> Replacement of mechanical equipment. | | | | | | | | | | | | | | | |

Types of Project Legend:

CIP - Planning
 CIP - Design
 CIP - Construction
 Maintenance Project

Acronym Key:

CCTV = Closed-Circuit Television; FY = Fiscal Year; I-5 = Interstate 5; OC San = Orange County Sanitation District; RUL = Remaining Useful Life; SR-91 = State Route 91; VCP = Vitrified Clay Pipe

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – COAST TRUNK

System Overview



Major Assets and Condition Information

| Asset Type | Total Length (miles) | # of Pipes | Average Age (years) | # of Pipes with RUL Score of 5 | # of Pipes with RUL Score of 4 |
|----------------------------|----------------------|------------|---------------------|--------------------------------|--------------------------------|
| Vitrified Clay | | | | | |
| ≤ 18" Ø | 2.1 | 32 | 63 | 7 | 9 |
| 21" - 36" Ø | 4.4 | 58 | 61 | - | - |
| Reinforced Concrete | | | | | |
| 48" - 54" Ø | 3.3 | 44 | 40 | - | - |
| ≥ 72" Ø | 1.7 | 14 | 37 | - | - |

Acronym Key:

Ø = Diameter; RUL = Remaining Useful Life

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – COAST TRUNK

Key Issues

| Key Issues | Actions & Recommendations |
|---|--|
| <ul style="list-style-type: none"> Pipeline Fracturing – CCTV identified an area with significant fracturing of VCP pipelines primarily in Lake Street and Atlanta Avenue. | <ul style="list-style-type: none"> Project X-126 will address all of the major fractures by rehabilitating the pipelines. |
| <ul style="list-style-type: none"> Root Intrusion – CCTV identified 2 pipelines experiencing significant root intrusion all located in Lake Street. | <ul style="list-style-type: none"> OC San staff are in the process of selecting a Contractor for a new blanket contract for root treatment. The NTP is expected prior to the end of 2022. In the future, Project X-126 includes the rehabilitation of all of these pipelines. |
| <ul style="list-style-type: none"> Uninspected Gravity Pipelines – Two (2) gravity sewers within Plant No. 2 have never been inspected in the Coast Trunk system. There is no condition data for these reaches to determine field adjusted RUL. | <ul style="list-style-type: none"> There are no known access issues for the 2 uninspected gravity sewers. Inspections will be completed via future CCTV PM work orders or separate CCTV work orders. |

Current and Future Projects

| Project No. | Project Title | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|--|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| X-126 | Lake Avenue and Atlanta Interceptor Rehabilitation | <ul style="list-style-type: none"> Rehabilitation of sewer facilities in the City of Huntington Beach | | | | | | | | | | | | | | | |

Types of Project Legend:

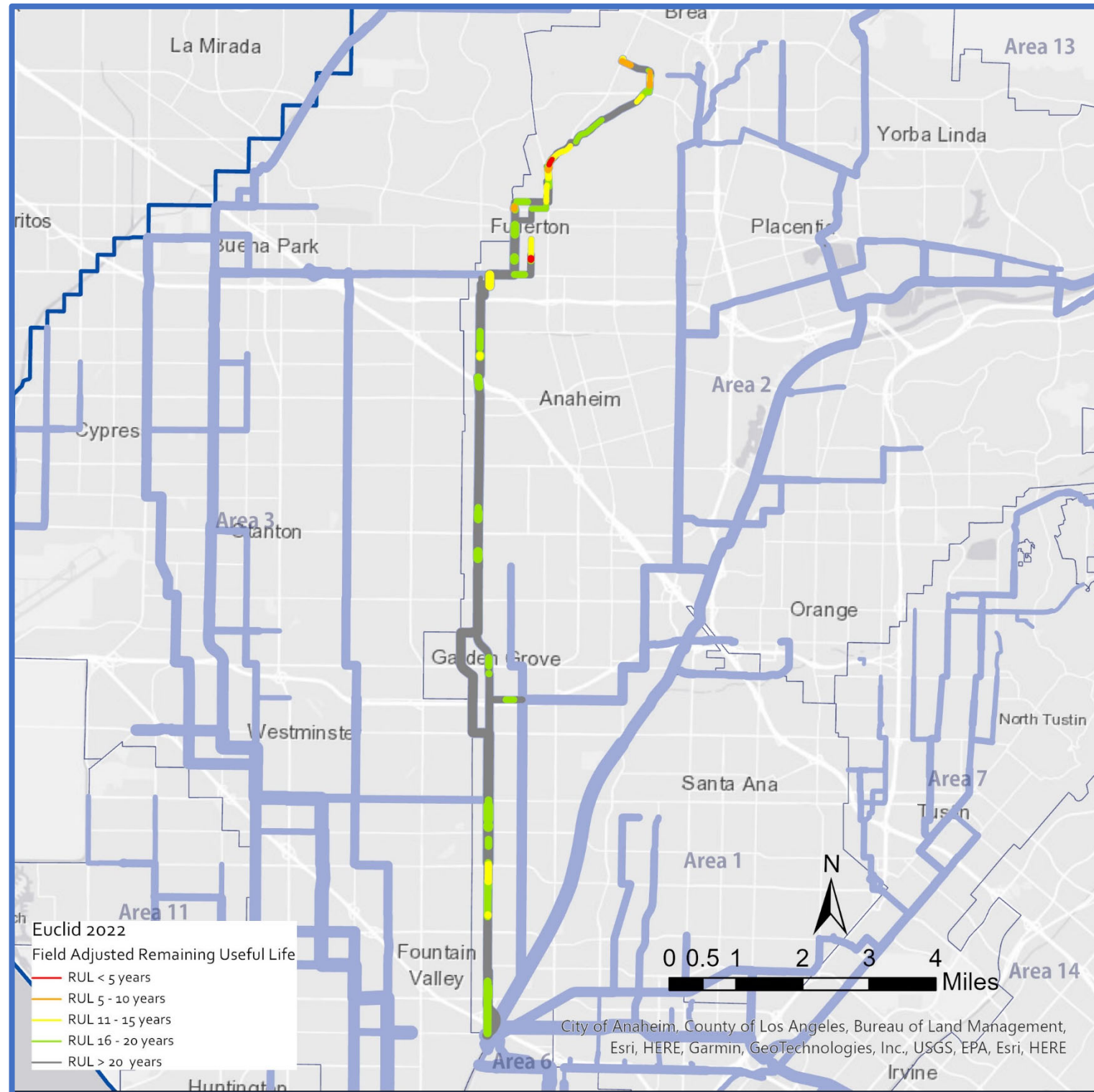
CIP - Planning
 CIP - Design
 CIP - Construction
 Maintenance Project

Acronym Key:

CCTV = Closed-Circuit Television; FY = Fiscal Year; OC San = Orange County Sanitation District; NTP = Notice to Proceed; RUL = Remaining Useful Life; VCP = Vitrified Clay Pipe

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – EUCLID TRUNK

System Overview



Major Assets and Condition Information

| Asset Type | Total Length (miles) | # of Pipes | Average Age (years) | # of Pipes with RUL Score of 5 | # of Pipes with RUL Score of 4 |
|----------------------------------|----------------------|------------|---------------------|--------------------------------|--------------------------------|
| Vitrified Clay | | | | | |
| ≤ 18" Ø | 4.4 | 79 | 59 | 1 | 2 |
| 21" - 27" Ø | 3.9 | 52 | 39 | - | 2 |
| ≥ 30" Ø | 12.1 | 151 | 50 | 1 | 2 |
| Reinforced Concrete | | | | | |
| ≤ 42" Ø | 2.4 | 15 | 50 | - | - |
| 45" - 60" Ø | 11.6 | 131 | 33 | - | - |
| Polyvinyl Chloride | | | | | |
| ≤ 18" Ø | 0.05 | 5 | 23 | - | - |
| 24" - 30" Ø | 0.1 | 7 | 13 | - | - |
| Steel | | | | | |
| 10" Ø | 0.01 | 3 | 13 | - | - |
| High-Density Polyethylene | | | | | |
| 26" Ø | 0.05 | 1 | 13 | - | - |

Acronym Key:

Ø = Diameter; RUL = Remaining Useful Life

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – EUCLID TRUNK

Key Issues

| Key Issues | Actions & Recommendations |
|---|--|
| <ul style="list-style-type: none"> Pipeline Fracturing – CCTV identified an area with significant fracturing of VCP pipelines in the vicinity of Coyote Hills and northern Fullerton. | <ul style="list-style-type: none"> Project X2-79 will address all of the major fractures by rehabilitating the pipelines. |

Current and Future Projects

| Project No. | Project Title | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|---|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| X2-79 | Fullerton-Brea Interceptor and Rolling Hills Drive Sub-Trunk Rehabilitation | <ul style="list-style-type: none"> Rehabilitation of sewer facilities in the City of Fullerton. | | | | | | | | | | | | | | | |

Types of Project Legend:

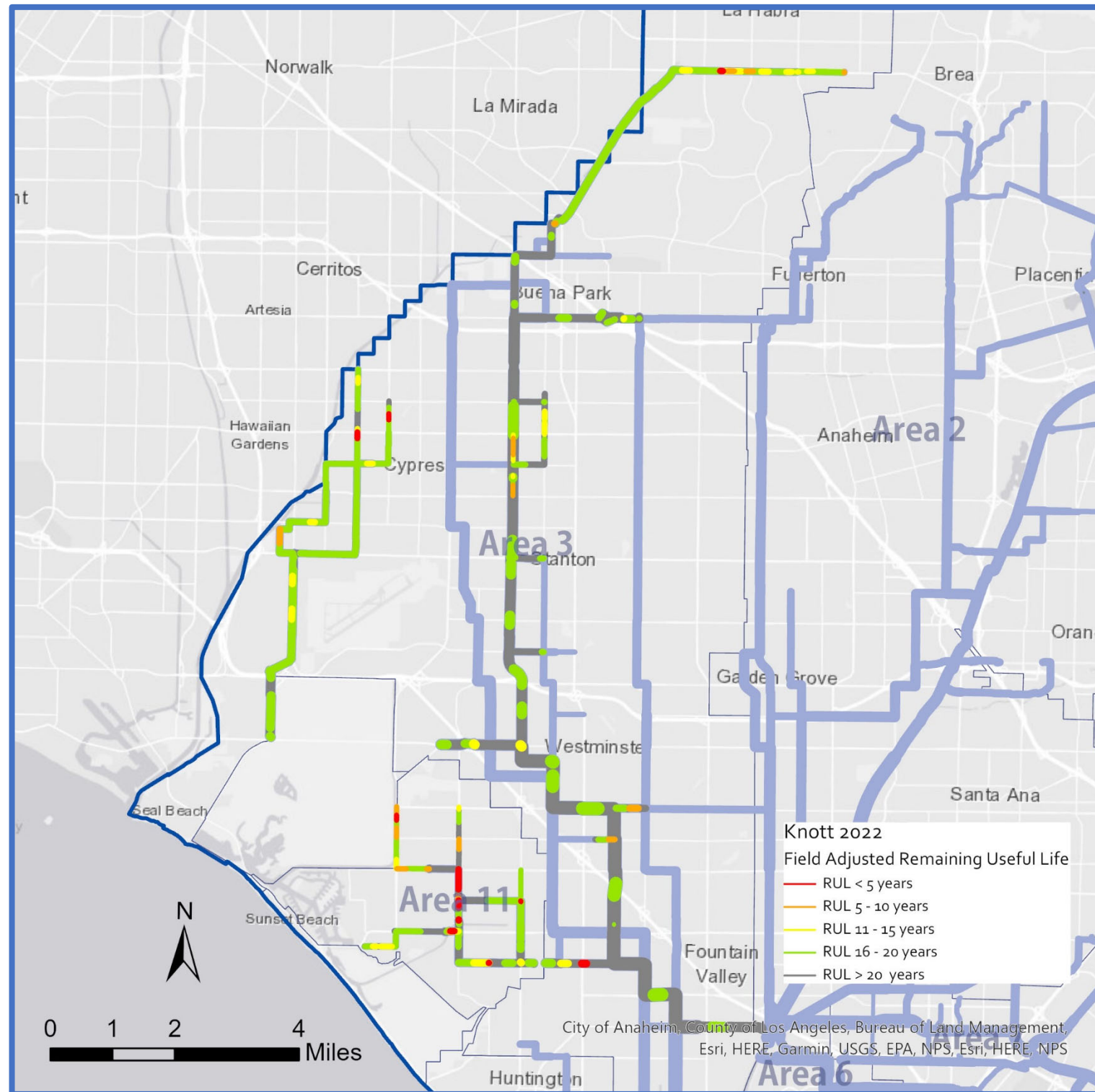
CIP - Planning
 CIP - Design
 CIP - Construction
 Maintenance Project

Acronym Key:

CCTV = Closed-Circuit Television; FY = Fiscal Year; OC San = Orange County Sanitation District; RUL = Remaining Useful Life; VCP = Vitrified Clay Pipe

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – KNOTT TRUNK

System Overview



Major Assets and Condition Information

| Asset Type | Total Length (miles) | # of Pipes | Average Age (years) | # of Pipes with RUL Score of 5 | # of Pipes with RUL Score of 4 |
|----------------------------------|----------------------|------------|---------------------|--------------------------------|--------------------------------|
| Vitrified Clay | | | | | |
| ≤ 18" Ø | 9.1 | 130 | 54 | 3 | 17 |
| 21" - 27" Ø | 20.5 | 300 | 50 | 5 | 6 |
| ≥ 30" Ø | 17.1 | 221 | 42 | 1 | 1 |
| Reinforced Concrete | | | | | |
| ≤ 42" Ø | 2.0 | 21 | 35 | - | - |
| 45" - 66" Ø | 7.7 | 71 | 45 | - | - |
| ≥ 72" Ø | 9.6 | 68 | 48 | - | - |
| Polyvinyl Chloride | | | | | |
| ≤ 18" Ø | 1.2 | 17 | 17 | - | - |
| High-Density Polyethylene | | | | | |
| 18" Ø | 0.01 | 2 | 9 | - | - |
| 24" - 32" Ø | 0.03 | 3 | 13 | - | - |
| Fiberglass | | | | | |
| 16" - 24" Ø | 0.1 | 2 | 13 | - | - |
| 66" - 78" Ø | 1.1 | 8 | 15 | - | - |
| Ductile Iron | | | | | |
| 20" Ø | 0.02 | 1 | 63 | - | - |
| Steel | | | | | |
| 4" Ø | 0.02 | 1 | 13 | - | - |
| Unknown | | | | | |
| 18" Ø | 0.01 | 2 | 64 | - | - |

Acronym Key:
Ø = Diameter; RUL = Remaining Useful Life

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – KNOTT TRUNK

Key Issues

| Key Issues | Actions & Recommendations |
|---|---|
| <ul style="list-style-type: none"> Groundwater Infiltration – CCTV identified areas experiencing significant groundwater infiltration, primarily concentrated in the western regional trunk sewers. | <ul style="list-style-type: none"> Projects 3-64A, B, and C, X-061, and X-071 will address the majority of areas with significant groundwater infiltration. Two (2) severe and isolated locations are suitable for chemical grouting. OC San staff are developing the scope of work for a new blanket contract for chemical grouting. One (1) severe and isolated location is co-located with fractures and therefore has been identified as a high priority point repair. OC San staff are in the process of grouping point repairs together for 7-pack task orders. Additional areas with groundwater infiltration do not have any other defects and are lower priority. |
| <ul style="list-style-type: none"> Pipeline Fracturing – CCTV identified several areas with significant fracturing of VCP pipelines. Most fractures are concentrated in northern Huntington Beach, Cypress, La Habra in Imperial Highway, and with small diameter sewers owned and operated by the City of Anaheim in the northern central area of the trunk. | <ul style="list-style-type: none"> Projects 3-60, 3-64B and C, X-061, and X-071 will address the majority of fractures. OC San staff will coordinate with the City of Anaheim pertaining to operation and maintenance of the local small diameter sewers. 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 point repairs together for 7-pack task orders. |
| <ul style="list-style-type: none"> Root Intrusion – CCTV identified 3 pipelines experiencing significant root intrusion, all located in northern Huntington Beach. A blockage occurred in one of the pipe segments in January 2022. | <ul style="list-style-type: none"> OC San staff are in the process of selecting a Contractor for a new blanket contract for root treatment. The NTP is expected prior to the end of 2022. In the future, Project X-071 includes the rehabilitation of all of these pipelines. |
| <ul style="list-style-type: none"> Vault Vibration Issues – Three sewer vaults in Warner Avenue cause local vibration / resonance issues to nearby residences when cars pass over them. | <ul style="list-style-type: none"> Project FRC-0010 will rehabilitate each of the Warner Avenue vaults to eliminate local vibration/resonance issues. |
| <ul style="list-style-type: none"> Missing Air Jumpers – Four (4) out of 17 inverted siphon / reduction locations in the Knott Trunk system do not have air jumpers. | <ul style="list-style-type: none"> OC San staff to evaluate if new air jumper construction to be added to existing or future project(s). |
| <ul style="list-style-type: none"> Uninspected Gravity Pipelines – Three (3) gravity sewers have never been inspected in the Knott and Ellis Avenue Trunk systems. There is no condition data for these reaches to determine field adjusted RUL. | <ul style="list-style-type: none"> There are no known access issues for the 3 uninspected gravity sewers. Inspections will be completed via future CCTV PM work orders or separate CCTV work orders. |

Current and Future Projects

| Project No. | Project Title | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|---|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| FRC-0012 | Springdale-Relief Concrete Encasement Extension at Wintersburg Channel | <ul style="list-style-type: none"> Extend encasement of sewer pipeline in City of Huntington Beach. | | | | | | | | | | | | | | | |
| 3-64A&B | Orange Western Sub-Trunk Rehabilitation & Los Alamitos Trunk Sewer Rehabilitation | <ul style="list-style-type: none"> Rehabilitate sewer facilities in the cities of Anaheim, Buena Park, Cypress, Los Alamitos, Seal Beach, and the community of Rossmoor. | | | | | | | | | | | | | | | |
| FRC-0010 | Warner Avenue Vault Cover Improvements | <ul style="list-style-type: none"> Rehabilitation of sewer vaults in the City of Huntington Beach. | | | | | | | | | | | | | | | |
| FE21-06 | Chemical Dosing Station Installation at Westside Pump Station | <ul style="list-style-type: none"> Install odor control chemical dosing facility in the community of Rossmoor. | | | | | | | | | | | | | | | |
| 3-64C | Cypress Trunk Sewer Rehabilitation - West | <ul style="list-style-type: none"> Rehabilitate sewer facilities in the cities of Cypress, La Palma and Los Alamitos. | | | | | | | | | | | | | | | |
| 3-60 | Knott / Miller-Holder / Artesia Branch Rehabilitation | <ul style="list-style-type: none"> Rehabilitation of sewer facilities in the cities of Buena Park and La Palma. | | | | | | | | | | | | | | | |
| X-071 | Bolsa Chica/Edinger/Springdale Rehabilitation | <ul style="list-style-type: none"> Rehabilitation of sewer facilities in the City of Huntington Beach. | | | | | | | | | | | | | | | |
| 3-68 | Los Alamitos Sub-Trunk Extension | <ul style="list-style-type: none"> Extension of the Los Alamitos Sub-Trunk to facilitate abandonment of Westside Pump Station. | | | | | | | | | | | | | | | |
| X-061 | Imperial Relief Interceptor/Miller-Holder Trunk Rehabilitation | <ul style="list-style-type: none"> Rehabilitation of sewer facilities in the City of La Habra. | | | | | | | | | | | | | | | |

Types of Project Legend:

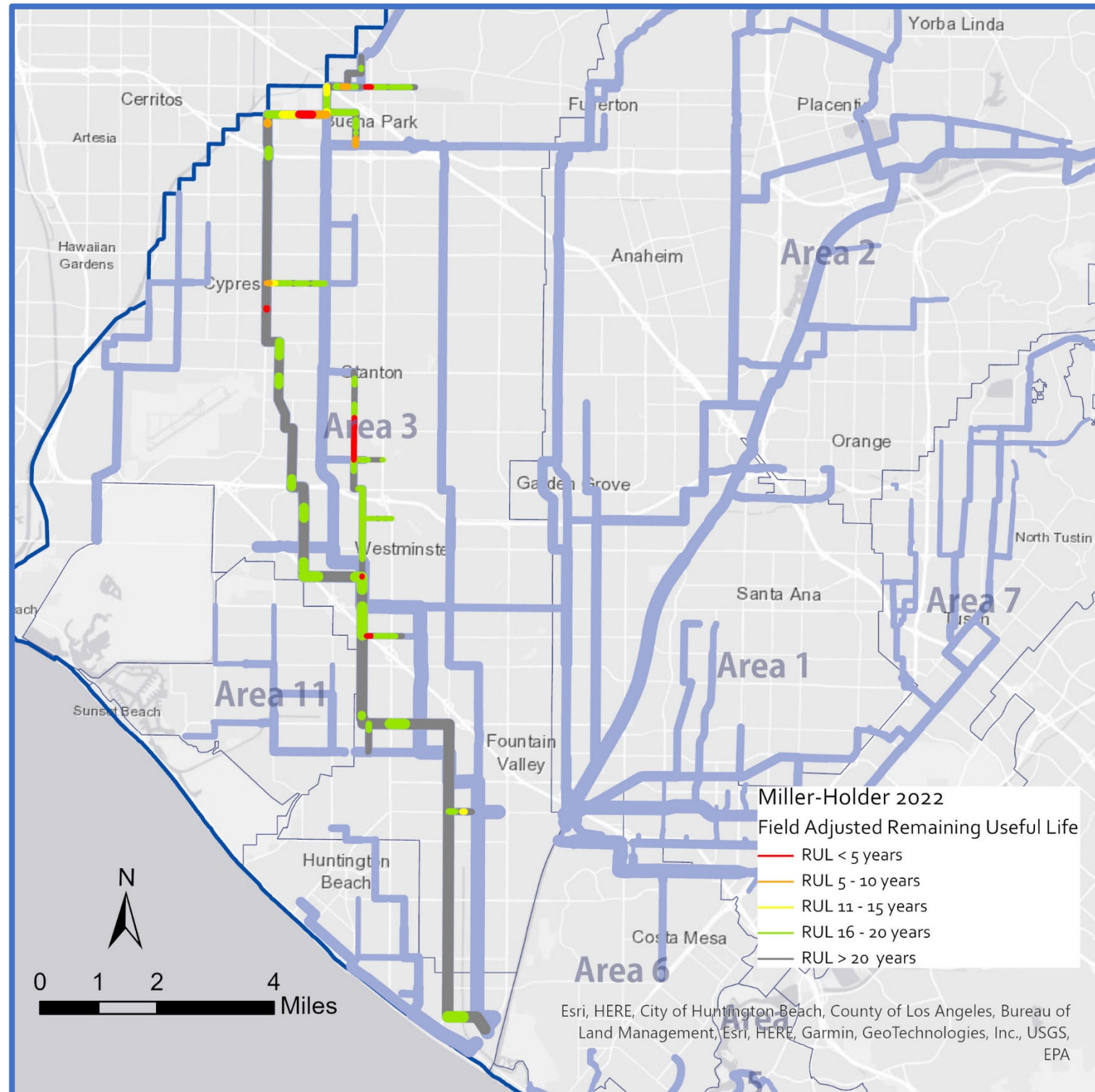
- CIP - Planning
- CIP - Design
- CIP - Construction
- Maintenance Project

Acronym Key:

CCTV = Closed-Circuit Television; FY = Fiscal Year; OC San = Orange County Sanitation District; NTP = Notice to Proceed; RUL = Remaining Useful Life; VCP = Vitrified Clay Pipe

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – MILLER-HOLDER TRUNK

System Overview



Major Assets and Condition Information

| Asset Type | Total Length (miles) | # of Pipes | Average Age (years) | # of Pipes with RUL Score of 5 | # of Pipes with RUL Score of 4 |
|----------------------------|----------------------|------------|---------------------|--------------------------------|--------------------------------|
| Vitrified Clay | | | | | |
| ≤ 18" Ø | 2.9 | 50 | 62 | 3 | 1 |
| 21" - 27" Ø | 6.9 | 87 | 61 | 10 | 2 |
| ≥ 30" Ø | 2.5 | 27 | 58 | 2 | 2 |
| Reinforced Concrete | | | | | |
| 45" - 69" Ø | 13.4 | 76 | 63 | - | 1 |
| ≥ 72" Ø | 5.8 | 25 | 72 | - | - |
| Ductile Iron | | | | | |
| ≤ 18" Ø | 0.1 | 5 | 40 | - | 3 |
| Polyvinyl Chloride | | | | | |
| 24" Ø | 0.02 | 1 | 20 | - | - |

