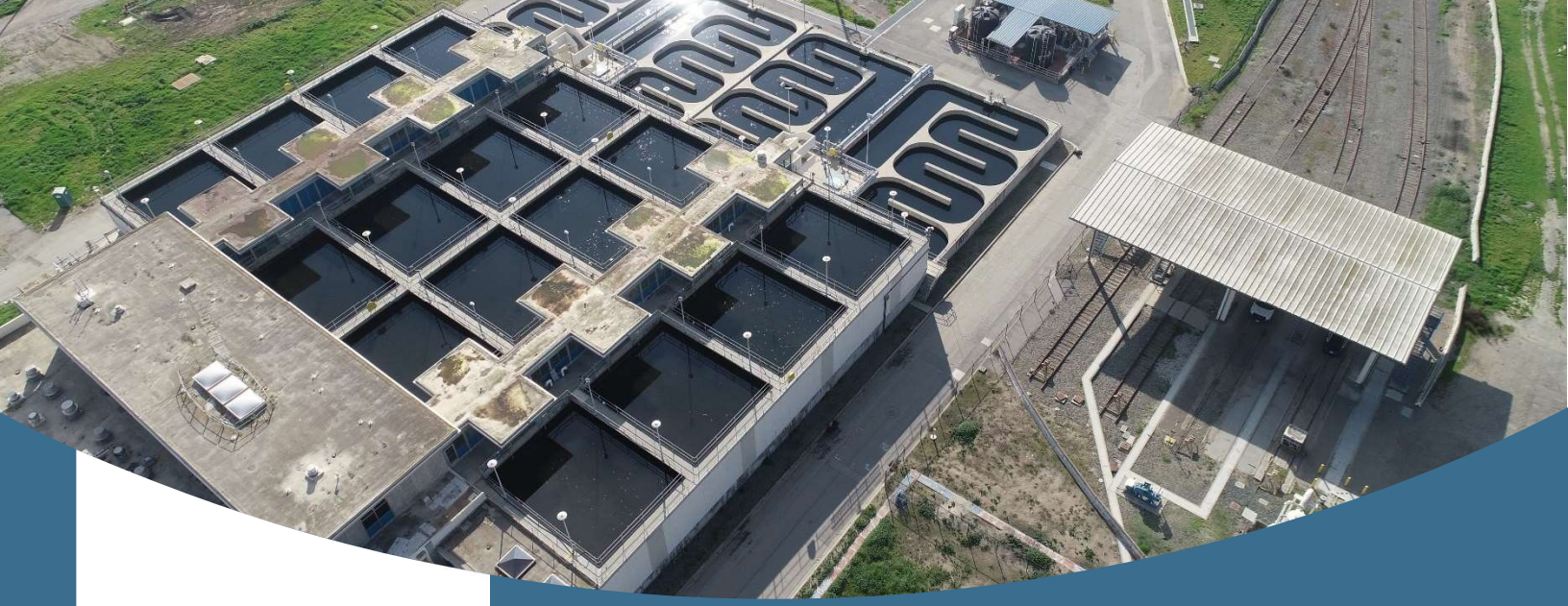
San José-Santa Clara
Regional Wastewater Facility

CIP

CAPITAL IMPROVEMENT PROGRAM

Quarterly Status Report:
April – June 2022

MISSION
Rebuild and revitalize the Regional Wastewater Facility and deliver the CIP on time and within budget.



CAPITAL IMPROVEMENT PROGRAM

HOW ARE WE DOING?

Key Performance Indicators (KPI) Year-to-Date:

SAFETY
1 Incident

EXPENDITURES
On Target

ENVIRONMENTAL
0 Permit Violations

LEGEND

●	On Target
▲	Alert
◆	At Risk

The San José-Santa Clara Regional Wastewater Facility (RWF) is the largest advanced wastewater treatment facility in the western United States. The RWF has been treating the South Bay's wastewater and protecting public health and the environment without interruption since 1956. The discharge of clean wastewater into the South San Francisco Bay contributes to diverse and thriving fish and wildlife ecosystems.

Much of the RWF's infrastructure is functioning well beyond its intended use. As a result of a long and thoughtful Master Plan process, a $2.1 billion, 30-year Capital Improvement Program (CIP) is modernizing and refurbishing the RWF so that its critical work can continue into the future. Homes and businesses in Silicon Valley need a modern, reliable, state-of-the-art treatment plant to ensure a high quality of life and thriving economy. The CIP is rebuilding RWF infrastructure and updating treatment processes with innovative, efficient new technologies. The first phase of the CIP is a 10-year plan that began in 2014, with a budget of $1.4 billion.