Acronym Key:
Ø = Diameter; RUL = Remaining Useful Life

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – MILLER-HOLDER TRUNK

Key Issues

| Key Issues | Actions & Recommendations |
|---|---|
| <ul style="list-style-type: none"> Capacity – The Collections Capacity Evaluation Study completed in 2019 conducted a detailed capacity analysis to identify the location of capacity deficiencies during dry and peak wet weather flows. During existing peak wet weather flows, capacity issues were identified in a portion of the Hoover-Western Sub-Trunk. | <ul style="list-style-type: none"> Project X-085 includes upsizing a portion of the Hoover-Western Sub-Trunk to address existing capacity issues. |
| <ul style="list-style-type: none"> Pipeline Fracturing – CCTV identified several areas with significant fracturing of VCP pipelines. Most fractures are concentrated in Buena Park and Westminster. | <ul style="list-style-type: none"> Projects 3-60 and X-085 will address some of the fracturing issues. OC San staff will validate the creation of the Hoover-Western Sub-Trunk Repair at I-405 project to address fractures and a sag under I-405. 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 point repairs together for 7-pack task orders. |
| <ul style="list-style-type: none"> Groundwater Infiltration – CCTV identified areas experiencing significant groundwater infiltration, primarily concentrated in Buena Park, Garden Grove, and Westminster. | <ul style="list-style-type: none"> Projects 3-60, 3-64A, and X-085 will address about half of the areas with significant groundwater infiltration. One (1) severe and isolated location is suitable for chemical grouting. OC San staff are developing the scope of work for a new blanket contract for chemical grouting. Additional areas with groundwater infiltration do not have any other defects and are lower priority. |
| <ul style="list-style-type: none"> Missing Air Jumpers – Two (2) out of 5 inverted siphon / reduction locations in the Miller-Holder Trunk system do not have air jumpers. | <ul style="list-style-type: none"> Project 3-60 includes constructing a new air jumper at 1 location. Final location under evaluation to be added to existing or future project. |

Current and Future Projects

| Project No. | Project Title | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|---|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 3-64A&B | Orange Western Sub-Trunk Rehabilitation & Los Alamitos Trunk Sewer Rehabilitation | <ul style="list-style-type: none"> Rehabilitate sewer facilities in the cities of Anaheim, Buena Park, Cypress, Los Alamitos, Seal Beach, and the community of Rossmoor | | | | | | | | | | | | | | | |
| 3-60 | Knott / Miller-Holder / Artesia Branch Rehabilitation | <ul style="list-style-type: none"> Rehabilitation of sewer facilities in the cities of Buena Park and La Palma | | | | | | | | | | | | | | | |
| X-085 | Hoover-Western Sub-Trunk/Lampson Branch Improvements | <ul style="list-style-type: none"> Upsizing of sewer segments to increase capacity and rehabilitation of sewer facilities in the cities of Westminster and Garden Grove | | | | | | | | | | | | | | | |

Types of Project Legend:

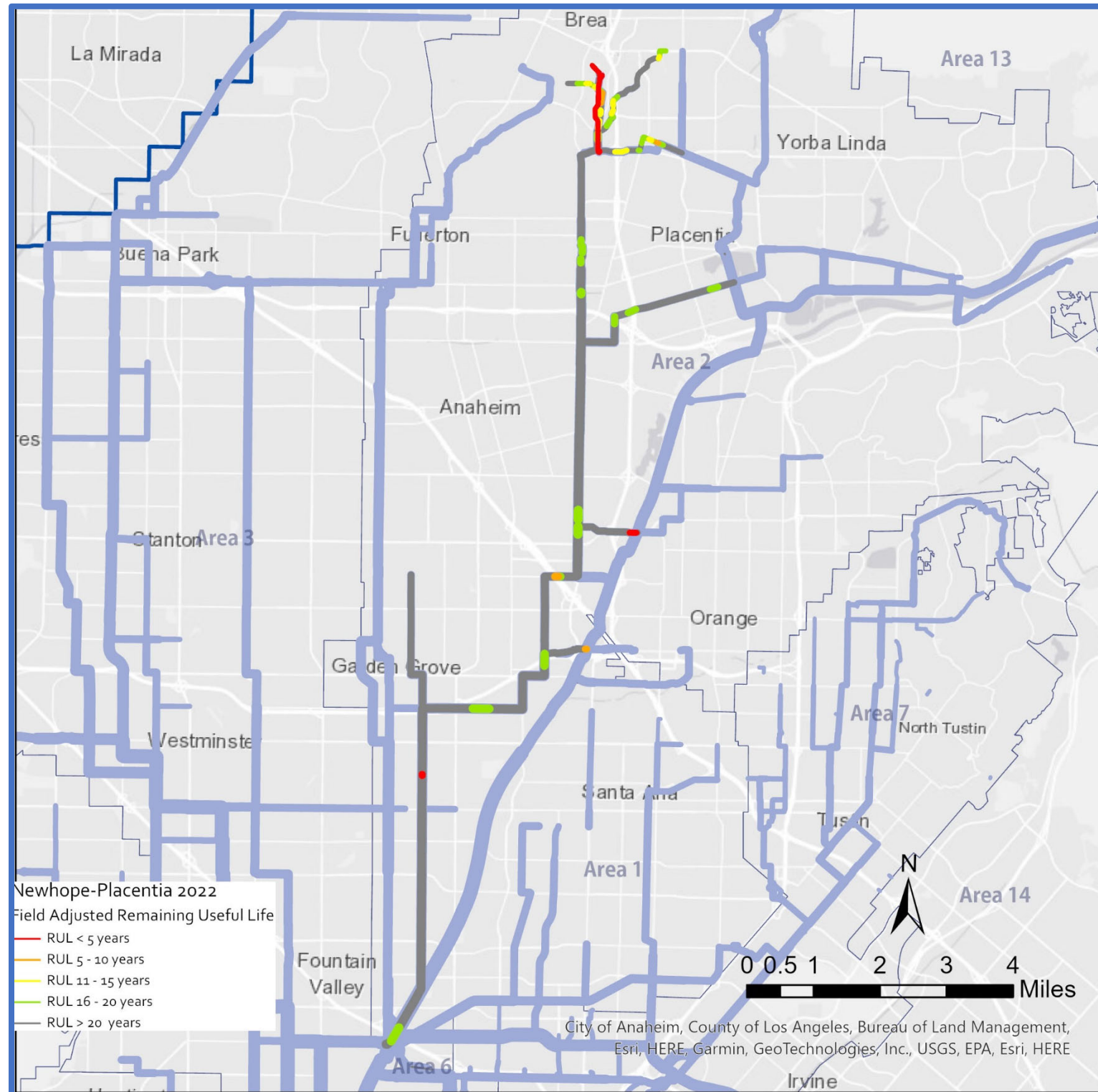
CIP - Planning
 CIP - Design
 CIP - Construction
 Maintenance Project

Acronym Key:

CCTV = Closed-Circuit Television; CIP = Capital Improvement Program; DIP = Ductile Iron Pipe; FY = Fiscal Year; I-405 = Interstate 405; OC San = Orange County Sanitation District; RUL = Remaining Useful Life; VCP = Vitrified Clay Pipe

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – NEWHOPE TRUNK

System Overview



Major Assets and Condition Information

| Asset Type | Total Length (miles) | # of Pipes | Average Age (years) | # of Pipes with RUL Score of 5 | # of Pipes with RUL Score of 4 |
|----------------------------|----------------------|------------|---------------------|--------------------------------|--------------------------------|
| Vitrified Clay | | | | | |
| ≤ 18" Ø | 4.0 | 69 | 49 | 13 | 1 |
| 21" – 27" Ø | 2.7 | 39 | 54 | - | 1 |
| ≥ 30" Ø | 8.6 | 130 | 39 | 2 | 2 |
| Reinforced Concrete | | | | | |
| 45" – 54" Ø | 7.9 | 42 | 62 | - | - |
| Polyvinyl Chloride | | | | | |
| ≤ 18" Ø | 0.03 | 2 | 28 | 1 | - |
| 24" – 30" Ø | 0.01 | 3 | 18 | - | - |
| Fiberglass | | | | | |
| ≤ 42" Ø | 0.02 | 1 | 4 | - | - |
| 48" – 54" Ø | 4.5 | 50 | 4 | - | - |
| Ductile Iron | | | | | |
| ≤ 18" Ø | 1.0 | 18 | 27 | - | - |
| 20" – 36" Ø | 0.4 | 7 | 42 | 2 | 2 |
| Steel | | | | | |
| 12" Ø | 0.07 | 6 | 13 | - | - |

Acronym Key:

Ø = Diameter; RUL = Remaining Useful Life

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – NEWHOPE TRUNK

Key Issues

| Key Issues | Actions & Recommendations |
|---|--|
| <ul style="list-style-type: none"> 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. | <ul style="list-style-type: none"> 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. |
| <ul style="list-style-type: none"> Manhole Defects – There are 3 isolated manholes in the southern reaches of the Newhope Trunk system with severe liner detachment, surface aggregate missing, and visible reinforcement. | <ul style="list-style-type: none"> Project FE21-08 will replace all 3 manholes. |
| <ul style="list-style-type: none"> Pipeline Fracturing – There are isolated pipe segments in Anaheim, Fullerton, and Orange with fracturing that are not part of a current project. | <ul style="list-style-type: none"> OC San staff will validate the creation of the Batavia-Grove Trunk Rehabilitation project which includes addressing fractures in Orange. 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 point repairs together for 7-pack task orders. |
| <ul style="list-style-type: none"> Root Intrusion – CCTV identified 1 pipeline experiencing significant root intrusion, located in Craig Regional Park. | <ul style="list-style-type: none"> OC San staff are in the process of selecting a Contractor for a new blanket contract for root treatment. The NTP is expected prior to the end of 2022. |
| <ul style="list-style-type: none"> Uninspected Gravity Pipelines – Additionally, 58 gravity sewers have never been inspected in the Newhope Trunk system, 15 of which are high priority based on theoretical RUL. There is no condition data for these reaches to determine field adjusted RUL. | <ul style="list-style-type: none"> Forty-four (44) gravity sewers were recently constructed less than 5 years ago and 7 other gravity sewers have no access issues. Six (6) gravity sewers appear to have buried manhole frame and covers which will be located and uncovered by OC San staff. All of these reaches will be inspected via future CCTV PM work orders or separate CCTV work orders. The final gravity sewer is proposed to be abandoned as part of Project 2-73. |

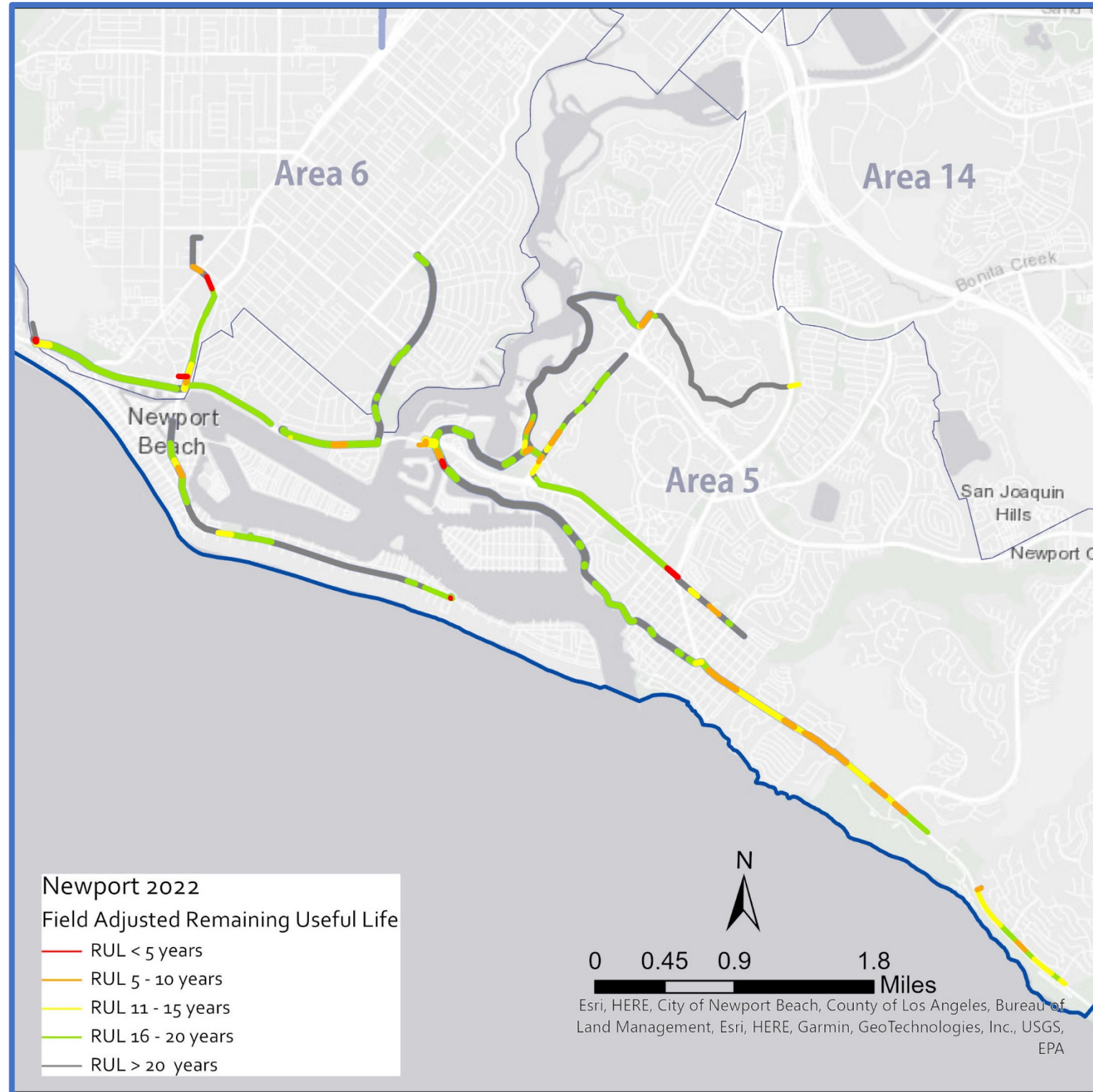
Current and Future Projects

| Project No. | Project Title | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|--|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| FE20-08 | Olive Sub-Trunk Repair | <ul style="list-style-type: none"> Rehabilitation of an inverted siphon in the cities of Anaheim and Orange. | | | | | | | | | | | | | | | |
| FE21-08 | Manhole Replacements along Newhope-Placentia Trunk Sewer | <ul style="list-style-type: none"> Replacement of sewer manholes in Fountain Valley, Garden Grove, and Santa Ana. | | | | | | | | | | | | | | | |

| | |
|--|--|
| <p>Types of Project Legend:</p> <p> CIP - Planning CIP - Design CIP - Construction Maintenance Project </p> | <p>Acronym Key:</p> <p>CCTV = Closed-Circuit Television; CIP = Capital Improvement Program; DIP = Ductile Iron Pipe; FY = Fiscal Year; OC San = Orange County Sanitation District; NTP = Notice to Proceed; RUL = Remaining Useful Life</p> |
|--|--|

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – NEWPORT TRUNK

System Overview



Major Assets and Condition Information

| Asset Type | Total Length (miles) | # of Pipes | Average Age (years) | # of Pipes with RUL Score of 5 | # of Pipes with RUL Score of 4 |
|----------------------------------|----------------------|------------|---------------------|--------------------------------|--------------------------------|
| Vitrified Clay | | | | | |
| ≤ 18" Ø | 5.9 | 127 | 45 | 3 | 9 |
| 21" – 27" Ø | 4.5 | 100 | 37 | 2 | 4 |
| ≥ 30" Ø | 3.8 | 76 | 35 | - | 1 |
| Ductile & Cast Iron | | | | | |
| ≤ 18" Ø | 1.4 | 20 | 30 | - | 3 |
| 24" – 30" Ø | 1.5 | 22 | 30 | - | 10 |
| Polyvinyl Chloride | | | | | |
| ≤ 18" Ø | 0.1 | 3 | 10 | - | - |
| 30" – 36" Ø | 2.6 | 36 | 22 | - | - |
| Cured-in-Place | | | | | |
| 24" Ø | 1.1 | 13 | 24 | - | - |
| High-Density Polyethylene | | | | | |
| ≤ 20" Ø | 0.8 | 14 | 29 | - | - |
| 30" – 42" Ø | 0.02 | 2 | 23 | 1 | - |
| Reinforced Concrete | | | | | |
| 48" Ø | 0.02 | 1 | 10 | - | - |

Acronym Key:

Ø = Diameter; RUL = Remaining Useful Life

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – NEWPORT TRUNK

Key Issues

| Key Issues | Actions & Recommendations |
|--|---|
| <ul style="list-style-type: none"> Broken Influent Sewer to Bitter Point Pump Station – In the influent sewer upstream of Bitter Point Pump Station, previous repairs of fractures and breaks have failed along with heavy infiltration. | <ul style="list-style-type: none"> Project FRC-0009 will address all issues with the influent sewer to Bitter Point Pump Station via rehabilitation. |
| <ul style="list-style-type: none"> Pipeline Fracturing – CCTV identified several areas with significant fracturing of VCP pipelines. Most fractures are concentrated within the Bay Bridge PS influent sewers. | <ul style="list-style-type: none"> OC San staff will validate the creation of the South Coast Trunk Sewer Rehabilitation and Newport Dunes / Jamboree Road Sewer Rehabilitation projects which will address the majority of fractures. 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 point repairs together for 7-pack task orders. |
| <ul style="list-style-type: none"> Groundwater Infiltration – CCTV identified many additional areas experiencing significant groundwater infiltration, primarily in Jamboree Road and the Balboa Peninsula. | <ul style="list-style-type: none"> OC San staff will validate the creation of the South Coast Trunk Sewer Rehabilitation and Newport Dunes / Jamboree Road Sewer Rehabilitation projects which include addressing 5 locations total. One (1) other location is severe and isolated but suitable for repair by chemical grouting. OC San staff are developing the scope of work for a new blanket contract for chemical grouting. Three (3) locations are co-located with fractures or tuberculation and therefore have been identified as high priority point repairs. OC San staff are in the process of grouping point repairs together for 7-pack task orders. Additional areas with groundwater infiltration do not have any other defects and are lower priority. |
| <ul style="list-style-type: none"> Root Intrusion – CCTV identified 1 pipeline experiencing significant root intrusion, located near Newport Dunes. | <ul style="list-style-type: none"> OC San staff are in the process of selecting a Contractor for a new blanket contract for root treatment. The NTP is expected prior to the end of 2022. |
| <ul style="list-style-type: none"> Missing Air Jumpers – One (1) out of 2 inverted siphon locations in the Newport Trunk system do not have air jumpers. | <ul style="list-style-type: none"> OC San staff to evaluate if new air jumper construction to be added to existing or future project. |
| <ul style="list-style-type: none"> Uninspected Gravity Pipelines – Eight (8) gravity sewers have never been inspected in the Newport Trunk system. There is no condition data for these reaches to determine field adjusted RUL. | <ul style="list-style-type: none"> There are no known access issues for the 8 uninspected gravity sewers. Inspections will be completed via future CCTV PM work orders or separate CCTV work orders. |

Current and Future Projects

| Project No. | Project Title | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|---------------|---------------------|----------|--|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | | FRC-0009 | Bitter Point Trunk Sewer Repair at Bitter Point Pump Station | <ul style="list-style-type: none"> Rehabilitation of broken HDPE pipeline in the City of Newport Beach. | | | | | | | | | | | | |

Types of Project Legend:

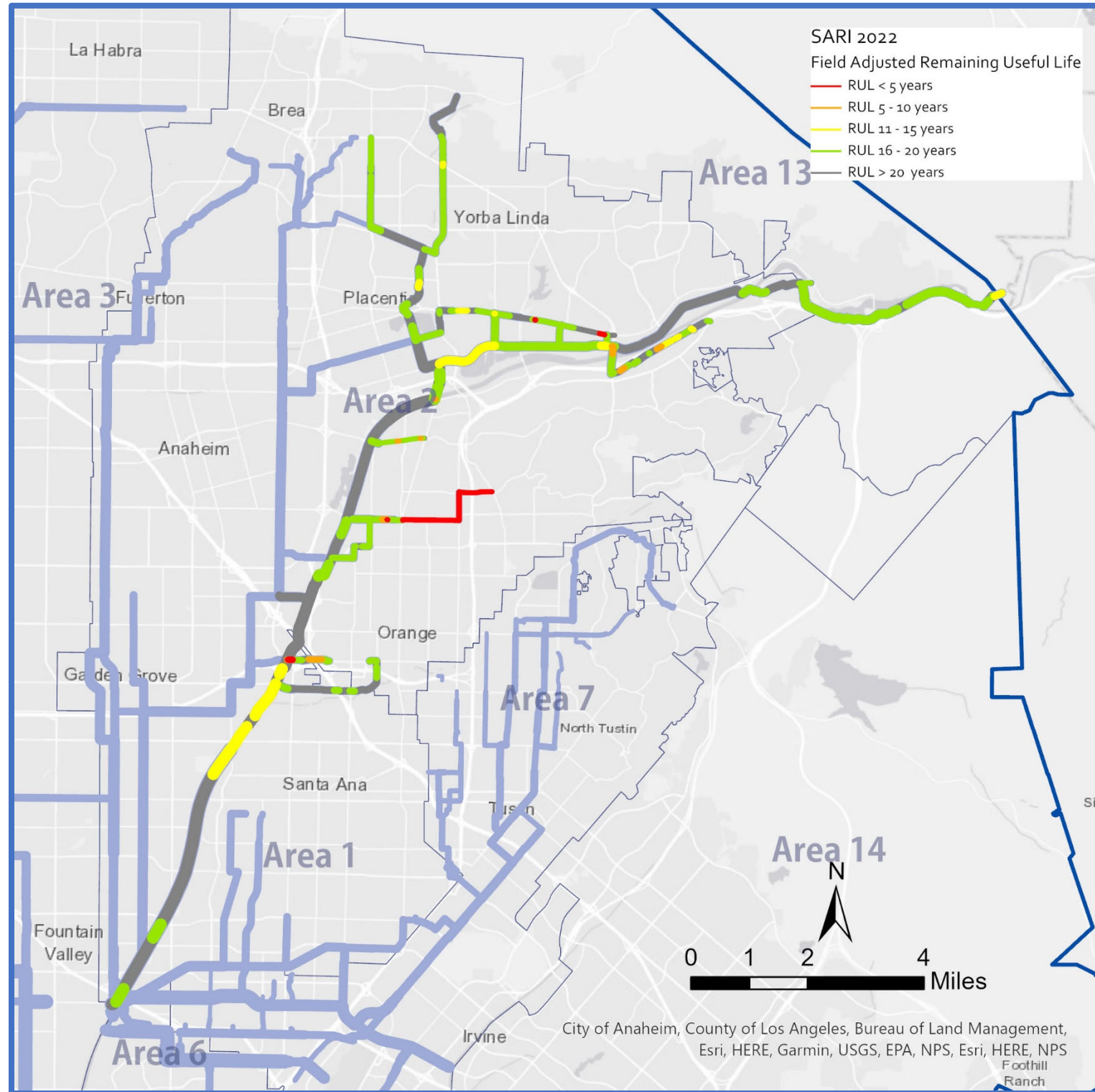
CIP - Planning
 CIP - Design
 CIP - Construction
 Maintenance Project

Acronym Key:

CCTV=Closed-Circuit Television; DIP = Ductile Iron Pipe; FY=Fiscal Year; HDPE = High Density Polyethylene; OC San=Orange County Sanitation District; NTP = Notice to Proceed; RUL = Remaining Useful Life; VCP = Vitrified Clay Pipe