After registering more than one million hours of safe work, the CIP unfortunately recorded its first Occupational Safety and Health Administration (OSHA) reportable incident, a fatality in June. The incident on June 14 involved a contract employee with Kiewit Infrastructure West Co. working on the Advanced Facility Control and Meter Replacement Phase 2 Project. The City of San José extend our sincere condolences to the family of the worker and are fully cooperating with the ongoing Cal/OSHA investigation of this tragic incident.

This report summarizes the CIP's progress and highlights accomplishments from April to June 2022.

CIP Celebrates Digester Upgrades Completion!

By: Kerrie Romanow, ESD Director

Seven years is a long time for any project. For the Digester and Thickener Facilities Upgrade Project, it's been seven years of extremely complex work involving several highly skilled teams, elevating gas lines from underground tunnels, designing and constructing multiple new facilities and retrofitting existing facilities. The project reached substantial completion on April 20, 2022, and is expected to be fully operational by October 2022.

A key component of wastewater treatment, digesters are large tanks in which anaerobic bacteria break down wastewater solids, or sludge, producing biogas that helps generate power for the RWF. Like other RWF infrastructure, digesters work nonstop to treat waste. Eventually, that can take its toll. Built between 1956 and 1983, some of the RWF's 16 anaerobic digesters were experiencing structural damage or mechanical failure and urgently needed refurbishment.

The project started in 2015, recommended by the 2013 Plant Master Plan and the 2014 Council-approved Biosolids Transition Strategy, which sought to convert the RWF's digesters from a low-temperature mesophilic single-phase digestion process to a more efficient, two-phased process known as Temperature-Phased Anaerobic Digestion (TPAD). Upgrading digesters to the TPAD process improves gas production, enabling the RWF to meet more of its energy needs, while reducing sludge volume and the number of required digesters.

Construction started in June 2016. Four of the existing digesters were converted to TPAD. The project also constructed a new primary sludge screening facility to provide cleaner primary sludge, improving anaerobic process efficiency; rehabilitated existing dissolved air flotation thickener (DAFT) tanks, including adding covers and odor control; removed existing digester gas lines from tunnels for improved employee safety and installed them on new elevated pipe racks; and installed new odor control facilities to treat foul air from the primary sludge screening facility and the DAFT tanks.

Testing, startup and functional commissioning of various individual equipment and facilities began in July 2019. Following completion of functional testing, the next phase of the project startup involved sending primary sludge to the new sludge screening building and mixing polymer into the primary sludge. Afterwards, the thickened primary sludge was pumped to the DAFT tanks to co-thicken with the waste activated sludge.

Finally in August 2021, Walsh began the commissioning process for the four TPAD digesters and appurtenances. After completing the functional testing of the digesters, pumps, piping systems and heat exchangers with water, Walsh started seeding the TPAD digesters using sludge from the mesophilic digesters. The seeding process is essential to allow anaerobic bacteria to grow in the new TPAD digesters.

After the initial seeding of the TPAD digesters was completed successfully, Walsh then started the process of slowly feeding the co-thickened sludge from the DAFT tanks into the digesters. Staff collect daily samples to measure the amount of volatile fatty acids produced by the anaerobic bacteria in the digesters in order to determine the appropriate feeding rate. The feeding of the TPAD digester is well-underway and expected to be complete in approximately 80 days.

The successful construction and startup of this project is a credit to the highly talented team of contractor staff, CIP team, and designer. "It was really an honor to serve with team members who were so good at solving complex problems," said Project Manager **Virginia Farley**. "I call them the construction Titans!"

RWF Spotlight – M4 Switchgear Replacement Project concludes 10-years of RWF Electrical Upgrades

New M4 Switchgear Installation

Reliable electrical power is critical for RWF operations. For the last 10 years, the RWF has been upgrading its electrical distribution system. The M4 Switchgear Replacement and G3 & G3A Removal Project is the final phase of that effort. Prior to the project, switchgears M1 and M3 were replaced, and switchgear M5 was added to form an electrical "ring bus" with the existing M4 switchgear. That left the M4 switchgear—at more than 30 years old and at the end of its useful life—the weak link in need of replacement. Also, in anticipation of future RWF electrical load increases, the electric current flow capacity on the M4 breakers was increased from 2,000 amps to 3,000 amps.