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – SARI TRUNK

System Overview



Major Assets and Condition Information

| Asset Type | Total Length (miles) | # of Pipes | Average Age (years) | # of Pipes with RUL Score of 5 | # of Pipes with RUL Score of 4 |
|----------------------------------|----------------------|------------|---------------------|--------------------------------|--------------------------------|
| Vitrified Clay | | | | | |
| ≤ 18" Ø | 5.0 | 113 | 57 | 43 | 3 |
| 21" - 27" Ø | 11.4 | 184 | 46 | - | 3 |
| ≥ 30" Ø | 5.7 | 79 | 37 | - | 3 |
| Reinforced Concrete | | | | | |
| 42" Ø | 1.5 | 19 | 39 | - | - |
| 45" - 66" Ø | 10.5 | 69 | 45 | - | - |
| ≥ 72" Ø | 10.0 | 50 | 47 | - | - |
| Fiberglass | | | | | |
| ≤ 42" Ø | 0.3 | 2 | 13 | - | - |
| 48" - 54" Ø | 3.6 | 39 | 11 | - | - |
| High-Density Polyethylene | | | | | |
| ≤ 18" Ø | 0.5 | 4 | 8 | - | - |
| 30" Ø | 0.7 | 3 | 11 | - | - |
| Ductile Iron | | | | | |
| 24" - 30" Ø | 0.8 | 10 | 35 | - | - |
| Steel | | | | | |
| 30" Ø | 0.03 | 2 | 11 | - | - |
| Cured-in-Place | | | | | |
| 33" Ø | 0.3 | 4 | 13 | - | - |
| Polyvinyl Chloride | | | | | |
| 12" Ø | 0.01 | 1 | 6 | - | - |

Acronym Key:
 Ø = Diameter; RUL = Remaining Useful Life;
 SARI=Santa Ana River Interceptor

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – SARI TRUNK

Key Issues

| Key Issues | Actions & Recommendations |
|---|---|
| <ul style="list-style-type: none"> Capacity – The Collections Capacity Evaluation Study completed in 2019 conducted a detailed capacity analysis to identify the location of capacity deficiencies during dry and peak wet weather flows. During existing peak wet weather flows, capacity issues were identified in the Taft Branch. During future peak wet weather flows, capacity issues were identified in a northern portion of the SARI system. | <ul style="list-style-type: none"> Project 2-49 will address existing wet weather capacity issues in the Taft Branch and Project X-086 will address future wet weather capacity issues in a northern portion of the SARI system. |
| <ul style="list-style-type: none"> Pipeline Fracturing – CCTV identified several areas with significant fracturing of VCP pipelines. Most fractures are concentrated in Anaheim and Orange. | <ul style="list-style-type: none"> Project 2-78 will address some fracturing issues in Anaheim, and OC San staff will validate the creation of the Batavia-Grove Trunk Rehabilitation project that includes addressing some fractures in Orange. Isolated defects in Anaheim and Orange not included or near a CIP project have been identified as high priority point repairs. OC San staff are in the process of grouping point repairs together for 7-pack task orders. |
| <ul style="list-style-type: none"> Groundwater Infiltration – CCTV identified 4 areas experiencing significant groundwater infiltration, with 2 locations in Anaheim and 2 in Orange. | <ul style="list-style-type: none"> Project 2-78 addresses the groundwater infiltration issues in Anaheim, and OC San staff will validate the creation of the Batavia-Grove Trunk Rehabilitation project that includes addressing 1 location in Orange. The last location in Orange is isolated but is suitable for repair by chemical grouting. OC San staff are developing the scope of work for a new blanket contract for chemical grouting. |
| <ul style="list-style-type: none"> 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. | <ul style="list-style-type: none"> 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. |
| <ul style="list-style-type: none"> Missing Air Jumpers – Four (4) out of 12 inverted siphon / reduction locations in the SARI Trunk system do not have air jumpers. | <ul style="list-style-type: none"> OC San staff to evaluate if new air jumper construction to be added to existing or future project(s). |
| <ul style="list-style-type: none"> Uninspected Gravity Pipelines –Four (4) gravity sewers have never been inspected in the SARI Trunk system. There is no condition data for these reaches to determine field adjusted RUL. | <ul style="list-style-type: none"> Two (2) gravity sewers were recently constructed less than 5 years ago and 1 other gravity sewer has no access issues. These reaches will be inspected via future CCTV PM work orders or separate CCTV work orders. The last gravity sewer has a tight horizontal curve that may not allow for CCTV inspection; OC San staff to discuss with CCTV Contractor. |

Current and Future Projects

| Project No. | Project Title | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|--|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| FRC-0011 | Richfield Sub-Trunk Encasement for BNSF Railway Addition | <ul style="list-style-type: none"> Extend existing encasement of sewer pipeline in City of Anaheim. | | | | | | | | | | | | | | | |
| FE20-08 | Olive Sub-Trunk Repair | <ul style="list-style-type: none"> Rehabilitation of an inverted siphon in the cities of Anaheim and Orange. | | | | | | | | | | | | | | | |
| 2-49 | Taft Branch Improvements | <ul style="list-style-type: none"> Upsizing of sewer pipelines to increase capacity in the City of Orange. | | | | | | | | | | | | | | | |
| 2-78 | Santa Ana Canyon South River Trunk Rehabilitation | <ul style="list-style-type: none"> Rehabilitation of sewer facilities in the City of Anaheim. | | | | | | | | | | | | | | | |
| X-086 | Santa Ana River Interceptor Improvements | <ul style="list-style-type: none"> Upsizing of sewer pipelines to increase capacity in the City of Anaheim. | | | | | | | | | | | | | | | |

Types of Project Legend:

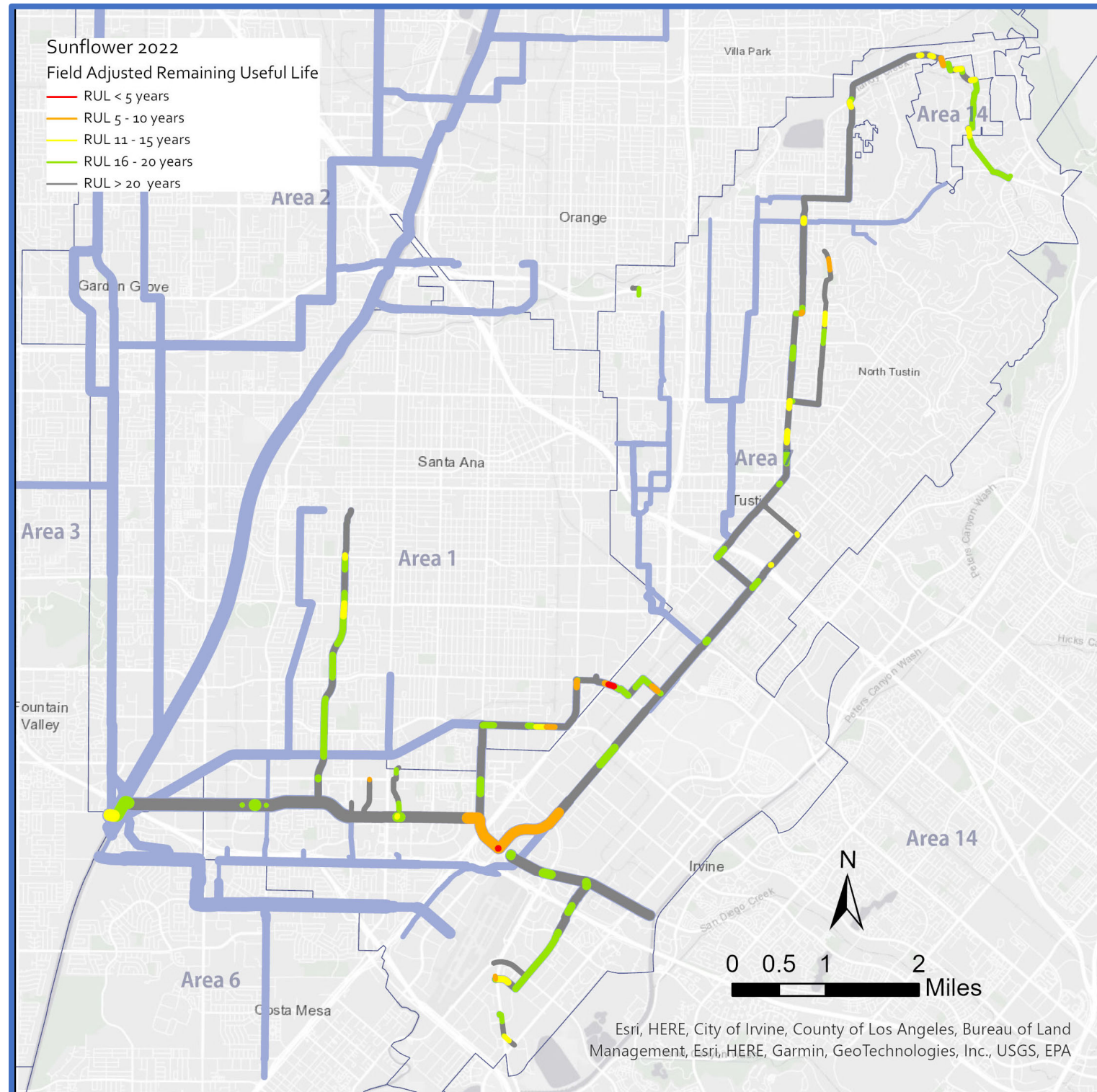
CIP - Planning
 CIP - Design
 CIP - Construction
 Maintenance Project

Acronym Key:

BNSF = Burlington Northern & Santa Fe; CCTV = Closed-Circuit Television; CIP = Capital Improvement Program; FY = Fiscal Year; OC San = Orange County Sanitation District; RUL = Remaining Useful Life; SARI = Santa Ana River Interceptor; VCP = Vitrified Clay Pipe

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – SUNFLOWER TRUNK

System Overview



Major Assets and Condition Information

| Asset Type | Total Length (miles) | # of Pipes | Average Age (years) | # of Pipes with RUL Score of 5 | # of Pipes with RUL Score of 4 |
|----------------------------------|----------------------|------------|---------------------|--------------------------------|--------------------------------|
| Vitrified Clay | | | | | |
| ≤ 18" Ø | 7.1 | 144 | 46 | - | 2 |
| 21" - 27" Ø | 13.6 | 206 | 51 | 2 | 5 |
| ≥ 30" Ø | 4.4 | 55 | 44 | - | - |
| Reinforced Concrete | | | | | |
| 42" Ø | 1.3 | 9 | 51 | - | - |
| 48" - 66" Ø | 3.4 | 39 | 41 | - | 11 |
| ≥ 72" Ø | 4.1 | 27 | 51 | - | 1 |
| Ductile Iron | | | | | |
| 20" Ø | 0.5 | 11 | 23 | - | - |
| Polyvinyl Chloride | | | | | |
| 30" Ø | 0.05 | 3 | 14 | - | - |
| Reinforced Plastic Mortar | | | | | |
| 15" Ø | 0.1 | 3 | 51 | - | - |
| Asbestos Cement | | | | | |
| 10" Ø | 0.04 | 1 | 58 | 1 | - |
| Unknown | | | | | |
| 18" Ø | 0.01 | 1 | 5 | - | - |

Acronym Key:

Ø = Diameter; RUL = Remaining Useful Life

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – SUNFLOWER TRUNK

Key Issues

| Key Issues | Actions & Recommendations |
|--|---|
| <ul style="list-style-type: none"> Vortex Device Failure (AI-508) – During routine cleaning activities in July 2022, OC San staff discovered the vortex insert near John Wayne Airport disconnected from the influent sewer. A condition assessment was performed in late July 2022 which confirmed a fracture of the base flange and strap support anchoring failure. | <ul style="list-style-type: none"> OC San staff have temporarily diverted more flows to College PS and are actively working on an interim repair plan to be completed by October 2022. Design modifications the vortex insert supports are being considered for a future small project or addition to an existing project. |
| <ul style="list-style-type: none"> Pipeline Fracturing and Liner Failures – CCTV identified several areas with significant fracturing of VCP pipelines and large diameter pipe with liner failures. Most fractures are concentrated in Santa Ana with others located in Irvine, Newport Beach, Orange, and Tustin. Liner failures were found north of John Wayne Airport in the 63” – 78” RCP. | <ul style="list-style-type: none"> Liner failures in the 63” – 78” RCP are being addressed with Project 7-66. Project FRC-0007, X-066, and X068 address fractured pipeline in various locations throughout the trunk system. Isolated defects in Santa Ana, Irvine, and Tustin not included or near a CIP project have been identified as high priority point repairs. OC San staff are in the process of grouping point repairs together for 7-pack task orders. |
| <ul style="list-style-type: none"> Groundwater Infiltration – CCTV identified several areas experiencing significant groundwater infiltration, primarily in Irvine, Santa Ana, and Orange. | <ul style="list-style-type: none"> Two (2) infiltration locations that are severe and isolated are suitable for repair by chemical grouting. OC San staff are developing the scope of work for a new blanket contract for chemical grouting. Two (2) infiltration locations are co-located with fractures and therefore have been identified as high priority point repairs. OC San staff are in the process of grouping point repairs together for 7-pack task orders. Additional areas with groundwater infiltration do not have any other defects and are lower priority. |
| <ul style="list-style-type: none"> Root Intrusion – Historically, 1 pipeline near Panorama Heights experienced significant root intrusion. However, recent CCTV did not show evidence of significant root intrusion. | <ul style="list-style-type: none"> Continue to monitor for root intrusion. OC San staff are in the process of selecting a Contractor for a new blanket contract for root treatment. The NTP is expected prior to the end of 2022. |
| <ul style="list-style-type: none"> Missing Air Jumpers – Two (2) out of 11 inverted siphon / reduction locations in the Sunflower Trunk system do not have air jumpers. | <ul style="list-style-type: none"> OC San staff to evaluate if new air jumper construction to be added to existing or future project(s). |
| <ul style="list-style-type: none"> Uninspected Gravity Pipelines – Three (3) gravity sewers have never been inspected in the Sunflower Trunk system. There is no condition data for these reaches to determine field adjusted RUL. | <ul style="list-style-type: none"> One (1) gravity sewer is proposed to be abandoned-in-place as part of Project 7-68. OC San staff are reviewing options to temporarily modify Main Street PS operations to allow for a CCTV inspection of the other 2 gravity sewers. |

Current and Future Projects

| Project No. | Project Title | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|--|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 7-66 | Sunflower and Red Hill Interceptor Repairs | <ul style="list-style-type: none"> Rehabilitation of sewer facilities in the cities of Santa Ana and Costa Mesa | | | | | | | | | | | | | | | |
| FE18-13 | Redhill Relief Sewer Relocation at SR-55 | <ul style="list-style-type: none"> Relocate sewer facilities in the City of Santa Ana | | | | | | | | | | | | | | | |
| FRC-0007 | Redhill Relief Sewer Liner Repair at SR-55 | <ul style="list-style-type: none"> Rehabilitation of sewer facilities in the City of Santa Ana | | | | | | | | | | | | | | | |
| X-068 | North Trunk / Panorama Heights / Tustin-Orange Rehabilitation | <ul style="list-style-type: none"> Rehabilitation of sewer facilities in the City of Orange | | | | | | | | | | | | | | | |
| X-066 | Tustin-Orange Interceptor / Orange Park Acres Trunk Rehabilitation | <ul style="list-style-type: none"> Rehabilitation of sewer facilities in the City of Orange | | | | | | | | | | | | | | | |
| X-065 | Tustin-Orange Interceptor Rehabilitation | <ul style="list-style-type: none"> Rehabilitation of sewer facilities in the City of Orange | | | | | | | | | | | | | | | |

Types of Project Legend:

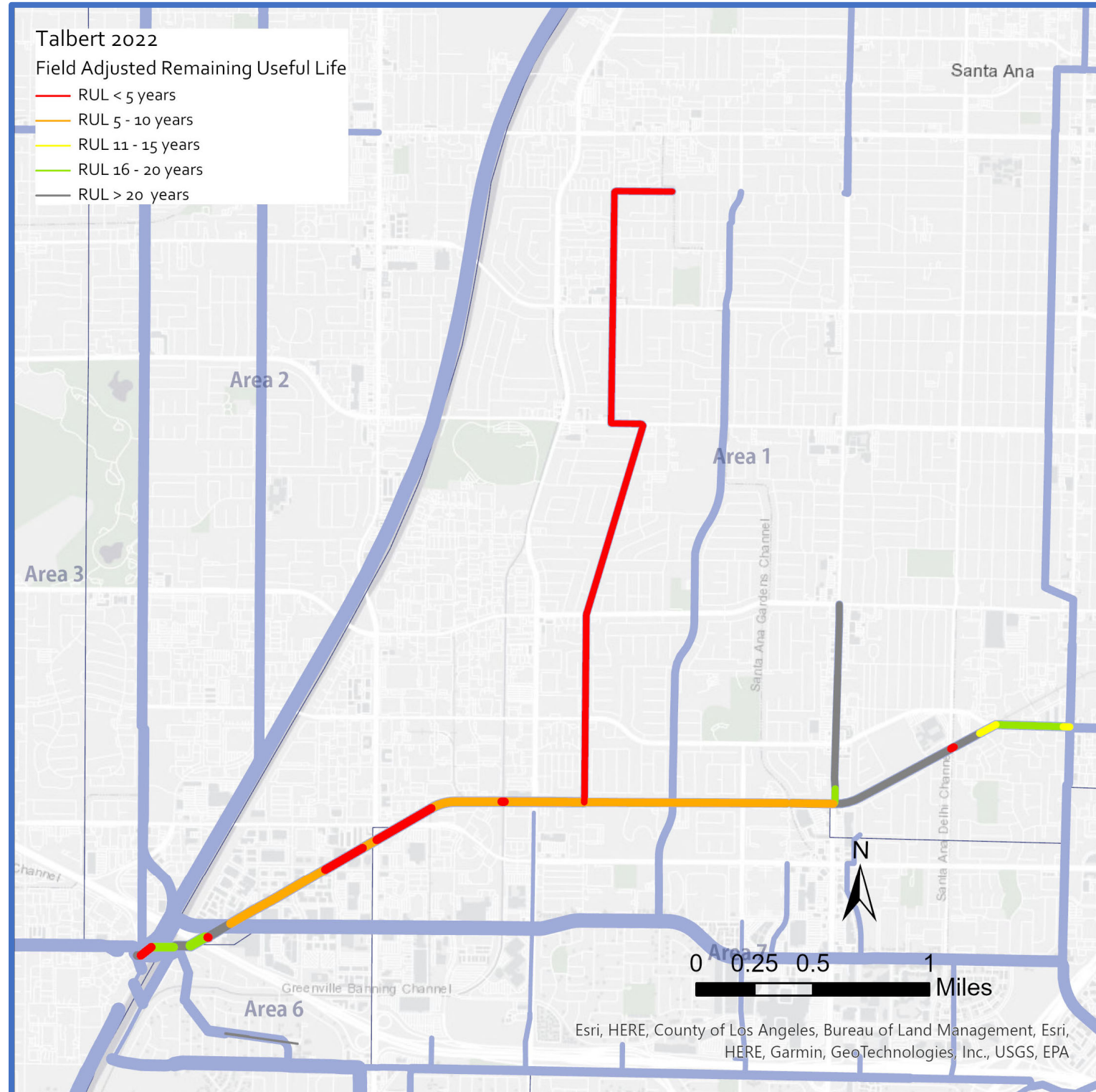
- CIP - Planning
- CIP - Design
- CIP - Construction
- Maintenance Project

Acronym Key:

CCTV=Closed-Circuit Television; FY=Fiscal Year; OC San=Orange County Sanitation District; NTP = Notice to Proceed; RCP = Reinforced Concrete Pipe; RUL = Remaining Useful Life; SR-55 = State Route 55; VCP = Vitrified Clay Pipe

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – TALBERT TRUNK

System Overview



Major Assets and Condition Information

| Asset Type | Total Length (miles) | # of Pipes | Average Age (years) | # of Pipes with RUL Score of 5 | # of Pipes with RUL Score of 4 |
|----------------------------|----------------------|------------|---------------------|--------------------------------|--------------------------------|
| Vitrified Clay | | | | | |
| ≤ 18" Ø | 0.1 | 6 | 47 | 2 | - |
| 21" - 27" Ø | 3.4 | 46 | 69 | 39 | - |
| ≥ 30" Ø | 1.7 | 23 | 69 | 2 | - |
| Reinforced Concrete | | | | | |
| 42" Ø | 1.1 | 10 | 54 | - | 10 |
| 48" - 60" Ø | 2.1 | 29 | 52 | 5 | 16 |

Acronym Key:

Ø = Diameter; RUL = Remaining Useful Life

ASSET MANAGEMENT SYSTEM SUMMARY – COLLECTION SYSTEM – TALBERT TRUNK

Key Issues

| Key Issues | Actions & Recommendations |
|---|--|
| <ul style="list-style-type: none"> Capacity – The Collections Capacity Evaluation Study completed in 2019 conducted a detailed capacity analysis to identify the location of capacity deficiencies during dry and peak wet weather flows. During existing peak wet weather flows, capacity issues were identified in the entire Greenville Trunk. | <ul style="list-style-type: none"> Project 1-24 will replace and upsize the entire Greenville Trunk to address existing wet weather capacity issues, developing sags, fractures, and widespread infiltration. |
| <ul style="list-style-type: none"> Surface Aggregate Damage – Most of the RCP pipeline of the Talbert Trunk between Plant No. 1 and Bristol Street has moderate to severe surface aggregate loss in areas not rehabilitated by past project 1-17. | <ul style="list-style-type: none"> Project FE20-07 will address the most severe segment of concrete wall damage in the Talbert Trunk by rehabilitating the segment just outside Plant No. 1. Project 1-23 will rehabilitate the remaining pipeline segments with moderate to severe surface aggregate loss. It is recommended that the frequency of monitoring of pipelines with RUL scores of 4 or 5 be increased from every 5 years to every 2.5 years. |
| <ul style="list-style-type: none"> Missing Air Jumpers – Four (4) out of 5 inverted siphon locations in the Talbert Trunk system do not have air jumpers. | <ul style="list-style-type: none"> Projects 1-23 and 1-24 include constructing new air jumpers at 3 locations. Final location under evaluation to be added to existing or future project. |

Current and Future Projects

| Project No. | Project Title | Description of Work | FY 22/23 | FY 23/24 | FY 24/25 | FY 25/26 | FY 26/27 | FY 27/28 | FY 28/29 | FY 29/30 | FY 30/31 | FY 31/32 | FY 32/33 | FY 33/34 | FY 34/35 | FY 35/36 | FY 36/37 |
|-------------|---|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| FE20-07 | Santa Ana Trunk Rehabilitation at Plant No. 1 | <ul style="list-style-type: none"> Rehabilitation of influent trunk line in the City of Fountain Valley | | | | | | | | | | | | | | | |
| 1-23 | Santa Ana Trunk Sewer Rehabilitation | <ul style="list-style-type: none"> Rehabilitation of sewer facilities in the cities of Santa Ana and Costa Mesa | | | | | | | | | | | | | | | |
| 1-24 | Greenville Trunk Improvements | <ul style="list-style-type: none"> Upsizing of sewer segments to increase capacity in the City of Santa Ana | | | | | | | | | | | | | | | |

Types of Project Legend:

- CIP - Planning
- CIP - Design
- CIP - Construction
- Maintenance Project

Acronym Key:

CCTV = Closed-Circuit Television; CIP = Capital Improvement Program; FY = Fiscal Year; OC San = Orange County Sanitation District; RCP = Reinforced Concrete Pipe; RUL = Remaining Useful Life; VCP = Vitrified Clay Pipe

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3 Program Monitoring and Improvements

3.1 Program Monitoring

OC San has developed 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 objectives. The key objectives OC San is building into the Asset Management Program are as follows:

- 1) Take a proactive approach to repair, rehabilitation, and replacement.
- 2) Ensure assets are reliable and operating when needed.
- 3) Minimize unplanned outages and equipment downtime.
- 4) Manage risks associated with asset or service impairment through asset performance optimization.
- 5) Develop cost-effective management strategies for the long term.
- 6) Strive to implement world class asset management strategies through continual improvement in our asset management practices.

The following metrics were chosen to demonstrate the effectiveness of the Asset Management Program and establish a baseline for which to gauge future performance:

- **The proactive maintenance percent**, the percent of PM as a total of all maintenance, demonstrates the effectiveness of the maintenance program (proactive vs. reactive). The percent PM includes predictive and preventive maintenance 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 our Maximo® EAM system, this is described as a Level 50 priority. This is also described as break-in work that is deemed “emergency” or “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 F. As the Maintenance program moves towards a more proactive state, these 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 Collections system, and the CCTV program demonstrate the effectiveness of the combined efforts of Collections Maintenance, the Regional Odor & Corrosion Control System (ROCCS) program, and the Gravity Collections Condition Assessment Program as they pertain to asset management.