The project replaced the existing M4 switchgear with a new switchgear with 3,000-amp breakers, while also lowering arc flash levels. The arc flash level is the amount of electrical energy expended during an electrical fault. Protective relays in the new M4 switchgear lower arc flash levels, enhancing staff safety.

Main challenge in project execution was to maintain the continuity of power supply to all RWF critical loads during the M4 switchgear shutdown. An additional hurdle was to synchronize the new equipment with the existing RWF electrical system, power transformers and Distribution Control System. The construction management and project teams worked with the contractor to overcome these constraints and complete all critical items in a timely and professional manner, commissioning the new M4 switchgear before the onset of the 2021 winter wet season. The project was completed five months ahead of the baseline schedule and within the original budget. The project reached substantial completion in May 2022.

"I'm proud to have brought the RWF's electrical upgrades work to such a great finish," said Project Manager and Principal Engineer, **Nelso Petroni**. "This project has increased our electrical power reliability and staff safety, and those are two very important benefits."

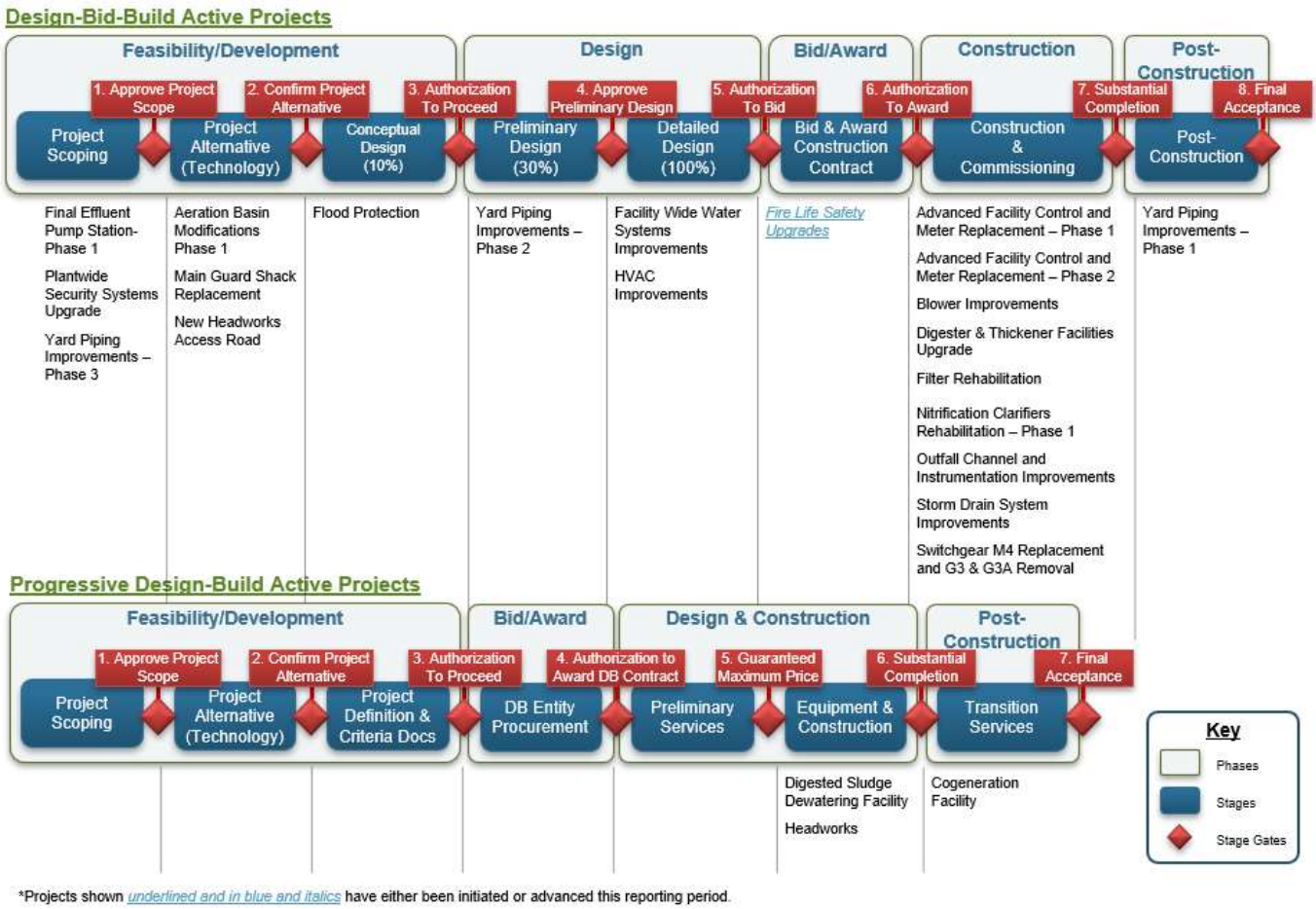
How the CIP Delivers Projects

The CIP uses two project delivery methods:

- **Design-bid-build** is a commonly used delivery method in which an owner first procures a professional engineering firm to prepare detailed design plans and specifications for a project. The owner then procures a general contractor to construct the project, based on the design completed by the engineer.
- **Progressive design-build** is a two-phase delivery method contracted with a single design-build firm in which the project's design, cost estimating, construction schedule, and final guaranteed maximum price (GMP) are developed during the first phase. If the owner and design-builder agree on the schedule and the GMP during the first phase, the final design, construction, and commissioning are completed during the second phase.

All CIP projects, regardless of project delivery method, follow a consistent process of consecutive delivery stages, each culminating in a stage gate, as presented in the project delivery models below. Stage gates are go/no-go points at which the project team must demonstrate that the project has met set evaluation criteria before advancing to the next delivery stage. The benefits of the stage gate process include consistency, quality, ensuring that the scope continues to address existing needs, budget/schedule control, and O&M team engagement.

Project Delivery Models



*Projects shown *underlined and in blue and italics* have either been initiated or advanced this reporting period.

CIP PROJECTS

The CIP includes projects in both design and construction. CIP accomplishments for this quarter are outlined in two sections: Projects in Design and Projects in Construction. The CIP's projects in construction and post-construction phases have cost and schedule baselines that are monitored using the City's Capital Project Management System. Project performance information can be found in the link below:

Project Performance Information

COVID-19 update: From April through June, CIP projects continued to progress despite COVID-19 pandemic impacts. Projects in construction continued with all contractors and construction management (CM) staff following the latest guidance from the Santa Clara County Public Health Officer. The City continued to screen all City, consultant and contractor staff using an online form. During this period CIP staff continued to work both in office and remotely. ESD and PW staff continue to work with the City Attorney's Office to address pandemic-related impacts to construction schedules and costs to ensure a consistent approach to resolving COVID-19-related claims across the City.

Projects in Design

- HVAC Improvements
  In May, consultant Kennedy/Jenks submitted the 100 percent design deliverables for City staff review and comments. The construction contract is expected to advertise in August.

- Flood Protection
  In April, consultant HDR submitted the draft conceptual design report (CDR) for City staff review. The final CDR was received in June.

- Main Guard Shack Replacement Project
  In May, consultant Jacobs submitted the draft CDR for City staff review. The final CDR is expected in July.

- Aeration Basin Modifications – Phase 1
  In May, consultant CDM Smith held the first alternatives analysis workshop. In June, hazardous materials assessment in the east and west primaries and aeration basins commenced and is expected to be completed in July.

- Yard Piping Improvements – Phase 2
  In April, consultant Black & Veatch submitted the draft preliminary design report (PDR) for City staff review. Final PDR was received in June. Also during this period, the project team completed soil boring for hazardous materials survey.

- Yard Piping Improvements - Phase 3
  In June, a project kick-off workshop was held. Also, in June, consultant Black & Veatch submitted a project work plan, health and safety plan and quality management plan for City staff review.

- Plantwide Security System Upgrade
  In June, a project scoping workshop was held with the consultant, Jacobs, RWF O&M staff, and the City project team.

Projects in Construction

This aerial map of the RWF shows the CIP's active construction projects.

1 Advanced Facility Control & Meter Replacement - Phase 1 Project: Reliably controlling processes

Contractors on a final walkthrough of Nitrification B side.

This is the first of a two-phased project. The project will replace aging and outdated RWF control equipment such as flow meters, valves, actuators and sensors. Original manufacturers no longer provide support for the existing equipment. New, reliable controls are vital to maintain effective process control and will ensure that the RWF continues to meet the requirements of the National Pollutant Discharge Elimination System (NPDES) permit.