These program metrics or key performance indicators (KPI) are evaluated on an annual basis and may change over time to better determine Program performance.

3.1.1 Data

The metric data were sourced from Maximo®. The data from each database are from FY2018-19, 2019-20, 2020-21, and 2021-22 and is included in Appendix F for reference.

3.2 Program Metrics

3.2.1 Proactive Maintenance Percent

The Proactive Maintenance Percent is the percent of PM as a total of all maintenance performed. An increase in proactive maintenance percent represents a shift from reactive to a proactive maintenance program. Tables 3-1 and 3-2 provide the annual average of the proactive maintenance percent for both Reclamation Plant No. 1 and Treatment Plant No. 2. A proactive maintenance percent of 80% is considered best in class value based on manufacturing industry standards which may not be comparable to a critical facility as wastewater treatment but helpful to have as a guideline. Many of the areas at both plants were at or below 60% indicating that improvement in this area is likely over time as proactive maintenance programs are implemented and older facilities are replaced. Refer to Appendix F for more information on proactive maintenance percentages expressed in chart format.

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

| Process Area | FY 18/19 | FY 19/20 | FY 20/21 | FY 21/22 |
|----------------------------|----------|----------|----------|----------|
| Preliminary | 25% | 39% | 39% | 25% |
| Primary | 29% | 39% | 32% | 40% |
| Interplant | 69% | 84% | 82% | 59% |
| Activated Sludge | 58% | 53% | 64% | 56% |
| Trickling Filters | 55% | 56% | 53% | 47% |
| Digesters | 34% | 46% | 46% | 47% |
| Solids Handling Facilities | 31% | 34% | 42% | 44% |
| Central Power Generation | 40% | 64% | 62% | 62% |
| Electrical Distribution | 77% | 68% | 65% | 77% |
| Utilities | 43% | 33% | 30% | 26% |

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

| Process Area | FY 18/19 | FY 19/20 | FY 20/21 | FY 21/22 |
|----------------------------|----------|----------|----------|----------|
| Preliminary | 55% | 64% | 59% | 55% |
| Primary | 37% | 25% | 35% | 38% |
| Activated Sludge | 54% | 48% | 53% | 50% |
| Trickling Filters | 64% | 67% | 57% | 61% |
| Effluent Disposal | 61% | 57% | 35% | 59% |
| Digesters | 39% | 39% | 55% | 51% |
| Solids Handling Facilities | 35% | 41% | 53% | 41% |
| Central Power Generation | 58% | 42% | 50% | 67% |
| Electrical Distribution | 84% | 70% | 74% | 75% |
| Utilities | 34% | 39% | 44% | 43% |

At Plant No.1 & 2, the proactive percent for the solids handling facility increased in FY20/21 when the new dewatering facility started operating, and the older belt press facility was decommissioned and demolished. The proactive percent for preliminaries at Plant 1 decreased this year because Project P1-105 Headworks Rehabilitation is in construction. Plant 1 and 2 recognized an increase at Central Generation with improvements to the engines and assignment of specialized power plant operators.

The pump stations have proactive maintenance percentages over 60% 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. For instance, Bay Bridge required break-in work because check valves would not close. Common corrective maintenance (CM) work orders include replacing leaking valves, replacement of pump packing, de-ragging pumps, and attending to equipment that is making excessive noise when operating will also reduce the proactive percent.

Table 3-3. Proactive Maintenance Percent for Pump Stations

| Pump Station | FY 18/19 | FY 19/20 | FY 20/21 | FY 21/22 |
|--------------|----------|----------|----------|----------|
| 'A' Street | 84% | 86% | 85% | 67% |
| 15th Street | 88% | 88% | 85% | 85% |
| Lido | 47% | 80% | 42% | 72% |

Table 3-3. Proactive Maintenance Percent for Pump Stations

| Pump Station | FY 18/19 | FY 19/20 | FY 20/21 | FY 21/22 |
|--------------|----------|----------|----------|----------|
| Bay Bridge | 69% | 65% | 34% | 45% |
| Rocky Point | 76% | 96% | 84% | 76% |
| Bitter Point | 84% | 82% | 76% | 84% |
| Seal Beach | 58% | 55% | 65% | 50% |
| Westside | 79% | 75% | 74% | 80% |
| Edinger | 74% | 81% | 79% | 74% |
| Slater | 63% | 86% | 86% | 73% |
| College | 98% | 91% | 69% | 86% |
| Crystal Cove | 82% | 57% | 91% | 80% |
| Yorba Linda | 72% | 30% | 92% | 99% |
| Main Street | 36% | 66% | 66% | 76% |
| MacArthur | 97% | 66% | 88% | 83% |

Table 3.4 is an average of the percent proactive work orders for the process areas at each plant (not including the interplant, effluent disposal, electrical, and utilities) and the pump stations. The snapshot view shows an overall upward trend for the treatment plants and pump stations.

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

| Proactive Work | FY18/19 | FY19/20 | FY20/21 | FY21/22 |
|----------------|---------|---------|---------|---------|
| Plant No. 1 | 40% | 48% | 47% | 53% |
| Plant No. 2 | 49% | 47% | 49% | 52% |
| Pump Stations | 74% | 74% | 74% | 75% |

3.2.2 Break-In Percent

Break-In Percent illustrates the amount of emergency work (or reactive work) as a percent of total work in the process area. Typically, the break-in percent metric should track closely with the inverse of the proactive maintenance percent as one is a measure of proactive maintenance program and the other a measure of unplanned outages or a reactive maintenance response. Break-in percent for Plant No. 1 is shown in Table 3-5 and Plant No. 2 in Table 3-6. There was an increase in break-in work and decrease in proactive work at Plant 1 due to project P1-105 construction and equipment shut down demands. The increase of break-in work at the trickling filters was due to a failure of the only operable sludge pump. At Plant No. 2, the data shows an increase break-in percent in areas with current construction projects and the need for shutdowns and tie-ins. Success in Break-In Percent is measured as a consistent trend downward overtime.

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

| Process Area | FY 18/19 | FY 19/20 | FY 20/21 | FY 21/22 |
|----------------------------|----------|----------|----------|----------|
| Preliminary | 16% | 20% | 24% | 43% |
| Primary | 30% | 28% | 23% | 28% |
| Interplant | 0% | 16% | 7% | 0% |
| Activated Sludge | 14% | 14% | 11% | 8% |
| Trickling Filters | 4% | 10% | 18% | 36% |
| Digesters | 38% | 20% | 27% | 19% |
| Solids Handling Facilities | 37% | 22% | 24% | 20% |
| Central Power Generation | 29% | 11% | 14% | 23% |
| Electrical Distribution | 5% | 5% | 10% | 6% |
| Utilities | 26% | 21% | 26% | 21% |

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

| Process Area | FY 18/19 | FY 19/20 | FY 20/21 | FY 21/22 |
|----------------------------|----------|----------|----------|----------|
| Preliminary | 20% | 8% | 11% | 17% |
| Primary | 17% | 17% | 23% | 26% |
| Interplant | 11% | 14% | 10% | 12% |
| Activated Sludge | 9% | 17% | 19% | 22% |
| Trickling Filters | 18% | 17% | 15% | 17% |
| Digesters | 20% | 16% | 13% | 12% |
| Solids Handling Facilities | 24% | 32% | 21% | 26% |
| Central Power Generation | 23% | 20% | 20% | 13% |
| Electrical Distribution | 13% | 7% | 14% | 6% |
| Utilities | 32% | 31% | 15% | 29% |

The pump station break-in percent is shown in Table 3-7. Many aging pump stations, such as Bay Bridge, Seal Beach, Edinger and Slater, saw an increase in break-in percent that is reflective of the RUL of the pump stations. Bay Bridge, Seal Beach and Edinger pump stations all have replacement projects that are in progress while Slater Pump Station rehabilitation is scheduled to start in a few years. Westside pump station also saw an increase in break-in percent, and while this pump station was rehabilitated in 2008, the original structure was constructed in 1962; and the design of the wet well and pumps present some hydraulic challenges that cause the pumps to require additional maintenance.

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

| Process Area | FY 18/19 | FY 19/20 | FY 20/21 | FY 21/22 |
|--------------|----------|----------|----------|----------|
| 'A' Street | 12% | 4% | 6% | 7% |
| 15th Street | 2% | 7% | 6% | 12% |
| Lido | 36% | 27% | 35% | 24% |
| Bay Bridge | 11% | 18% | 31% | 38% |
| Rocky Point | 20% | 4% | 7% | 13% |
| Bitter Point | 9% | 14% | 14% | 11% |
| Seal Beach | 27% | 14% | 20% | 36% |
| Westside | 3% | 7% | 3% | 14% |
| Edinger | 12% | 18% | 0% | 22% |
| Slater | 17% | 7% | 3% | 16% |
| College | 0% | 2% | 11% | 12% |
| Crystal Cove | 5% | 32% | 6% | 1% |
| Yorba Linda | 0% | 29% | 10% | 0% |
| Main Street | 60% | 4% | 4% | 1% |
| MacArthur | 3% | 28% | 11% | 1% |

The trend in emergency call out work for Electrical and Mechanical assets shown in Figures 3-1 and 3-2, respectively and reflects the demand older assets can have to maintain reliability of a facility.

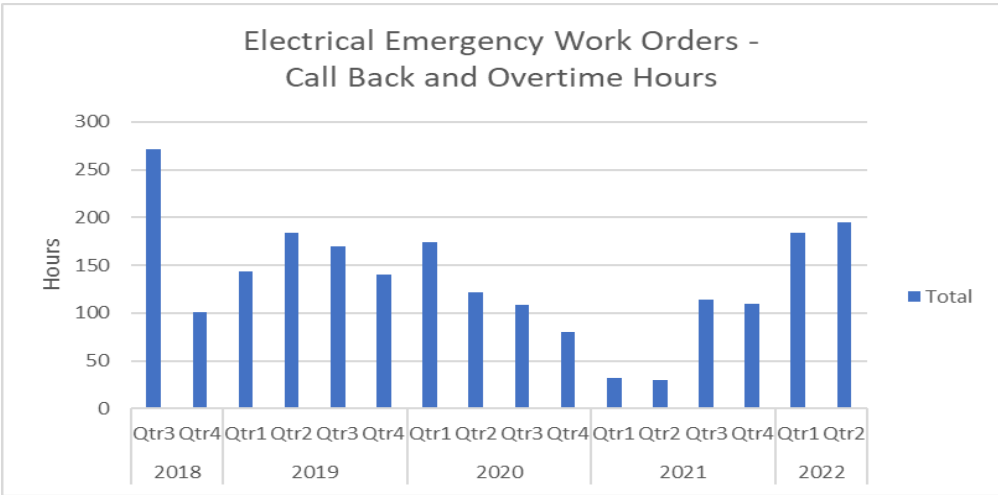


Figure 3-1. Electrical Emergency Work Orders

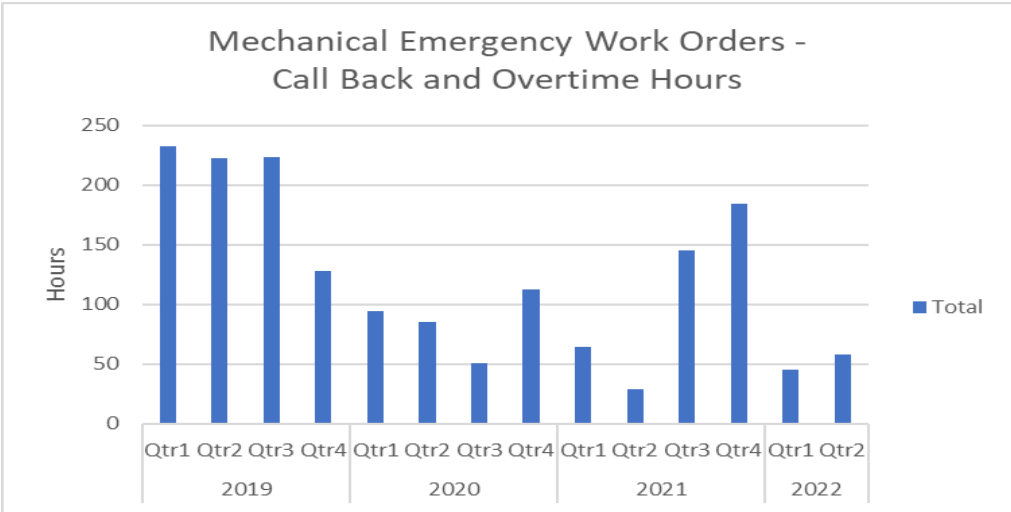


Figure 3-2. Mechanical Emergency Work Orders

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 work at the Plant 1 Sunflower pumps, waste side stream pump station and the gas compressors. All three areas have future projects that will rehabilitate or replace the equipment. We expect the trend for Electrical break-in/emergency work to trend down as more electrical projects are implemented to replace or upgrade aging assets. Overall, mechanical break-in/emergency work continues to trend down over time which is a good indicator on the effectiveness of the Asset Management Program.

3.2.3 Maintenance Costs and Labor Hours

OC San uses the maintenance costs and number of labor hours over time as trend indicators to indicate the amount of resources devoted to reliably maintaining the process areas. Figure 3-3 shows Maintenance costs (materials and services) per FY broken down by process area at Plant 1. The data indicates that there has been a large increase in maintenance costs at

Plant No. 1 Solids Handling due to high cost to maintain the new dewatering equipment and contracts with manufactures of the equipment.

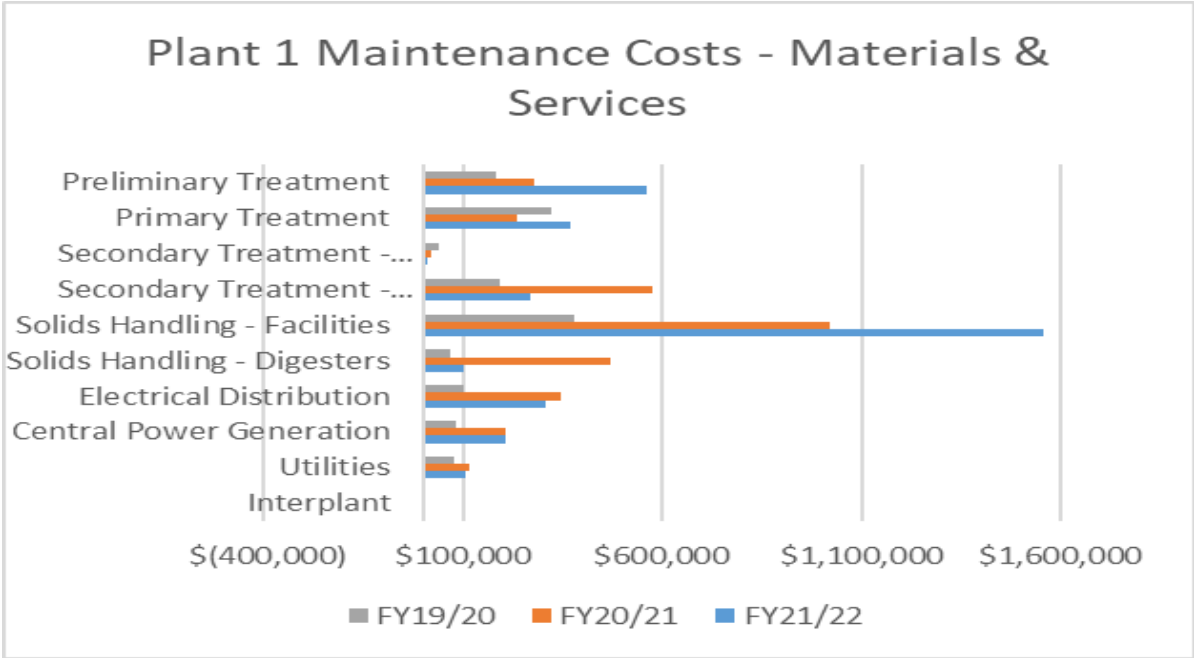


Figure 3-3. Graph of Maintenance Costs (Materials and Services) at Plant No. 1

Figure 3-4 shows Maintenance labor hours per FY broken down by process area at Plant 1. The labor hours are high at the Plant No.1 secondary facility because of the older equipment at activated sludge facility 1 which is scheduled for rehabilitation under project P1-140. The labor hours are also high at the solids handling facility because the new thickening and dewatering process has more complex equipment that requires more staff to operate and maintain.

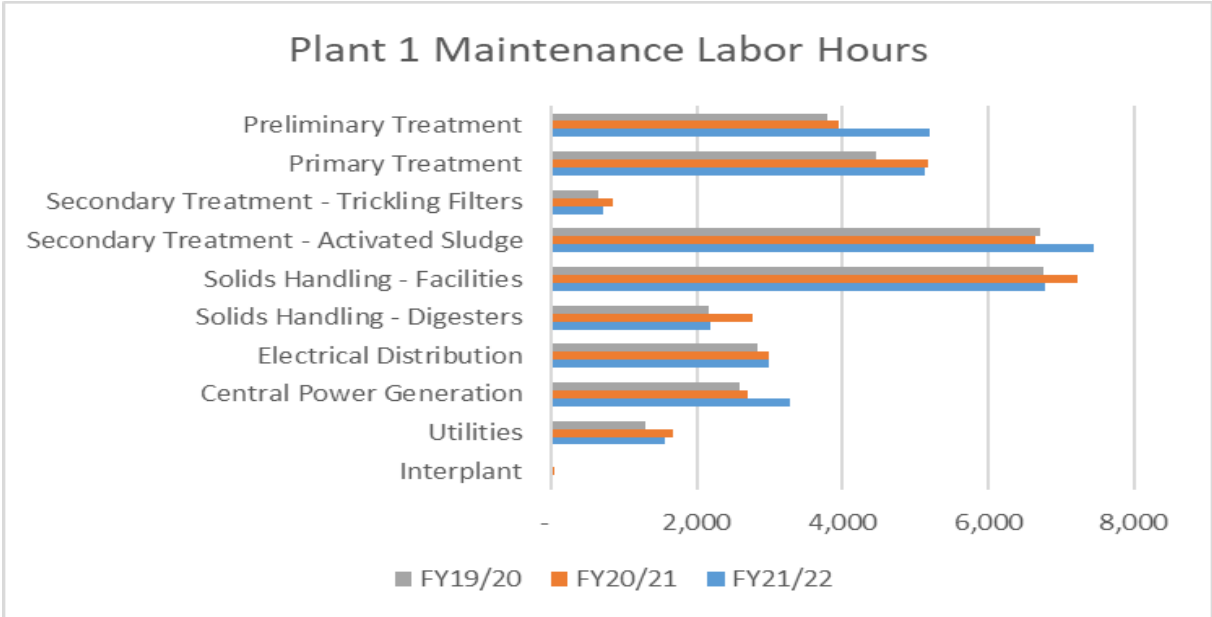


Figure 3-4. Graph of Maintenance Labor Hours at Plant No. 1

Figure 3-5 shows Maintenance costs (materials and services) per FY broken down by process area at Plant 2. The maintenance cost at Plant No. 2 were higher for FY21/22 for the secondary treatment process because of the oxygen pipe repairs due to accelerated corrosion. It is also higher for solids handling because of the complex dewatering and odor control equipment illustrated on Figure 3-5. Figure 3-6 shows Maintenance labor hours per FY broken down by process area at Plant 2.

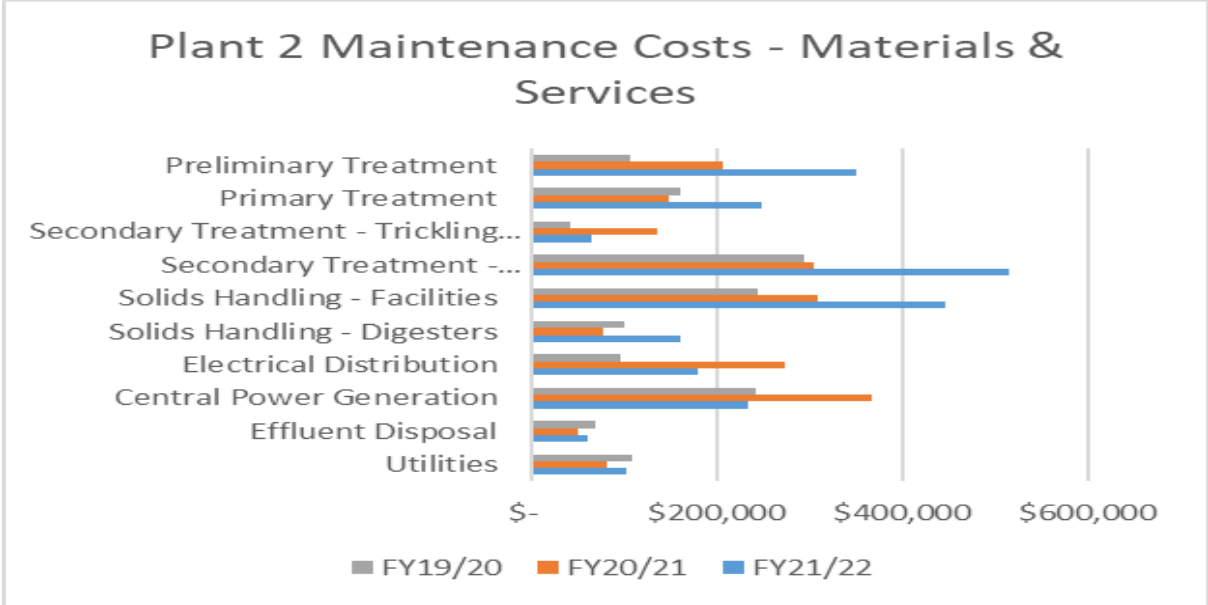


Figure 3-5. Graph of Maintenance Costs (Materials and Services) at Plant No. 2

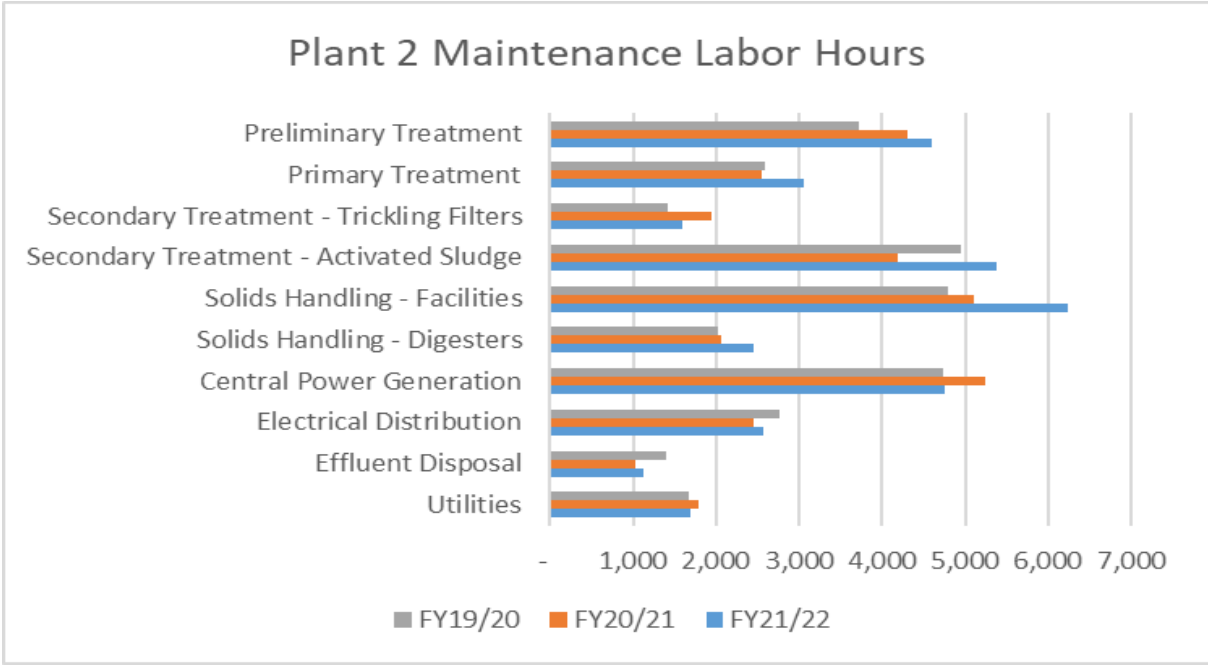


Figure 3-6. Graph of Maintenance Labor Hours at Plant No. 2

Maintenance labor hours and costs for the pump stations are included below in Figure 3-7 and Figure 3-8 below. There is a large increase in maintenance costs at the Slater Pump Station due to aging pumps requiring repair and rebuilding. This was also noticed with the increase in labor hours, break-in percent and decrease in the proactive percentage. Another large increase as compared to the previous year is at Crystal Cove pump station where both pumps had volute replacement due to corrosion/erosion. There is also an increase in labor hours at Seal Beach pump station due to the needs for staff to support current construction projects at the pump station.

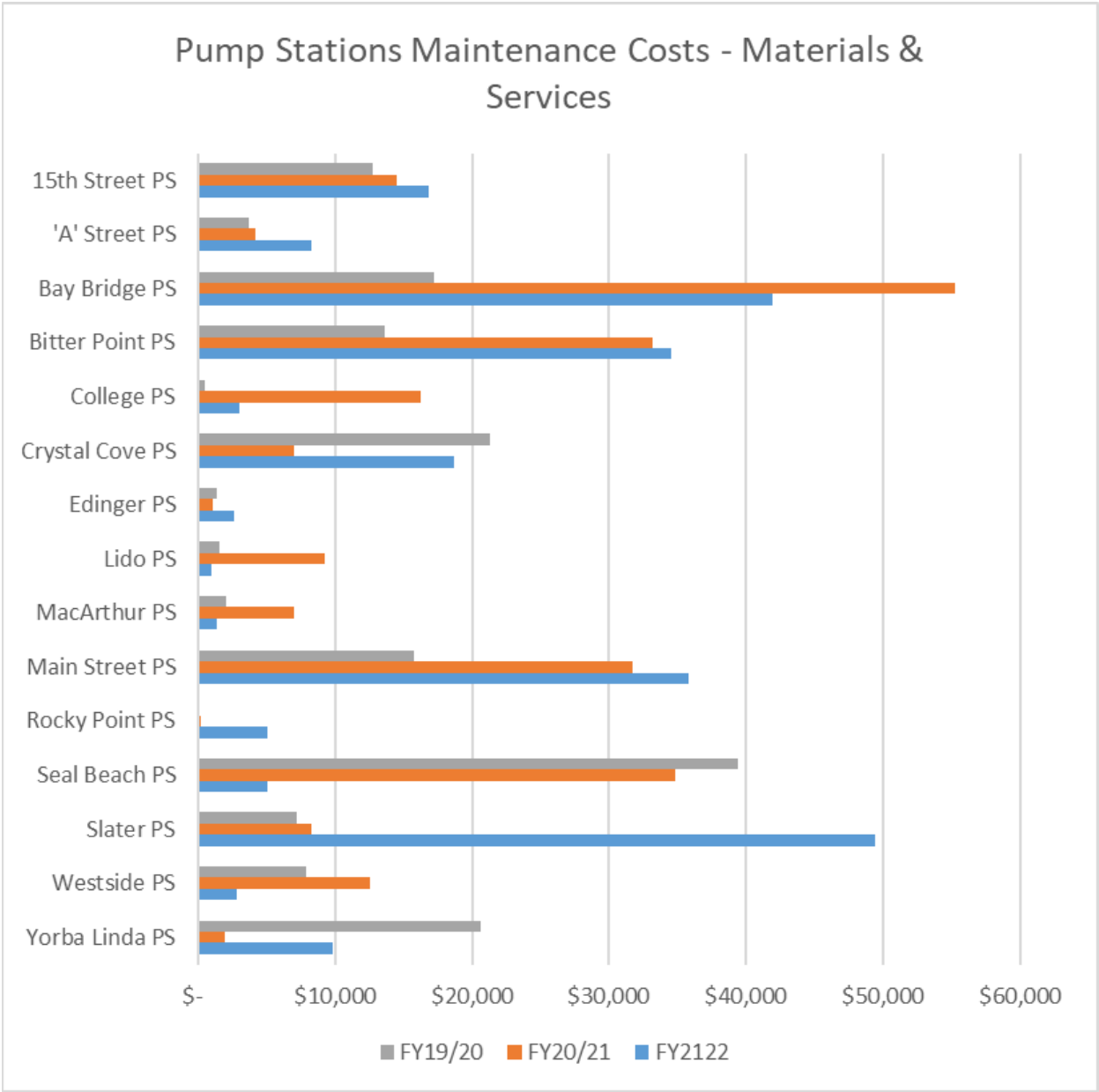


Figure 3-7. Graph of Pump Station Maintenance Costs (Materials and Services)

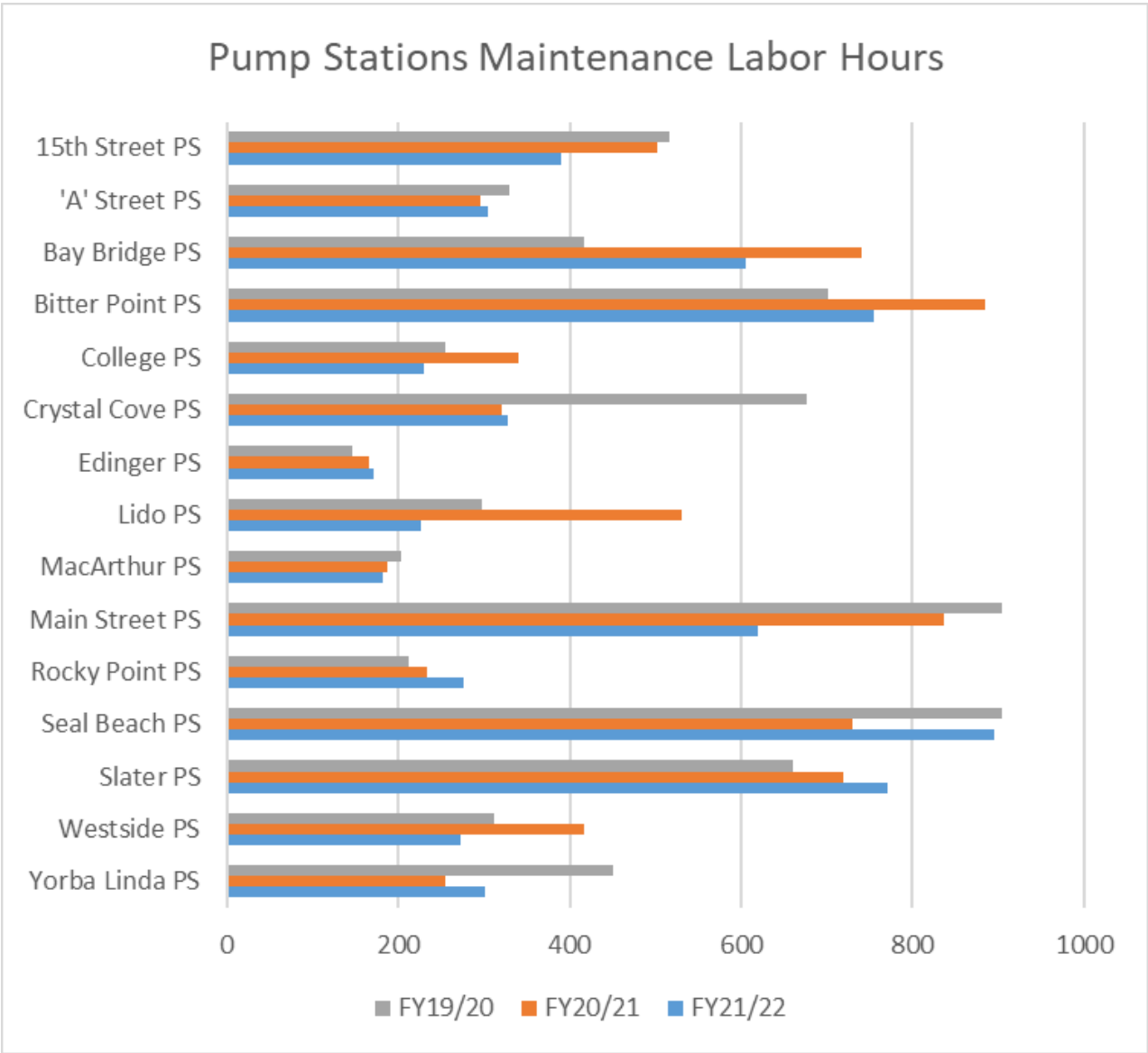


Figure 3-8. Graph of Pump Station Maintenance Labor Hours

3.2.4 Collection Level of Service Results

OC San monitors several level 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 three fiscal years are presented in Table 3-8 below.

SSO events are primarily caused due to 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 and prevent SSOs from occurring. Also see Section 3.4.4.2 for details on a new root control blanket contract for further preventive maintenance efforts.

Nuisance odors are actively managed by the ROCCS program through means of regular chemical dosing and caustic dumps at key locations, hydrogen sulfide monitoring, etc. The number of odor complaints are monitored to determine the effectiveness of chemical dosing, flow diversions, etc. to mitigate nuisance odors and prevent resulting corrosion damage to OC San's Collection assets. In recent fiscal years odor complaints in the Collection system have steadily declined given the precision and effectiveness of the ROCCS program.

The condition of assets in the Collection system are monitored via the *CCTV program* which inspects all gravity sewer and manhole assets every five (5) years. OC San manages three (3) CCTV Contractors which provide inspection media and reports to OC San with asset details as well as defects discovered per National Association of Sewer Service Companies (NASSCO) standards. OC San recently completed the latest five (5) year CCTV program for pipelines and has restarted the program for FY 22-23. Efforts to optimize pipeline CCTV in the past fiscal year were successful to meet the level of service goal.

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 Info Asset Planner for further evaluation and to continue building a comprehensive database of CCTV inspection data. Now that about 1,400 (31%) of OC San's manholes have been inspected since the start of the manhole CCTV program, we are now able to accurately define future gravity sewer projects for manhole rehabilitation and replacement.

Table 3-8. Collection Level of Service Results

| Description | Level of Service Target | FY 19/20 | FY 20/21 | FY 21/22 |
|---------------------------|-------------------------|----------|----------|----------|
| SSO per 100 miles | < 2.1 | 0 | 1.3 | 0.3 |
| Number of Odor Complaints | 12 | 9 | 7 | 4 |
| Miles of Pipeline CCTV | 70 mi | 78.4 mi | 60 mi | 71.9 mi |
| Number of Manhole CCTV | 650 | 32 | 465 | 813 |

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 67,000 stored in Maximo®. For the assets associated with process and treatment, there are typically approximately 4,300 active PM work orders and on average 230 of those PMs are related to predictive maintenance activities. A summary and breakdown of the PMs and PdMs are shown on Figure 3-9.

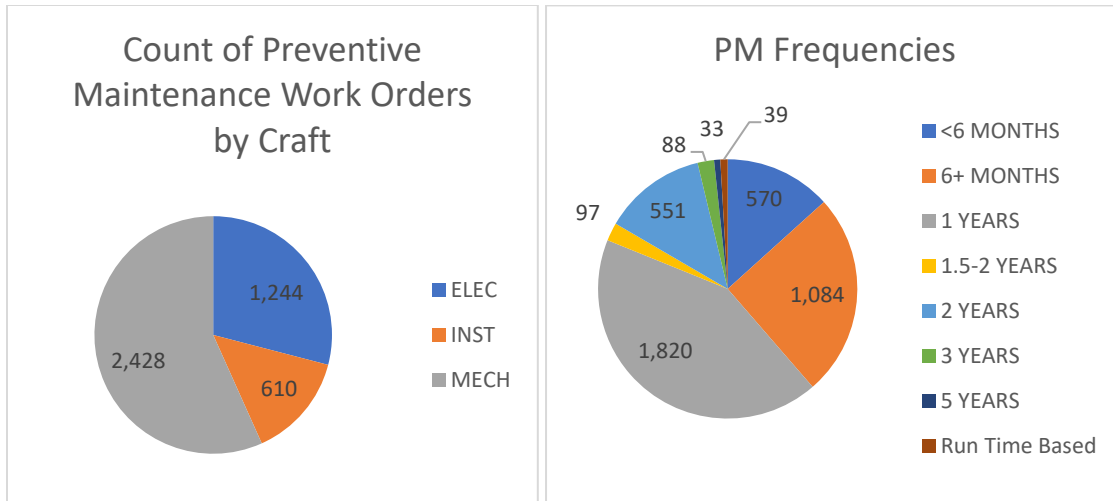


Figure 3-9. PM Workorder Broken Down by Both Craft and Frequency

OC San proactively maintains over 67,000 assets. This includes non-process related assets such as HVAC equipment, lighting, mobile equipment, etc.

3.3.1 Projected Maintenance Costs

The projected maintenance costs over the next two fiscal years in shown in Table 3-9. This accounts for materials and services only but is inclusive of both treatment plants and the collection system. For historical maintenance expenditures, please refer to Chapter 4.

Table 3-9. Projected Maintenance Costs Next 2 Fiscal Years

| | FY 22/23 | FY 23/24 |
|------------------------------------|----------|----------|
| Projected Maintenance Costs | \$22.2M | \$25.6M |

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 sections below are important because they focus on both long-term planning and accomplishments that helped extend the useful life of critical assets, increase reliability, reduce unexpected failures and break-ins allowing OC San to meet the key objectives of the Program.

3.4.1 Condition Assessment Program

Corrosion condition assessments are a key component of the Asset Management Program by providing vital information with respect to the condition and life expectancy of critical plant and collections process structures and equipment. Condition assessments are conducted during scheduled maintenance activities, by staff observations of the condition of an asset or when necessary to determine a more accurate RUL. The Asset Management Team has completed approximately 50 different condition assessments last fiscal year spending just under \$1 million utilizing an outside consultant and contractor. Figure 3.10 provides annual expenditures on the two condition assessment contracts for the last three fiscal years. The 2019/20 expenditures were less because of the pandemic. The expenditures were higher in FY21/22 because more assessments were completed, the cost of incidental repairs on some digesters, and labor cost increases.

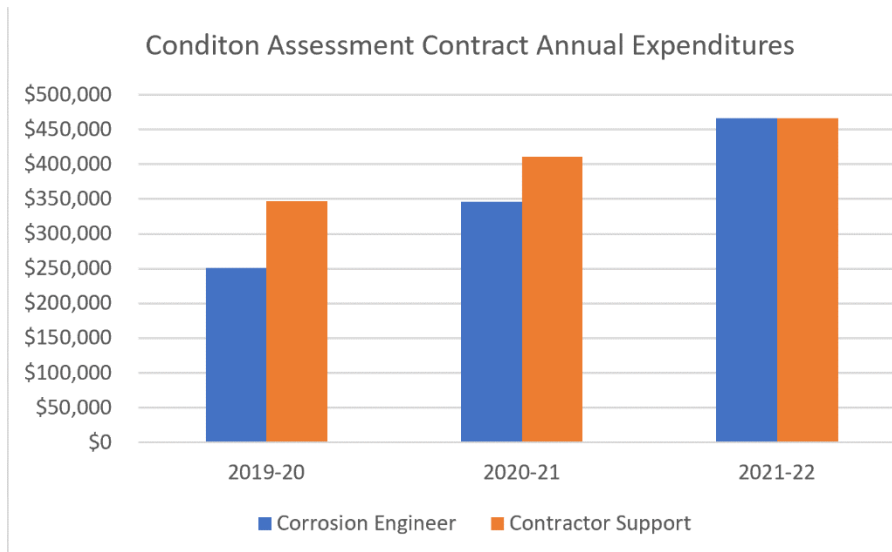


Figure 3-10. Condition Assessment Contract Expenditures

The condition assessments completed included assessing clarifiers, digesters, air and gas piping, primary effluent piping, chemical storage tanks, structural assets, manholes, pumpstation wetwells, cathodic protection, and sump pumps to name a few. These assessments identify deficiencies and the general condition of the assets, but more importantly recommendations for repairs or replacement and general timing based on RUL estimations. Some condition assessments resulted in repairs that extended the useful life of the facility, maintained asset reliability, and identified the need for future improvement projects to keep OC San facilities safe and reliable. Below are a few critical condition assessments completed last year:

- Digester K assessment discovered massive cracking and concrete degradation on the dome of the digester. The digester was placed out of service and will not be used until extensive repairs can be made. The assessment identified an issue that could have been disastrous if the digester remained in-service.
- Digester bridge condition assessment at both Plant 1 and Plant 2 were completed. Three bridges at Plant 2 were blocked for access due the unsafe conditions found. Several repair projects are planned. All the condition assessment findings provided critical information for the repair projects.
- Plant 1 Pressure Manhole. An assessment was completed on two pressure manholes located on the 108" primary effluent line. The assessment discovered a condition that needed immediate repair on eastside pressure manhole. The condition assessment measured a loss of thickness from the manhole cover. A replacement manhole was fabricated and installed before failure. Also, a critical junction box, Primary Effluent Distribution Box No. 2 (PEDB-2) was partially inspected and found to be in good condition.
- Plant 2 Oxygen Activated Sludge Plant Oxygen Piping – Condition assessments identified corrosion and pinholes on the oxygen piping. Repairs were completed that extended the life and reliability of the pipe until a rehabilitation project replaces the piping in the next 8 to 10 years.
- Edinger Pump Station – The condition assessment at the Edinger PS included UT scans of a discharge pipe that has shown signs of corrosion. In 2015 there was a 56% pipe wall loss. The assessment in 2021 the pipe wall loss was 61%. A project is in design that will replace this pump station. The assessment provided information for the engineers to determine an

emergency or short term project to replace the pipe was not required. A contingency plan was prepared as well as continued assessments to monitor the pipe will take place.

3.4.2 Collection System Assets

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

3.4.2.1 Gravity Collections Remaining Useful Life

Over the past 3 years, OC San has aggregated and validated all gravity sewer, siphon, air jumper, and manhole data into a single comprehensive Gravity Collections Asset Registry. Data in the asset registry includes a copy of pertinent GIS data, theoretical RUL, field adjusted RUL, last inspection year, upcoming projects affecting an asset, and next inspection year. In 2021, RUL scoring was determined for the entire Gravity Collections system taking into account NASSCO scoring to complete the asset registry. High risk assets were further evaluated by considering the CoF. In 2022, a new analysis was performed using a weighted LoF formula (based on NASSCO quick scores). RUL scores were finalized by increasing or decreasing RUL scores based on specific CoF and additional LoF factors. As a result of the 2022 RUL analysis, approximately a quarter of Gravity Collections sewer pipelines had RUL scoring revised as compared to the 2021 RUL analysis and all manholes were given RUL scoring (primarily based on theoretical RUL). All Gravity Collection assets now have risk adjusted RUL scores to aid the development, validation, and refinement of the AMP and CIP for the Gravity Collections system.

3.4.2.2 Proactively Monitoring and Managing Operational and Defect Issues

In the Gravity Collection system there are a significant number of operational and structural defects which are isolated from current and future projects and are severe. 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 the sewer pipe wall and develop 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 are high risk given they are precursors to structural deformation and eventual collapse. Rather than create numerous small projects to address current and future isolated and severe asset issues, cost-effective and proactive maintenance-based approaches have been recommended as described below:

- **Root Control:** Create new blanket contract to strategically apply herbicide with a foaming agent into select sewers for root control on an annual basis. After exposing live roots via mechanical cutting, the active ingredient in the root control treatment kill roots in the sewer (without killing the plant they originate from) and prevent regrowth typically for two (2) to three (3) years. OC San is currently evaluating the bid for this contract prior to awarding.
- **Infiltration Control:** Create new blanket contract to strategically plug infiltration runners and gushers with chemical grouting and remove large calcified deposits mechanically. OC San is currently developing the scope of work.
- **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 work packages, priority, and developing the scope of work.

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. Of particular concern is that 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. CCTV cannot see 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 high. In response, OC San is performing sonar inspections of select large diameter sewers and inverted siphons to quantify debris and sediment, validate the cleansing state of sewers suspected to be non-cleansing, and ultimately provide Maintenance recommendations on which large diameter sewers and inverted siphons need to be cleaned regularly to adequately mitigate this risk. OC San has completed evaluating bids for this contract and moving to Committee and Board approval to award. Sonar inspections are expected to be completed in the second quarter of 2023.

3.4.2.3 Pump Station Isolation

Pump station reliability is critical to convey wastewater to the treatment plants when gravity flow is not an option. In the past, emergency break-in work has been required due to failure of critical assets such as isolation valves at some of the pump stations. With Asset Management Team taking ownership of the pump stations in recent years, OC San is now taking a proactive approach to rehabilitation and repair at the pump stations. For example, three valve replacement projects have recently been completed and two more valve replacement projects, which will replace aging and non-functioning valves at five different pump stations, have been opened. The timing of these projects considers risk and criticality to minimize the risk of emergency work.

3.4.3 Central Generation Facility Planning

The internal combustion engines at Plant No. 1 and Plant No. 2 have significant run time and need a major overhaul to maintain reliability for the next 10 years or longer. Engine No. 1 at Plant recently completed a successful top to bottom end overhaul. The J-135 project will be overhauling the remaining 2 engines at Plant 1 and 5 engines at Plant 2. A recently completed planning study showed that OC San's existing engines can be readily maintained for the next 10 to 20 years. For the long term planning of the Cen Gen Facility, the Energy and Digester Gas Master Plan, PS21-04 is being conducted. This study will evaluate viable alternatives for energy production and digester gas management, considering emerging technologies, market conditions and potential permitting constraints. The Asset Management Team and Maintenance are working together to ensure OC San has a long-term plan to manage energy use, energy production, and handling of digester gas.

3.4.4 Treatment Plant Project Delivery

A major focus of the Asset Management Program is streamlining the replacement or repair of our critical assets to extend RUL. The Asset Management Team works in tandem with Maintenance to identify projects, provide construction bid documents and manage project implementation of Maintenance Projects. Here are a few projects that were driven by Asset Management and Maintenance Teams:

- Condition assessment of Primary Clarifiers 3 and 4 were performed to evaluate their availability during 22/23 wet weather season. Multiple maintenance activities will be completed by the end of October 2022 to address some concerns in the area.
- Several of our critical pumping systems are equipped with VFDs that have become obsolete and can no longer be maintained properly. Projects are in place to replace the obsolete VFDs.
- Condition assessments on anaerobic digesters are completed during the scheduled maintenance cleaning cycle to evaluate and extend the life of the assets when deficiencies

are discovered. The condition assessment includes confined space entry, corrosion assessment, sludge line cleaning with CCTV, concrete core sampling and incidental repairs. This year six digesters were cleaned and assessed. Repairs were completed by the condition assessment contractor and maintenance staff to extend the life and reliability of the assets.

- PS20-03 Truck Loading Bay Odor Control Improvements at Plant No. 2 completed this year to address the odors escaping from the Truck Loading bays during cake loading and haul out. CIP Project P2-140 was developed based on the recommendations of this study that will make the loading of cake into the trucks safe and control odor release to be a good neighbor.
- The trickling filter rotary distributor assemblies at the Trickling Filter Solids Contact Facility at Plant No. 2 had reliability issues due to major equipment failures. Short term repairs and condition assessment for root cause analysis were completed - project MP2-005 was approved to replace the TF-A and TF-B center rotating assemblies with an improved design for better long-term reliability. Project MP2-005 is scheduled to be completed in spring 2023.
- Eleven Plant No. 2 digesters and associated bridges were inspected when the tanks were taken out of service for cleaning. Many urgent repairs were performed and new Maintenance projects were identified. Asset Management is coordinating all the digester-related projects to assure the projects are successfully executed without disruption to O&M activities.
- Oxygen piping leaks and severe corrosion at the Aeration Basin Facility at Plant No. 2 were found during condition assessment. Piping was repaired and coated by Maintenance projects. Pipe supports were also replaced. Oxygen piping will be replaced by CIP Project P2-136.

3.5 Asset Management Program Improvement Opportunities

The Asset Management Program continues to evolve with an emphasis on continuous improvement. The foundational elements of the program have been in place for a few years now, but there still is an emphasis on making sure we know the condition of all of our major assets. As discussed in Section 3.4.1, we continue to perform more condition assessments each year. Condition assessments and asset planning with Operations and Maintenance continue to lead to the identification of new projects and the subsequent updating of the short, medium, and long-term asset management plans described in Chapter 2. Condition assessment improvement opportunities are described in Section 3.5.1 below.