Project Budget: $12.4 million

Expected Beneficial Use: July 2022

Update:

- In June, contractor Overaa completed operational testing of new equipment installed in the Nitrification Battery B aeration tanks. Resolution of punch-list items continued.

2 Advanced Facility Control & Meter Replacement - Phase 2 Project: Reliably controlling processes

Measurements being taken at Secondary Battery A.

The second part of a two-phased project, this project will replace aging and outdated RWF control equipment such as flow meters, valves, actuators and sensors. Original manufacturers no longer provide support for the existing equipment.

Project Budget: $15.0 million

Expected Beneficial Use: March 2023

Update:

- In April, contractor Kiewit continued resolution of punch-list items and close out activities for Nitrification Battery A and Filtration areas.
- In June, demolition work started in the Secondary Battery A.

3 Blower Improvements Project: Oxygenating wastewater with greater energy efficiency

New motor installed on Secondary Blower #2

RWF's aeration blower systems supply the oxygen needed for breaking down organic material in wastewater. The existing blower systems are more than 30 years old and need rehabilitation. This project will replace blower engines, gearboxes, and associated control equipment, extending the system's useful life and enhancing its energy efficiency.

Project Budget: $51.5 million

Expected Beneficial Use: October 2022

Update:

- In June, contractor Monterey Mechanical completed pre-operational testing on Secondary Blower Building Blowers #2 and #3; and continued rehabilitation of Tertiary Building Blowers #1 and #2.

4 Digested Sludge Dewatering Facility: Drying biosolids more efficiently and effectively

Stone columns being installed for the new dewatering facility.

The RWF currently uses an open-air lagoon and drying bed process to stabilize biosolids before landfill disposal. The 2013 Plant Master Plan recommended transitioning to an enclosed mechanical dewatering process. This project will build a new mechanical dewatering facility and associated support facilities.

Project Budget: $164 million

Expected Beneficial Use: October 2025

Update:

- In June, as part of the early works package, design builder Walsh installed an underground sanitary sewer pipe under the future Dewatering Building, and placed rebar and concrete encasement around the pipe. Walsh also started excavation for process drainpipe installation at the future Truck Loading Building.

5 Digester and Thickener Facilities Upgrade Project: Producing energy, improving treatment

Aerial View of the Digesters

The RWF's 16 digesters use anaerobic digestion to break down sludge. This project will upgrade four of the digesters to improve gas production, reduce sludge volume and reduce the number of digesters required. A new sludge screening building will allow primary sludge to be thickened with secondary sludge before it reaches these upgraded digesters. Six thickening tanks will be renovated to improve efficiency, allowing the RWF to retire 10 older tanks.

Project Budget: $200.1 million

Achieved Beneficial Use: April 2022

Update:

- In April, the project reached substantial completion. Also, City O&M staff completed sludge seeding for all four digesters and started heating the digesters.
- In May, City O&M staff successfully heated all four digesters to thermophilic temperature (131F) and began to slowly feed sludge.

6 Filter Rehabilitation Project: Protecting health and the environment, increasing reliability and capacity

Excavation for electrical duct banks near the Filtration Building.

The filtration process is one of the final steps in wastewater treatment. The RWF's tertiary filtration unit process consists of 16 granular media filters and ancillary equipment. Built in the 1970s and 1980s, these components are near the end of their useful lives. The project will rehabilitate structural, mechanical, electrical and instrumentational elements of the system.

Project Budget: $58.3 million

Expected Beneficial Use: July 2024

Update:

- In May, contractor Walsh completed the removal of surface wash arms, piping and media in four filter basins, and flushed and repaired underdrain tiles.
- In June, four layers of gravel media were placed and leveled in each filter, and air headers were installed in the filters. Walsh also continued installation of conduits for new electrical feeds and controls in the filter building.

7 Headworks Project: New wastewater pretreatment system offers better performance and reliability

Aerial view of the new Raw Sewage Pump Station and Grit Facility.

Headworks pretreatment of raw wastewater enhances and protects downstream treatment processes. This project will replace Headworks 1, the oldest facility in the RWF, with a new Headworks 3, and also modify Headworks 2. The new pretreatment system will be more reliable and will be able to treat projected wet-weather wastewater flows.