Utilizing and managing available asset data more efficiently is one of the key challenges. Creating asset management and maintenance KPI business intelligence (BI) dashboards will lead us into a more data driven program. A data driven program where we have real time asset information available provides many benefits including more accurate asset condition and RUL ratings, improved collaboration and sharing of information between Asset Management and Maintenance Teams, improved project prioritizing and asset management planning. Developing a risk assessment framework will also improve asset management planning and project prioritizing where decision making can be backed up with both condition and risk scores.

3.5.1 Improvement Opportunities

Condition Assessments:

- Track future condition assessments in the Asset Registries and proactively plan ahead with Operations for assessments that require process interruptions. *STATUS: In progress.*

- Take field measurements to better understand how our major civil and mechanical assets degrade (deteriorate) over time allowing more accurate determination of RUL. *STATUS: In progress.*

Remaining Useful Life:

- Define RUL such that it is clear what factors into a RUL determination. *STATUS: Completed*
- Consider both the risk and consequence of failure when determining asset RUL. *STATUS: In progress.*
- Create more condition scoring categories in the 1-10 year range as RUL accuracy improves over time. *STATUS: Longer term goal (not started).*

Asset Registries

- Ensure all major assets are being monitored and tracked in the Asset Registries. *STATUS: Completed.*
- 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: In progress.*
- Determine the best way to track major assets long term such that the Asset Registries are compatible for BI dashboards. *STATUS: Future Planning Study.*

Asset Hierarchy

- Create an OC San asset hierarchy that is relatable to both Maximo® and the Asset Registries. *STATUS: Not Started.*

Data Driven Asset Management

- Develop real-time BI dashboards that tracks Maintenance KPIs and key asset management information down to the asset level. *STATUS: Future Planning Study.*
- Use BI dashboards algorithms to more accurately estimate asset performance and RUL. *STATUS: Longer term goal (not started).*
- Optimize CIP planning using BI cost and risk modeling and constraints. *STATUS: Longer term goal (not started).*

Risk Assessment (Likelihood and Consequence of Failure)

- Identify a risk assessment approach and develop a framework that fits OC San's needs *STATUS: Future Planning Study.*
- Use risk assessment modeling and scoring to better prioritize projects. *STATUS: Not Started.*

These improvement opportunities will be re-evaluated on a periodic basis as the asset management program and the needs and priorities of OC San change. 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.”

3.6 Reference

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

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4 Budgetary Considerations

The Asset Management Plan 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 been working on developing a 20-year CIP by 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

FY22-23 Budget Update, the first year of the 2-year budget adopted in June 2022, includes updates to the 20-year CIP outlay. Figure 4-1 shows the 20-year CIP outlay, which includes current and projected future CIP projects. FY22-23 CIP Outlay is \$284.6 million and is further divided into process categories shown on Figure 4-2. From the chart, it is apparent that liquid treatment, support facilities, and collection facilities are primary areas where the FY 2022-23 CIP Outlay will be spent.

For liquid treatment, Project No. P1-105 Headworks Rehabilitation at Plant No. 1 and Project No. P2-98 Primary Treatment Rehabilitation Project are expected to be the largest expenditures of \$35 million and \$30.5 million, respectively, in FY 2022-23. For support facilities, Project No. P1-128 Headquarters Complex is the biggest driver with \$61 million in FY 2022-23. Lastly, for collection facilities, Project No. 3-64 Rehab of Western Regional Sewers and Project No. 7-65 Gisler-Red Hill Interceptor & Baker Force Main Rehab take more than half of collections CIP spending of \$17 million and \$10 million, respectively.

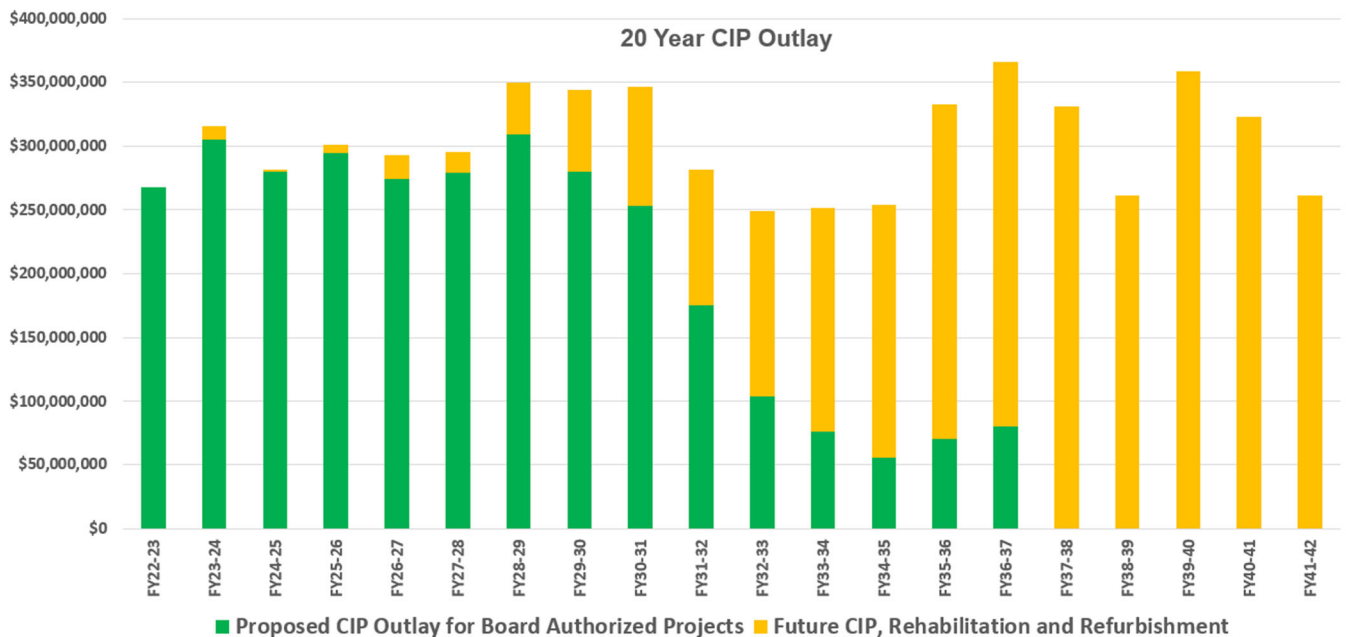
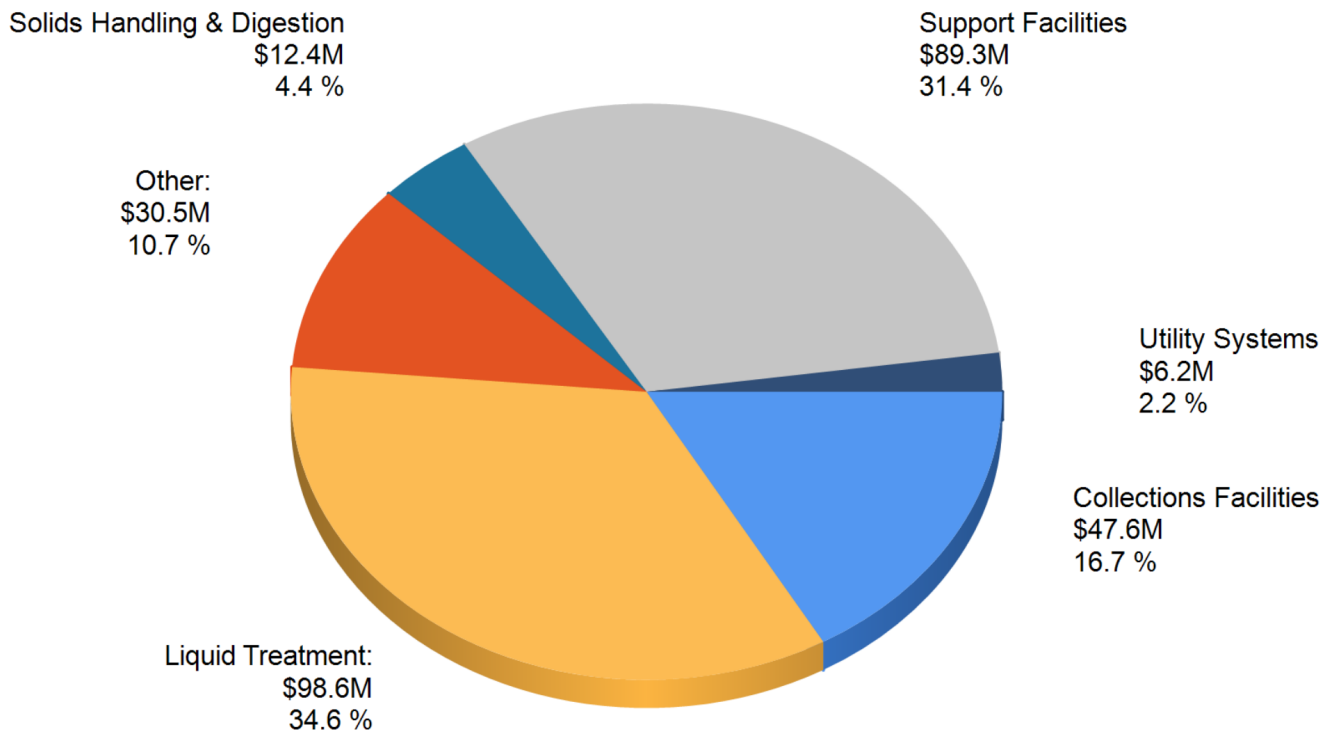


Figure 4-1. 20-Year CIP Outlay**Figure 4-2. FY22-23 CIP Outlay by Process – \$284.6 Million**

4.2 Maintenance Expenditures

4.2.1 Five-Year Historical Maintenance Expenditures

Figure 4-3 and Figure 4-4 show the historical actual spent 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, 54020).
- The collection system expenditures include maintenance services and materials (budget objects 54010, 54020, 53180).
- These costs represent the operations and maintenance costs of fixed assets, including operationally funded repair/replacement projects.

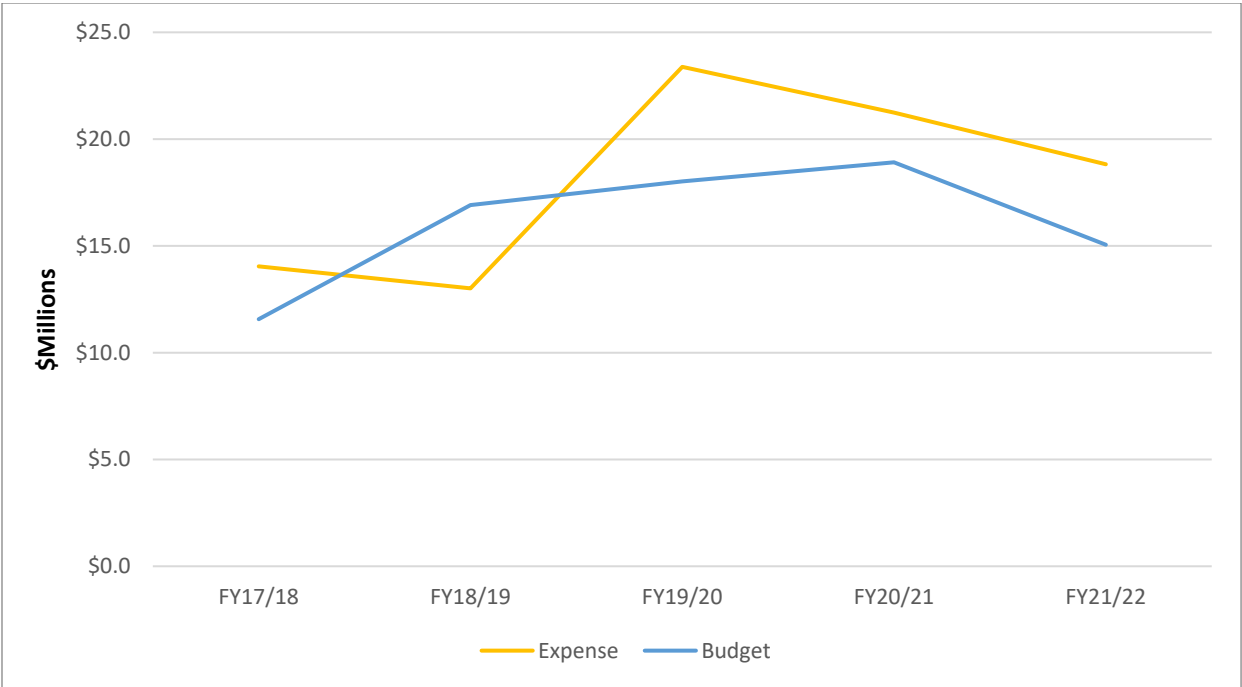


Figure 4-3. Five-Year Historical Maintenance Costs for Treatment Plants

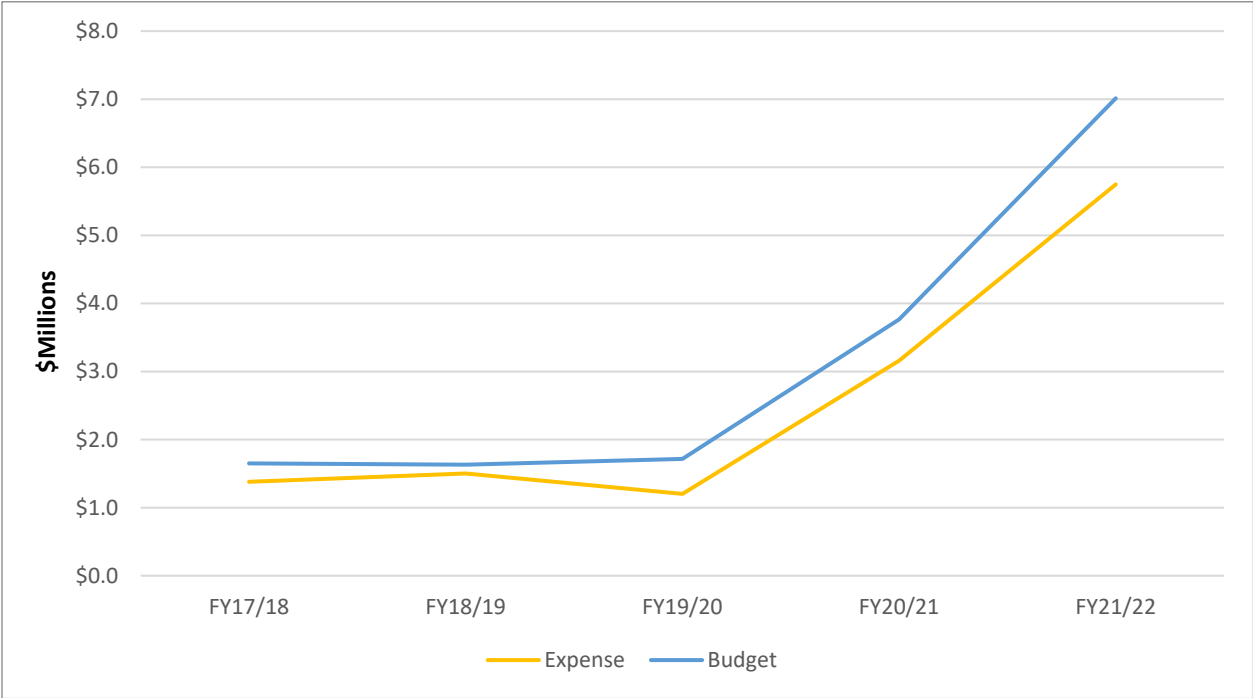


Figure 4-4. Five-Year Historical Maintenance Costs for Collection System

4.2.2 Three-Year Look-Ahead Maintenance Expenditures

Table 4-1 shows operational-funded projects identified to date and includes the projected annual expenditures. The projects are grouped by location (Plant No. 1, Plant No. 2, Joint, and Collection System), and then sorted by the project start fiscal year. The list encompasses projects identified as of August 31, 2022, with an expected construction cost exceeding \$50,000. It is likely FY22-23 and beyond will fluctuate based on the condition of assets as they age. Additionally, projects in the following list represent expenditures that are operationally funded. Some of the projects below that are similar in nature may be combined into a single project for more efficient project execution.

Table 4-1. Planned Operational-Funded Maintenance Projects in FY22-23 through FY24-25 (as of August 31, 2022)

| PRN NO. | Alt Project No. | Project Title | FY22-23 | FY23-24 | FY24-25 | 3-Year Total Cost |
|-----------------------------------|-----------------|--|-----------|-----------|-----------|-------------------|
| Collection System Projects | | | | | | |
| PRN-00159 | MP-307R | Bushard Diversion Structure Repair | \$880,000 | \$320,000 | | \$1,200,000 |
| PRN-00373 | FRC-0014 | Improperly Abandoned Manhole at Magnolia & I-5 | | \$250,000 | \$50,000 | \$300,000 |
| PRN-00449 | FRC-0002 | Bay Bridge Pump Station Valve Replacement | \$200,000 | | | \$200,000 |
| PRN-00592 | FRC-0007 | Redhill Relief Sewer Liner Repair at SR-55 | \$166,000 | | | \$166,000 |
| PRN-00713 | | Manhole Access Improvements on the Santa Ana River Trail | | \$65,000 | | \$65,000 |
| PRN-00728 | FRC-0009 | Repair of Incoming Sewer at Bitter Point Pump Station | \$270,082 | | | \$270,082 |
| PRN-00730 | FRC-0010 | Warner Avenue Vault Cover Replacements | \$364,000 | \$120,000 | | \$484,000 |
| PRN-00734 | FRC-0017 | Slater Pump Station Valve Replacement Project | | \$70,000 | \$105,000 | \$175,000 |

Table 4-1. Planned Operational-Funded Maintenance Projects in FY22-23 through FY24-25 (as of August 31, 2022)

| PRN NO. | Alt Project No. | Project Title | FY22-23 | FY23-24 | FY24-25 | 3-Year Total Cost |
|---|-----------------|--|-------------|-----------|-----------|-------------------|
| Collection System Projects (Continued) | | | | | | |
| PRN-00766 | FRC-0011 | Richfield Sub-trunk Encasement at BNSF Crossing at Orangethorpe Ave. and Richfield Rd. | \$40,000 | \$81,000 | | \$121,000 |
| PRN-00767 | FRC-0018 | Lido PS - Bathroom Reconfigure | | | \$50,000 | \$50,000 |
| PRN-00790 | | Lido PS Valve Replacement | | \$84,000 | \$126,000 | \$210,000 |
| PRN-00828 | | Manhole Adjustments on PCH (Caltrans Paving Project) | | \$627,000 | | \$627,000 |
| PRN-00839 | | Large Diameter Pipeline Sonar Inspections | \$150,000 | | | \$150,000 |
| PRN-00855 | | Gravity Collections Root Control | \$25,000 | \$25,000 | \$25,000 | \$75,000 |
| PRN-00869 | | Manhole Access Improvements to BUS0495-0000 | | \$90,000 | | \$90,000 |
| PRN-00874 | | Gravity Collections Infiltration Control | | \$250,000 | \$250,000 | \$500,000 |
| PRN-00892 | FRC-0017 | Slater Pump Station Wet Well Access Improvement | | \$170,000 | \$255,000 | \$425,000 |
| | 7-66 | Sunflower Trunkline Liner Repairs | \$1,500,000 | | | \$1,500,000 |
| Joint Projects | | | | | | |
| PRN-00630 | FRJ-0003 | Interplant Gas Line Blow Off Vaults | | \$306,000 | \$61,000 | \$367,000 |
| PRN-00699 | | Cen Gen (Joint) Basement Access Hatch Fall Restraint | \$50,000 | | | \$50,000 |

Table 4-1. Planned Operational-Funded Maintenance Projects in FY22-23 through FY24-25 (as of August 31, 2022)

| PRN NO. | Alt Project No. | Project Title | FY22-23 | FY23-24 | FY24-25 | 3-Year Total Cost |
|-----------------------------------|-----------------|--|-----------|-----------|-----------|-------------------|
| Joint Projects (Continued) | | | | | | |
| PRN-00729 | | Combustible Gas Detection Systems Replace | \$500,000 | \$500,000 | \$500,000 | \$1,500,000 |
| PRN-00754 | | District HVAC Assessment for Infectious Aerosol Mitigation | \$93,300 | | | \$93,300 |
| PRN-00811 | | 120-in Ocean Outfall Immediately Required Repairs | \$755,000 | | | \$755,000 |
| PRN-00863 | | Interplant Digester Gas Pipeline Leak Repairs | \$80,000 | | | \$80,000 |
| | | On call HVAC Services | \$90,000 | \$90,000 | | \$180,000 |
| | | On call Medium Voltage Cable Testing Services | \$240,000 | \$200,000 | | \$440,000 |
| | | Purchase of spare centrifuge parts | \$700,000 | | | |
| Plant No. 1 Projects | | | | | | |
| PRN-00492 | FR1-0011 | P1 VFD Replacements | \$250,000 | \$300,000 | \$280,000 | \$830,000 |
| PRN-00492 | FR1-0016 | WSSP VFD Replacements | \$550,000 | | | \$550,000 |
| PRN-00520 | | P1 AS1 Blower Flowmeter Replacement | \$76,500 | | | \$76,500 |
| PRN-00525 | FR1-0005 | P1 Gen Gen 125VDC and 24DC Battery System | \$250,000 | \$295,000 | | \$545,000 |
| PRN-00537 | FR2-0027 | Office Spaces for Heavy Equipment Team | \$50,000 | \$450,000 | | \$500,000 |
| PRN-00540 | FR1-0013 | Maintenance Platform Modifications | \$255,000 | \$750,000 | \$55,000 | \$1,300,000 |

Table 4-1. Planned Operational-Funded Maintenance Projects in FY22-23 through FY24-25 (as of August 31, 2022)

| PRN NO. | Alt Project No. | Project Title | FY22-23 | FY23-24 | FY24-25 | 3-Year Total Cost |
|---|-----------------|--|-----------|-------------|-----------|-------------------|
| Plant No. 1 Projects (Continued) | | | | | | |
| PRN-00567 | | P1 Primary Basin Rebar Protection Blanket Contract | \$130,000 | \$130,000 | | \$260,000 |
| PRN-00618 | FR1-0014 | P1 Laboratory HVAC Controls Repair | \$176,847 | | | \$176,847 |
| PRN-00632 | FR1-0012 | Rebuild Shop Wood Floor Replacement & JIB Crane | \$203,000 | \$203,000 | \$204,000 | \$610,000 |
| PRN-00686 | | Convert Sulfuric Acid Tank to HCl at P1 Solids Scrubber | | | \$220,000 | \$220,000 |
| PRN-00771 | | P1 Bldg. 6 Elevator Modernization | | \$182,000 | | |
| PRN-00778 | | P1 Outlet Installation in Cart Barn | | \$150,000 | | \$150,000 |
| PRN-00800 | FR1-0017 | P1 Trickle Filter Valve Replacement | | \$214,000 | | \$214,000 |
| PRN-00815 | FR1-0018 | P1 Dewatering Diverter Gate Replacement | \$260,000 | \$1,250,000 | \$290,000 | \$1,800,000 |
| PRN-00821 | | P1 T&D Facility Centrifuge Drive Motor Disconnecting Means | | \$150,000 | | |
| PRN-00824 | | P1 12kV Service Center Relay Modifications for Rule 21 | | \$66,700 | | \$66,700 |
| PRN-00829 | | P1 Acid Tank Replacement of Primary Odor Control System | | | | \$62,350 |
| PRN-00840 | | Lab Building Compressor and Vacuum Pump Replacement | \$106,750 | | | \$106,750 |

Table 4-1. Planned Operational-Funded Maintenance Projects in FY22-23 through FY24-25 (as of August 31, 2022)

| PRN NO. | Alt Project No. | Project Title | FY22-23 | FY23-24 | FY24-25 | 3-Year Total Cost |
|---|-----------------|---|-------------|-------------|---------|-------------------|
| Plant No. 1 Projects (Continued) | | | | | | |
| PRN-00854 | | Cen Gen P1 Roof Fall Protection | \$66,000 | | | \$66,000 |
| PRN-00888 | | UST Groundwater Monitoring Well Abandonment | \$50,000 | | | \$50,000 |
| PRN-00890 | | Plant 1 GWR Metering Vault Cable Replacement | | \$350,000 | | \$350,000 |
| | | P1 Digester Cleaning | \$1,500,000 | | | \$1,500,000 |
| | | P1 Centrifuge Maintenance | \$100,000 | | | \$100,000 |
| Plant No. 2 Projects | | | | | | |
| PRN-00536 | | Plant No. 2 Cen Gen Instrument Air Compressor Replacement | \$250,000 | | | \$250,000 |
| PRN-00571 | FR2-0022 | P2 Digester 'O' Structural Repairs | \$89,500 | | | \$89,500 |
| PRN-00572 | FR2-0018 | P2 AS Plant Clarifier Rehab (6) - Phase II | \$2,730,000 | \$2,324,000 | | \$5,054,000 |
| PRN-00633 | FR2-0023 | P2 AS Plant Secondary Clarifier Safety Entry Improvements | \$80,000 | \$385,000 | | \$465,000 |
| PRN-00684 | | P2 Digester Maintenance Projects | \$1,000,000 | | | \$1,000,000 |
| PRN-00742 | FR2-0025 | P2 Digester O-T, R-Q Bridge Repairs | \$400,000 | | | \$400,000 |
| PRN-00768 | FR2-0026 | Headworks 480V Cable Replacement at Plant 2 | | \$780,000 | | \$780,000 |
| PRN-00768 | | Plant 2 Reclaimed Water Valve Installation | \$64,000 | | | \$64,000 |

Table 4-1. Planned Operational-Funded Maintenance Projects in FY22-23 through FY24-25 (as of August 31, 2022)

| PRN NO. | Alt Project No. | Project Title | FY22-23 | FY23-24 | FY24-25 | 3-Year Total Cost |
|---|-----------------|--|-------------|-----------|---------|-------------------|
| Plant No. 2 Projects (Continued) | | | | | | |
| PRN-000837 | | P2 EPSA Pump Room Supply Fan & Ductwork Replacement | \$105,000 | | | \$105,000 |
| PRN-00852 | | P2 AS Plant Oxygen Purge Valve Replacement | | \$300,000 | | \$300,000 |
| PRN-00858 | | Headworks Influent PS PW Repair at P2 | \$80,000 | | | \$80,000 |
| PRN-00859 | | Flare Gas Piping Replacement at P2 | \$100,000 | \$200,000 | | \$300,000 |
| PRN-00865 | | Primary Sedimentation Basin F & G Dome Support Repair at P2 | \$135,000 | \$135,000 | | \$270,000 |
| PRN-00866 | | P2 Trickling Filter A & B Rotary Distributor Center Mast Replacement | \$1,300,000 | | | \$1,300,000 |
| PRN-00873 | | P2 Liquid Oxygen (LOX) Emergency Backup System | \$380,000 | | | \$380,000 |
| PRN-00880 | | Ella Tunnel Plant Water Piping Replacement | | \$100,000 | | \$100,000 |
| PRN-00884 | | Grit Pump Replacement at Plant 2 | \$128,264 | | | \$128,264 |
| PRN-00885 | | Centrifuge Cover Hinge Installation at Plant 2 | | \$130,000 | | \$130,000 |
| PRN-00886 | | Trickling Filter C Repair at Plant 2 | \$55,850 | | | \$55,850 |

Table 4-1. Planned Operational-Funded Maintenance Projects in FY22-23 through FY24-25 (as of August 31, 2022)

| PRN NO. | Alt Project No. | Project Title | FY22-23 | FY23-24 | FY24-25 | 3-Year Total Cost |
|---|-----------------|--|-------------|-----------|-----------|-------------------|
| Plant No. 2 Projects (Continued) | | | | | | |
| PRN-00887 | | Converting Digester O from Working to a Holding Digester | | \$150,000 | \$150,000 | \$300,000 |
| | | P2 Digester Cleaning | \$1,500,000 | | | \$1,500,000 |
| | | P2 Centrifuge Maintenance | \$90,946 | | | \$90,946 |

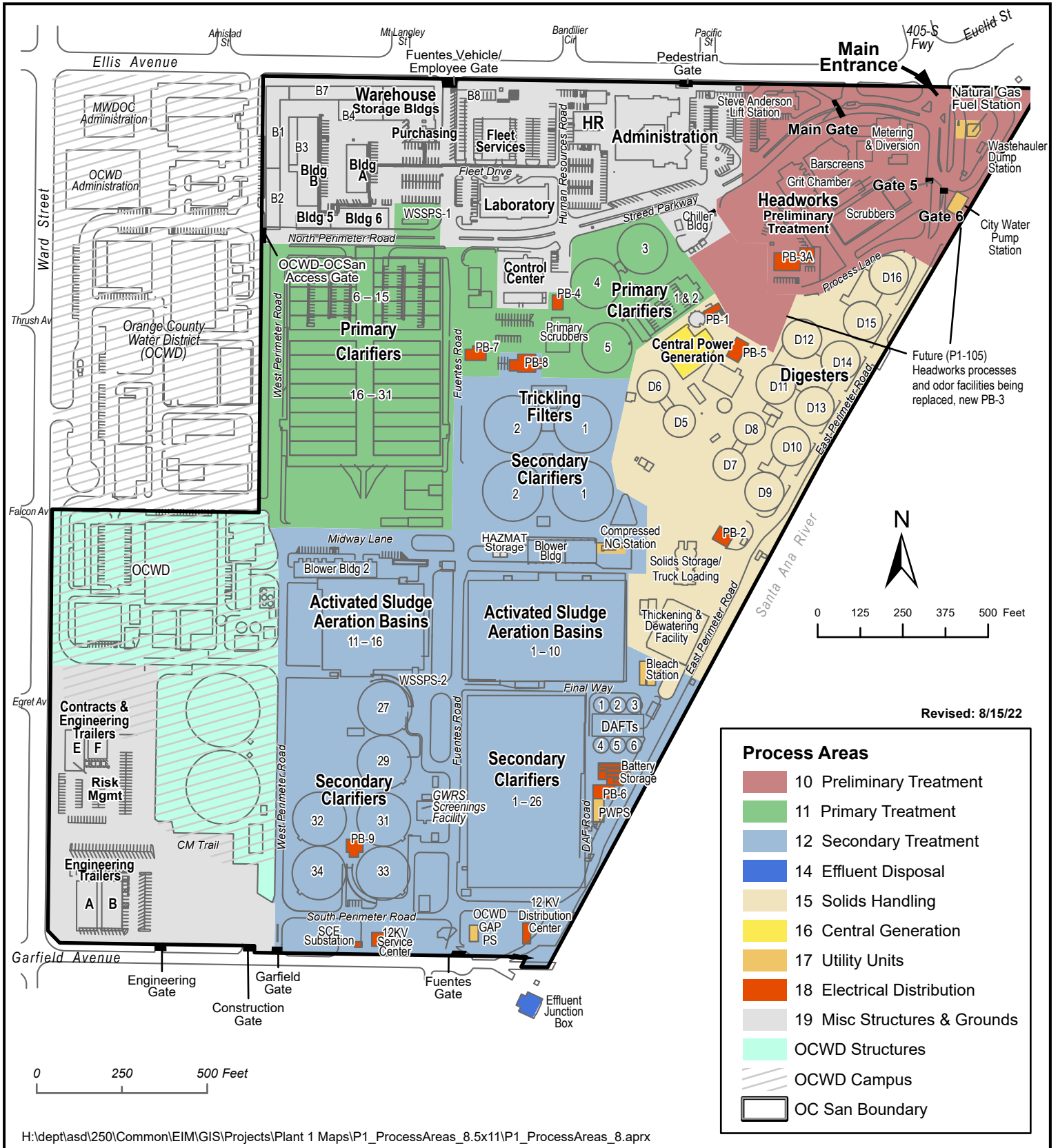
PRN = Project Request Number

Appendix A
Plant No. 1 Process Areas Map

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PROCESS AREAS – Reclamation Plant No. 1



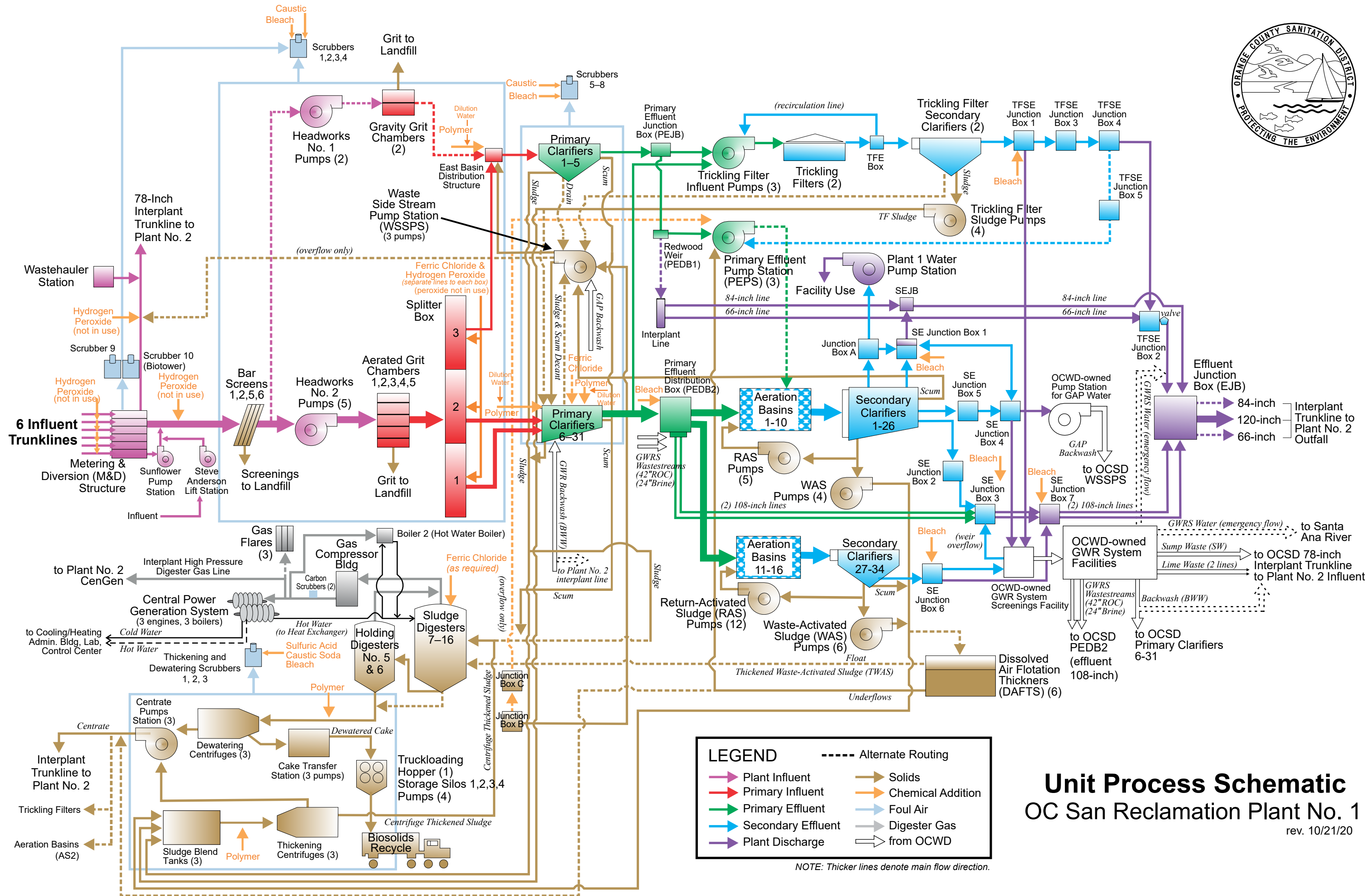
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Appendix B
Plant No. 1 Process Diagram

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LEGEND

| | | | |
|--|--------------------|--|-------------------|
| | Plant Influent | | Alternate Routing |
| | Primary Influent | | Solids |
| | Primary Effluent | | Chemical Addition |
| | Secondary Effluent | | Foul Air |
| | Plant Discharge | | Digester Gas |
| | | | from OCWD |

NOTE: Thicker lines denote main flow direction.

Unit Process Schematic

OC San Reclamation Plant No. 1

rev. 10/21/20

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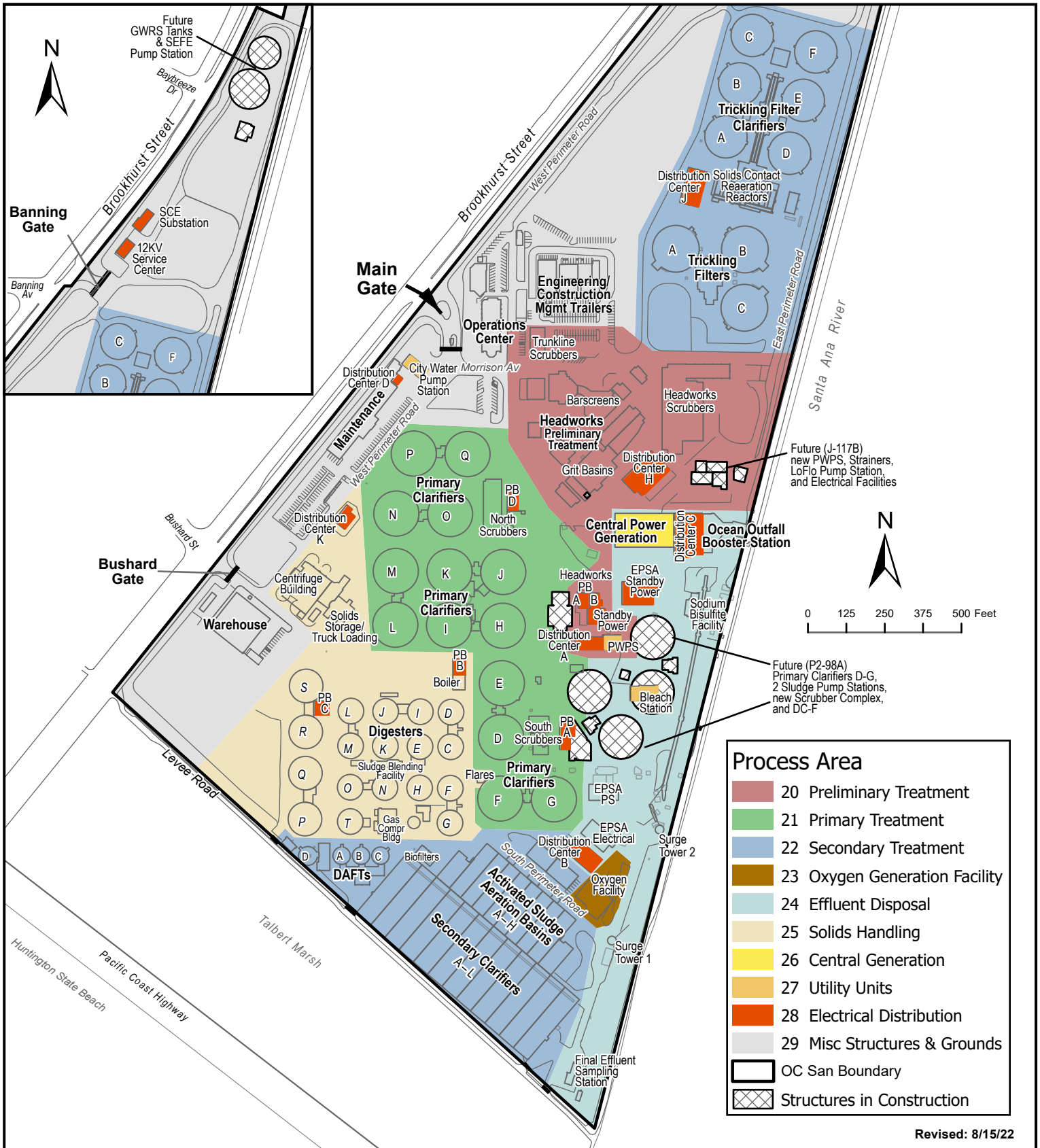


Appendix C
Plant No. 2 Process Areas Map

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PROCESS AREAS – Treatment Plant No. 2



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Appendix D
Plant No. 2 Process Diagram – Before GWRS Expansion

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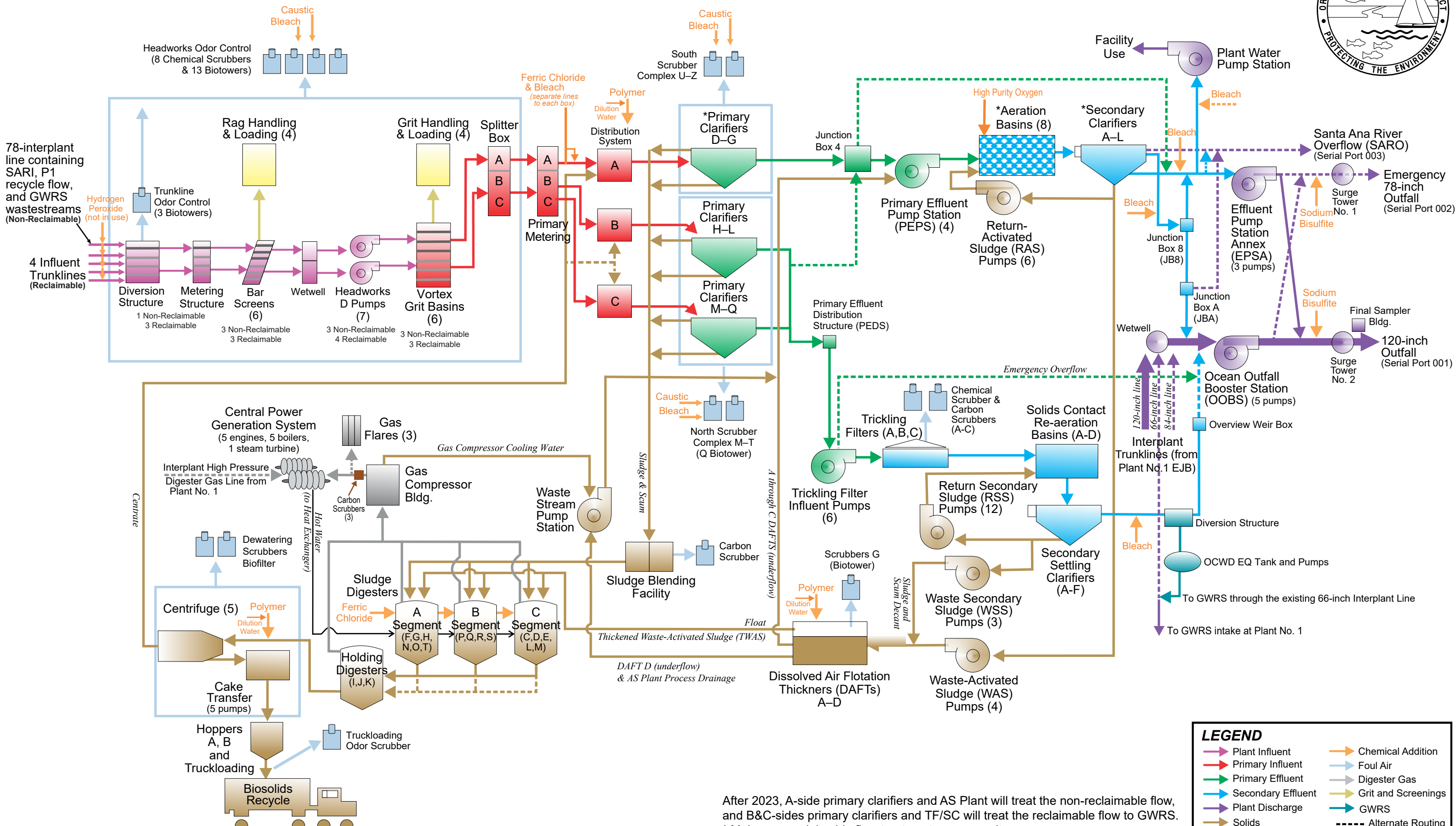
Appendix E
Plant No. 2 Process Diagram – After GWRS Expansion

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Unit Process Schematic — OC San Treatment Plant No. 2

Future Process after GWRs Final Expansion in 2023



After 2023, A-side primary clarifiers and AS Plant will treat the non-reclaimable flow, and B&C-sides primary clarifiers and TF/SC will treat the reclaimable flow to GWRs.
 * Major non-reclaimable flow treatment process units

| LEGEND | | | |
|--------|--------------------|--|---------------------|
| | Plant Influent | | Chemical Addition |
| | Primary Influent | | Foul Air |
| | Primary Effluent | | Digester Gas |
| | Secondary Effluent | | Grit and Screenings |
| | Plant Discharge | | GWRs |
| | Solids | | Alternate Routing |

NOTE: Thicker lines denote main flow direction.

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Appendix F
AM KPI Supplemental Information

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Appendix F

Program Monitoring KPI Data

Plant No. 1 Maintenance Activity Data

| Fiscal Year | | FY21/22 | | | | | |
|---|---------------|---------------|---------------|---------------|--|---------------|----------------|
| Plant | | 1 | | | | | |
| Sum of actlabhrs | | Column Labels | | | | | |
| | | CM | CM Total | Group1 | | Group1 Total | Grand Total |
| Row Labels | CM | | PD | PM | | | |
| Preliminary Treatment | 75.12% | 75.12% | 4.90% | 19.97% | | 24.88% | 100.00% |
| Primary Treatment | 60.06% | 60.06% | 3.92% | 36.02% | | 39.94% | 100.00% |
| Interplant | 41.03% | 41.03% | 0.00% | 58.97% | | 58.97% | 100.00% |
| Secondary Treatment - Activated Sludge | 43.95% | 43.95% | 10.56% | 45.49% | | 56.05% | 100.00% |
| Secondary Treatment - Trickling Filters | 53.30% | 53.30% | 6.31% | 40.39% | | 46.70% | 100.00% |
| Solids Handling - Digesters | 53.05% | 53.05% | 8.63% | 38.32% | | 46.95% | 100.00% |
| Solids Handling - Facilities | 55.84% | 55.84% | 11.64% | 32.52% | | 44.16% | 100.00% |
| Central Power Generation | 37.97% | 37.97% | 20.54% | 41.49% | | 62.03% | 100.00% |
| Electrical Distribution | 23.34% | 23.34% | 22.80% | 53.86% | | 76.66% | 100.00% |
| Utilities | 74.02% | 74.02% | 8.95% | 17.03% | | 25.98% | 100.00% |
| Grand Total | 52.94% | 52.94% | 10.65% | 36.41% | | 47.06% | 100.00% |

Plant No. 1 Maintenance Cost and Labor Hours

| Plant 1 | | | | | |
|---|--------------|--------------|------------|------------|--|
| | FY21/22 | FY20/21 | FY19/20 | FY18/19 | |
| Interplant | \$ 3,871 | \$ 1,274 | \$ 129 | \$ 98 | |
| Utilities | \$ 107,852 | \$ 116,792 | \$ 77,631 | \$ 72,507 | |
| Central Power Generation | \$ 207,719 | \$ 203,897 | \$ 84,162 | \$ 104,694 | |
| Electrical Distribution | \$ 307,243 | \$ 343,786 | \$ 99,052 | \$ 84,335 | |
| Solids Handling - Digesters | \$ 102,912 | \$ 471,345 | \$ 65,939 | \$ 108,286 | |
| Solids Handling - Facilities | \$ 1,555,219 | \$ 1,020,481 | \$ 376,349 | \$ 186,478 | |
| Secondary Treatment - Activated Sludge | \$ 266,568 | \$ 573,375 | \$ 189,689 | \$ 300,845 | |
| Secondary Treatment - Trickling Filters | \$ 11,391 | \$ 19,661 | \$ 36,448 | \$ 8,680 | |
| Primary Treatment | \$ 368,205 | \$ 235,044 | \$ 322,086 | \$ 244,157 | |
| Preliminary Treatment | \$ 560,414 | \$ 277,461 | \$ 182,331 | \$ 126,066 | |

| Plant 1 Labor Hours | | | | |
|--------------------------|---------|---------|---------|---------|
| | FY21/22 | FY20/21 | FY19/20 | FY18/19 |
| Interplant | 20 | 43 | 16 | 33 |
| Utilities | 1,562 | 1,680 | 1,299 | 1,304 |
| Central Power Genera | 3,283 | 2,706 | 2,577 | 2,994 |
| Electrical Distribution | 2,986 | 2,999 | 2,838 | 2,305 |
| Solids Handling - Diges | 2,184 | 2,765 | 2,165 | 2,243 |
| Solids Handling - Facili | 6,782 | 7,215 | 6,754 | 3,499 |
| Secondary Treatment | 7,446 | 6,634 | 6,709 | 8,281 |
| Secondary Treatment | 717 | 860 | 655 | 692 |
| Primary Treatment | 5,129 | 5,164 | 4,464 | 5,000 |
| Preliminary Treatment | 5,195 | 3,954 | 3,784 | 4,355 |

Plant No.1 Maintenance Activity Codes

| Sum of actlabhrs | | Column Labels | | | | | | | | | |
|------------------|---|---------------|--------------|---------------|---------------|---------------|---------------|---------------|--------------|---------------|----------------|
| | | 10 | 10 Total | 20 | 20 Total | 30 | 30 Total | Group1 | | Group1 Total | Grand Total |
| Row Labels | | 10 | 20 | 30 | 40 | 50 | | | | | |
| 1 | | 6.38% | 6.38% | 28.94% | 28.94% | 43.13% | 43.13% | 14.00% | 7.56% | 21.55% | 100.00% |
| | Preliminary Treatment | 2.77% | 2.77% | 18.97% | 18.97% | 35.42% | 35.42% | 18.72% | 24.12% | 42.84% | 100.00% |
| | Primary Treatment | 3.37% | 3.37% | 36.28% | 36.28% | 32.49% | 32.49% | 19.66% | 8.19% | 27.86% | 100.00% |
| | Interplant | 25.64% | 25.64% | 58.97% | 58.97% | 15.38% | 15.38% | 0.00% | 0.00% | 0.00% | 100.00% |
| | Secondary Treatment - Activated Sludge | 7.97% | 7.97% | 37.64% | 37.64% | 46.06% | 46.06% | 5.89% | 2.44% | 8.33% | 100.00% |
| | Secondary Treatment - Trickling Filters | 2.48% | 2.48% | 25.01% | 25.01% | 36.38% | 36.38% | 29.54% | 6.59% | 36.14% | 100.00% |
| | Solids Handling - Digesters | 11.90% | 11.90% | 27.60% | 27.60% | 41.55% | 41.55% | 12.75% | 6.19% | 18.95% | 100.00% |
| | Solids Handling - Facilities | 4.76% | 4.76% | 14.36% | 14.36% | 60.46% | 60.46% | 15.43% | 5.00% | 20.43% | 100.00% |
| | Central Power Generation | 3.88% | 3.88% | 31.46% | 31.46% | 41.20% | 41.20% | 18.08% | 5.38% | 23.45% | 100.00% |
| | Electrical Distribution | 17.10% | 17.10% | 46.84% | 46.84% | 30.27% | 30.27% | 3.78% | 2.01% | 5.78% | 100.00% |
| | Utilities | 6.31% | 6.31% | 23.63% | 23.63% | 48.74% | 48.74% | 17.88% | 3.44% | 21.32% | 100.00% |
| | Grand Total | 6.38% | 6.38% | 28.94% | 28.94% | 43.13% | 43.13% | 14.00% | 7.56% | 21.55% | 100.00% |

Plant No. 2 Maintenance Activity Data

| | | | | | | | |
|------------------|---|---------------|---------------|---------------|---------------|---------------|----------------|
| Fiscal Year | FY21/22 | | | | | | |
| Plant | 2 | | | | | | |
| Sum of actlabhrs | | Column Labels | | | | | |
| | | CM | CM Total | Group1 | | Group1 Total | Grand Total |
| Row Labels | | CM | | PD | PM | | |
| | Preliminary Treatment | 45.49% | 45.49% | 10.32% | 44.19% | 54.51% | 100.00% |
| | Primary Treatment | 61.83% | 61.83% | 1.96% | 36.21% | 38.17% | 100.00% |
| | Effluent Disposal | 41.03% | 41.03% | 7.68% | 51.29% | 58.97% | 100.00% |
| | Secondary Treatment - Activated Sludge | 50.27% | 50.27% | 7.80% | 41.93% | 49.73% | 100.00% |
| | Secondary Treatment - Trickling Filters | 38.65% | 38.65% | 6.37% | 54.99% | 61.35% | 100.00% |
| | Solids Handling - Digesters | 49.20% | 49.20% | 12.18% | 38.62% | 50.80% | 100.00% |
| | Solids Handling - Facilities | 59.30% | 59.30% | 10.88% | 29.82% | 40.70% | 100.00% |
| | Central Power Generation | 33.38% | 33.38% | 11.44% | 55.17% | 66.62% | 100.00% |
| | Electrical Distribution | 25.19% | 25.19% | 22.02% | 52.79% | 74.81% | 100.00% |
| | Utilities | 56.92% | 56.92% | 15.39% | 27.68% | 43.08% | 100.00% |
| | Grand Total | 47.42% | 47.42% | 10.43% | 42.15% | 52.58% | 100.00% |

Maintenance Cost and Labor Hours at Plant No. 2

| Plant 2 | | | | |
|---|------------|------------|------------|------------|
| | FY21/22 | FY20/21 | FY19/20 | FY18/19 |
| Utilities | \$ 102,743 | \$ 80,937 | \$ 108,149 | \$ 58,099 |
| Effluent Disposal | \$ 59,967 | \$ 50,630 | \$ 68,107 | \$ 29,777 |
| Central Power Generation | \$ 233,256 | \$ 367,368 | \$ 241,524 | \$ 194,064 |
| Electrical Distribution | \$ 179,106 | \$ 273,276 | \$ 95,924 | \$ 77,611 |
| Solids Handling - Digesters | \$ 161,736 | \$ 76,496 | \$ 101,361 | \$ 118,599 |
| Solids Handling - Facilities | \$ 446,100 | \$ 309,869 | \$ 244,815 | \$ 410,645 |
| Secondary Treatment - Activated Sludge | \$ 514,521 | \$ 305,721 | \$ 293,271 | \$ 228,999 |
| Secondary Treatment - Trickling Filters | \$ 65,575 | \$ 135,668 | \$ 41,765 | \$ 29,523 |
| Primary Treatment | \$ 248,595 | \$ 149,015 | \$ 161,145 | \$ 151,689 |
| Preliminary Treatment | \$ 350,177 | \$ 206,639 | \$ 107,316 | \$ 153,001 |

| Plant 2 Labor Hours | | | | |
|------------------------------|---------|---------|---------|---------|
| | FY21/22 | FY20/21 | FY19/20 | FY18/19 |
| Utilities | 1,691 | 1,782 | 1,677 | 1,146 |
| Effluent Disposal | 1,126 | 1,038 | 1,401 | 1,418 |
| Electrical Distribution | 2,567 | 2,443 | 2,773 | 2,763 |
| Central Power Generation | 4,748 | 5,232 | 4,726 | 3,607 |
| Solids Handling - Digesters | 2,445 | 2,064 | 2,015 | 2,082 |
| Solids Handling - Facilities | 6,236 | 5,098 | 4,789 | 4,891 |
| Secondary Treatment | 5,370 | 4,180 | 4,944 | 5,049 |
| Secondary Treatment | 1,599 | 1,940 | 1,412 | 1,354 |
| Primary Treatment | 3,062 | 2,547 | 2,581 | 2,165 |
| Preliminary Treatment | 4,587 | 4,301 | 3,710 | 3,639 |

Plant No.2 Maintenance Activity Codes

| Sum of actlabhrs | Column Labels | | | | | | | | | |
|---|---------------|--------------|---------------|---------------|---------------|---------------|---------------|--------------|---------------|----------------|
| | 10 10 Total | | 20 20 Total | | 30 30 Total | | Group1 | | Group1 Total | Grand Total |
| Row Labels | 10 | 20 | 30 | 40 | 50 | | | | | |
| 2 | 6.11% | 6.11% | 26.50% | 26.50% | 49.69% | 49.69% | 13.54% | 4.16% | 17.70% | 100.00% |
| Preliminary Treatment | 12.74% | 12.74% | 20.73% | 20.73% | 49.73% | 49.73% | 11.52% | 5.29% | 16.80% | 100.00% |
| Primary Treatment | 5.72% | 5.72% | 17.16% | 17.16% | 50.76% | 50.76% | 23.17% | 3.19% | 26.36% | 100.00% |
| Effluent Disposal | 4.77% | 4.77% | 41.87% | 41.87% | 36.12% | 36.12% | 7.59% | 9.64% | 17.23% | 100.00% |
| Secondary Treatment - Activated Sludge | 4.99% | 4.99% | 41.39% | 41.39% | 41.80% | 41.80% | 9.86% | 1.96% | 11.82% | 100.00% |
| Secondary Treatment - Trickling Filters | 2.31% | 2.31% | 22.83% | 22.83% | 53.19% | 53.19% | 20.58% | 1.08% | 21.66% | 100.00% |
| Solids Handling - Digesters | 16.76% | 16.76% | 18.98% | 18.98% | 52.72% | 52.72% | 8.71% | 2.83% | 11.55% | 100.00% |
| Solids Handling - Facilities | 2.41% | 2.41% | 12.54% | 12.54% | 59.37% | 59.37% | 17.15% | 8.54% | 25.68% | 100.00% |
| Central Power Generation | 2.10% | 2.10% | 21.88% | 21.88% | 62.55% | 62.55% | 12.35% | 1.11% | 13.46% | 100.00% |
| Electrical Distribution | 7.49% | 7.49% | 61.92% | 61.92% | 24.85% | 24.85% | 2.57% | 3.16% | 5.74% | 100.00% |
| Utilities | 4.35% | 4.35% | 26.49% | 26.49% | 39.91% | 39.91% | 24.33% | 4.92% | 29.25% | 100.00% |
| Grand Total | 6.11% | 6.11% | 26.50% | 26.50% | 49.69% | 49.69% | 13.54% | 4.16% | 17.70% | 100.00% |

Pump Station Maintenance Activity Data

| | | | | | | |
|--------------------|---------------|---------------|--------------|---------------|---------------|----------------|
| Fiscal Year | FY21/22 | | | | | |
| Plant | PS | | | | | |
| Sum of actlabhrs | | Column Labels | | | | |
| | CM | CM Total | Group1 | | Group1 Total | Grand Total |
| Row Labels | CM | | PD | PM | | |
| 'A' Street PS | 32.76% | 32.76% | 6.06% | 61.18% | 67.24% | 100.00% |
| 15th Street PS | 14.87% | 14.87% | 3.97% | 81.15% | 85.13% | 100.00% |
| Lido PS | 28.48% | 28.48% | 8.61% | 62.91% | 71.52% | 100.00% |
| Bay Bridge PS | 55.18% | 55.18% | 5.99% | 38.83% | 44.82% | 100.00% |
| Rocky Point PS | 23.96% | 23.96% | 10.40% | 65.64% | 76.04% | 100.00% |
| Bitter Point PS | 15.74% | 15.74% | 5.80% | 78.46% | 84.26% | 100.00% |
| Seal Beach PS | 49.59% | 49.59% | 1.76% | 48.64% | 50.41% | 100.00% |
| Westside PS | 20.42% | 20.42% | 5.86% | 73.72% | 79.58% | 100.00% |
| Edinger PS | 26.35% | 26.35% | 13.97% | 59.68% | 73.65% | 100.00% |
| Slater PS | 26.83% | 26.83% | 3.63% | 69.53% | 73.17% | 100.00% |
| College PS | 13.71% | 13.71% | 8.71% | 77.58% | 86.29% | 100.00% |
| Crystal Cove PS | 19.62% | 19.62% | 8.82% | 71.56% | 80.38% | 100.00% |
| Yorba Linda PS | 0.83% | 0.83% | 5.47% | 93.70% | 99.17% | 100.00% |
| Main Street PS | 23.77% | 23.77% | 4.52% | 71.71% | 76.23% | 100.00% |
| MacArthur PS | 16.74% | 16.74% | 8.50% | 74.76% | 83.26% | 100.00% |
| Grand Total | 27.95% | 27.95% | 5.61% | 66.44% | 72.05% | 100.00% |

Maintenance Cost and Labor Hours at Pump Stations

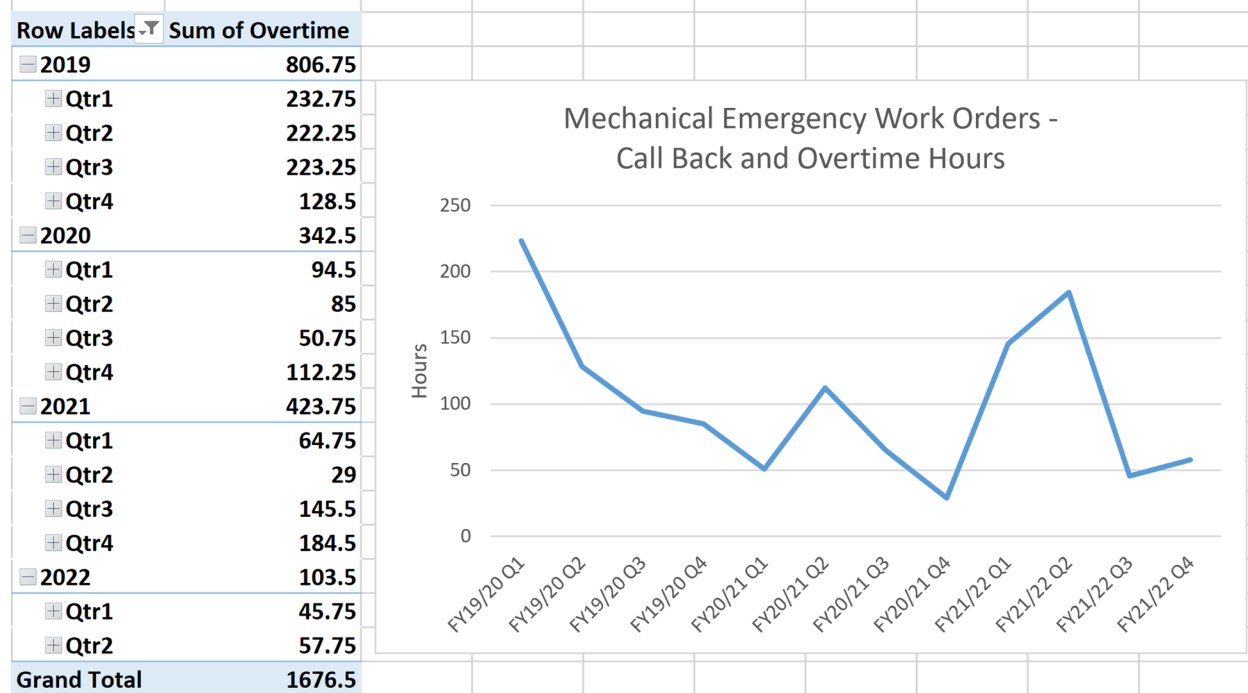
| Pump Stations | FY2122 | FY20/21 | FY19/20 | FY18/19 |
|-----------------|-----------|-----------|-----------|------------|
| Yorba Linda PS | \$ 9,846 | \$ 1,899 | \$ 20,572 | \$ 467 |
| Westside PS | \$ 2,753 | \$ 12,561 | \$ 7,862 | \$ 39,372 |
| Slater PS | \$ 49,393 | \$ 8,200 | \$ 7,190 | \$ 30,382 |
| Seal Beach PS | \$ 4,983 | \$ 34,840 | \$ 39,357 | \$ 4,877 |
| Rocky Point PS | \$ 5,045 | \$ 126 | \$ 95 | \$ 4,270 |
| Main Street PS | \$ 35,790 | \$ 31,724 | \$ 15,705 | \$ 120,387 |
| MacArthur PS | \$ 1,279 | \$ 6,951 | \$ 1,974 | \$ 1,144 |
| Lido PS | \$ 961 | \$ 9,256 | \$ 1,564 | \$ 16,070 |
| Edinger PS | \$ 2,635 | \$ 1,040 | \$ 1,303 | \$ 3,915 |
| Crystal Cove PS | \$ 18,675 | \$ 7,000 | \$ 21,309 | \$ 3,489 |
| College PS | \$ 3,026 | \$ 16,210 | \$ 461 | \$ 1,578 |
| Bitter Point PS | \$ 34,543 | \$ 33,194 | \$ 13,573 | \$ 37,860 |
| Bay Bridge PS | \$ 41,966 | \$ 55,315 | \$ 17,214 | \$ 4,052 |
| 'A' Street PS | \$ 8,207 | \$ 4,188 | \$ 3,683 | \$ 8,184 |
| 15th Street PS | \$ 16,826 | \$ 14,467 | \$ 12,704 | \$ 24,944 |

| Pump Stations Labor Hours | | | | |
|---------------------------|---------|---------|---------|---------|
| | FY21/22 | FY20/21 | FY19/20 | FY18/19 |
| Yorba Linda PS | 301.75 | 255.5 | 450 | 193 |
| Westside PS | 273 | 416.75 | 311.5 | 288 |
| Slater PS | 770.5 | 719.25 | 661 | 634.5 |
| Seal Beach PS | 894.75 | 729.75 | 905 | 550.5 |
| Rocky Point PS | 276.5 | 232.75 | 213 | 263 |
| Main Street PS | 619.5 | 837 | 905 | 1311.5 |
| MacArthur PS | 182.25 | 186.5 | 203.5 | 175.5 |
| Lido PS | 226.5 | 531.5 | 298.25 | 433.25 |
| Edinger PS | 171.75 | 165.75 | 147.25 | 146.75 |
| Crystal Cove PS | 328.75 | 321.5 | 676.25 | 410 |
| College PS | 229.75 | 339.75 | 255.75 | 191.75 |
| Bitter Point PS | 754.25 | 884.75 | 701 | 558.5 |
| Bay Bridge PS | 605.25 | 740.75 | 417.25 | 377.5 |
| 'A' Street PS | 305.25 | 296 | 329.5 | 279 |
| 15th Street PS | 390 | 502 | 516.25 | 448.75 |

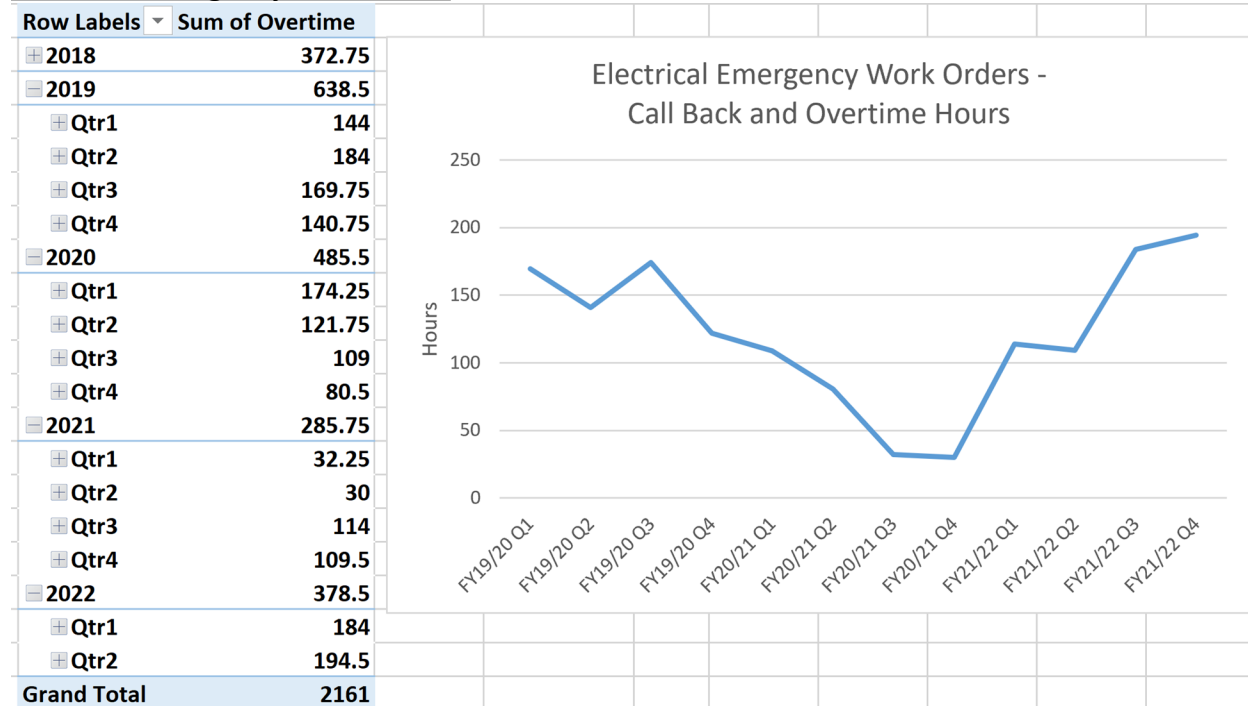
Pump Station Maintenance Activity Codes

| Sum of actlabhrs | Column Labels | | 10 10 Total | | 20 20 Total | | 30 30 Total | | Group1 | | Group1 Total | Grand Total |
|---------------------------|---------------|--------------|---------------|---------------|---------------|---------------|--------------|--------------|---------------|----------------|--------------|-------------|
| | Row Labels | 10 | 20 | 30 | 40 | 50 | | | | | | |
| PS | 4.45% | 4.45% | 36.65% | 36.65% | 42.74% | 42.74% | 9.09% | 7.07% | 16.16% | 100.00% | | |
| 'A' Street PS | 5.32% | 5.32% | 7.45% | 7.45% | 79.85% | 79.85% | 2.95% | 4.42% | 7.37% | 100.00% | | |
| 15th Street PS | 2.18% | 2.18% | 45.77% | 45.77% | 40.51% | 40.51% | 0.38% | 11.15% | 11.54% | 100.00% | | |
| Lido PS | 8.39% | 8.39% | 28.59% | 28.59% | 38.63% | 38.63% | 12.58% | 11.81% | 24.39% | 100.00% | | |
| Bay Bridge PS | 2.40% | 2.40% | 18.26% | 18.26% | 41.43% | 41.43% | 14.75% | 23.17% | 37.92% | 100.00% | | |
| Rocky Point PS | 5.15% | 5.15% | 32.91% | 32.91% | 48.92% | 48.92% | 3.25% | 9.76% | 13.02% | 100.00% | | |
| Bitter Point PS | 3.18% | 3.18% | 21.51% | 21.51% | 64.67% | 64.67% | 6.86% | 3.78% | 10.64% | 100.00% | | |
| College PS | 4.79% | 4.79% | 25.79% | 25.79% | 57.89% | 57.89% | 2.29% | 9.25% | 11.53% | 100.00% | | |
| Crystal Cove PS | 4.49% | 4.49% | 55.13% | 55.13% | 39.62% | 39.62% | 0.00% | 0.76% | 0.76% | 100.00% | | |
| Yorba Linda PS | 4.39% | 4.39% | 83.51% | 83.51% | 12.10% | 12.10% | 0.00% | 0.00% | 0.00% | 100.00% | | |
| Main Street PS | 7.51% | 7.51% | 43.50% | 43.50% | 48.02% | 48.02% | 0.73% | 0.24% | 0.97% | 100.00% | | |
| MacArthur PS | 7.27% | 7.27% | 55.83% | 55.83% | 35.80% | 35.80% | 1.10% | 0.00% | 1.10% | 100.00% | | |
| SARI Metering Station | 0.00% | 0.00% | 60.06% | 60.06% | 22.19% | 22.19% | 17.75% | 0.00% | 17.75% | 100.00% | | |
| Seal Beach PS | 4.86% | 4.86% | 31.18% | 31.18% | 28.11% | 28.11% | 31.77% | 4.08% | 35.85% | 100.00% | | |
| Westside PS | 7.14% | 7.14% | 19.32% | 19.32% | 59.52% | 59.52% | 8.79% | 5.22% | 14.01% | 100.00% | | |
| Edinger PS | 6.11% | 6.11% | 56.19% | 56.19% | 15.87% | 15.87% | 21.83% | 0.00% | 21.83% | 100.00% | | |
| Slater PS | 2.56% | 2.56% | 52.11% | 52.11% | 29.53% | 29.53% | 2.53% | 13.27% | 15.80% | 100.00% | | |
| Gisler Air Jumper Station | 0.00% | 0.00% | 0.00% | 0.00% | 87.65% | 87.65% | 12.35% | 0.00% | 12.35% | 100.00% | | |
| Grand Total | 4.45% | 4.45% | 36.65% | 36.65% | 42.74% | 42.74% | 9.09% | 7.07% | 16.16% | 100.00% | | |

Mechanical Emergency Work Hours



Electrical Emergency Work Hours





Orange County Sanitation District
Engineering Planning Division
10844 Ellis Avenue
Fountain Valley, California 92708-7018
714.962.2411 | www.ocsan.gov