Project Budget: $172.6 million

Expected Beneficial Use: June 2023

Update:

- In April, design-builder CH2M finished installing the 96-inch raw sewage pipe and encasement, and miscellaneous metals, handrails and stairs in the grit basin and influent screening area
- In June, CH2M completed the last section of concrete lining in the emergency overflow basin, and placed septage receiving concrete slabs in the influent screening area. Various other electrical and mechanical installations continued as well as pre-operational and functional testing of new equipment.

8 Nitrification Clarifiers Rehabilitation – Phase 1 Project: Improving secondary treatment infrastructure and efficiency

Contractor assembling the clarifier mechanism at nitrification clarifier B6.

Central to the RWF's biological nutrient removal (BNR) process, clarifiers separate sludge from effluent. The 16 existing clarifiers were constructed in the 1970s and 1980s and are near the end of their useful lives. This project will make cost-effective improvements to enhance the clarifiers' efficiency and minimize unscheduled maintenance on them for the next 30 years.

Project Budget: $62.7 million

Expected Beneficial Use: June 2023

Update:

- In April, contractor Overaa installed clarifier center columns, drives and arms in Nitrification Clarifiers B6 & B7, and demolished clarifier mechanisms on the A-side. The Contractor also demolished existing inlet valve box pipes, and pipe trains in the return activated sludge (RAS) gallery, installed eight drain wet valves and new pipe trains and pipe support in the RAS.
- In June, B6 and B7 clarifier mechanism motor power, control, and communication conductors were installed.

9 Outfall Channel and Instrumentation Improvements: Reliable water quality reporting at the edge of the Bay

The weir structure and Sulfur Dioxide building at the outfall channel.

The RWF's final effluent is the end product of the wastewater treatment process and travels through the outfall channel before it reaches Artesian Slough and South San Francisco Bay. This project will replace older, radio transmitter technology with a fiber optic system; install new instruments; construct a large vault structure to install new flow meter technology, making the meters accessible to staff; and improve the integrity of the weir structure.
Project Budget: $9.9 million
Expected Beneficial Use: March 2023

Update:

- In April, contractor, Anvil Builders installed wildlife exclusion fencing and Storm Water Pollution Prevention Plan measures.
- In June, Anvil Builders installed the duct bank from the SO2 building to the Daylight Station, and began vault installation near the Daylight Station with excavation and pile installation

10 Switchgear M4 Replacement and G3 & G3A Removal Project: Upgrading systems, enhancing safety

One of two newly installed spare breakers for the S40 switchgear.

For the last 10 years, the RWF has been implementing a series of electrical reliability projects to strengthen the RWF electrical distribution system. This project will replace the aging M4 switchgear with a new switchgear with 3,000-amp breakers. The M4 switchgear replacement will have protective relays to lower arc flash levels, enhancing employee safety. Removal of the existing G3 and G3A switchgears is also in the project scope.
Project Budget: $9.6 million
Achieved Beneficial Use: May 2022

Update:

- In April, contractor Blocka completed the removal of Switchgears G3 & G3A and installed two new spare breakers to the Busbar of Switchgear S-40.

11 Storm Drain System Improvements: Protecting critical infrastructure during 10-year through 100-year storm events

Flood risks to internal streets & roads

The RWF experiences localized flooding caused by runoff during heavy rainfall events. The existing storm drain system Is deficient and needs to be improved to protect the RWF from floods.
This project will improve the existing storm drain system by rehabilitating storm water pump station, pipes, manholes, catch basins and other components.

The upgrades made by this project will protect RWF's critical structures and equipment during 10-year through 100-year storm events.
Project Budget: $6.3 million
Expected Beneficial Use: December 2023

Update:

- In April, City issued the Notice to Proceed to contractor, Ranger Pipelines, Inc.
- In June, the contractor started to flush and clean storm drain pipes.

January 2022 aerial view of the Outfall Channel and Instrumentation Improvements Project.

What's Ahead?

In July - September 2022:

- Obtain Council approval:
  - To award the construction contract for Fire Life Safety Upgrades Project,
  - To amend Kennedy/Jenks MSA for Support Buildings Project,
  - Of the 4th contingency increase for Digester and Thickener Facilities Upgrade Project,
  - Of a contingency increase for Nitrification Clarifier Rehabilitation Phase 1 Project.
- Advertise the contractor prequalification packet for Facility Wide Water Systems Improvement Project.
- Advertise the construction contract for HVAC Improvements Project.

Program Performance Summary

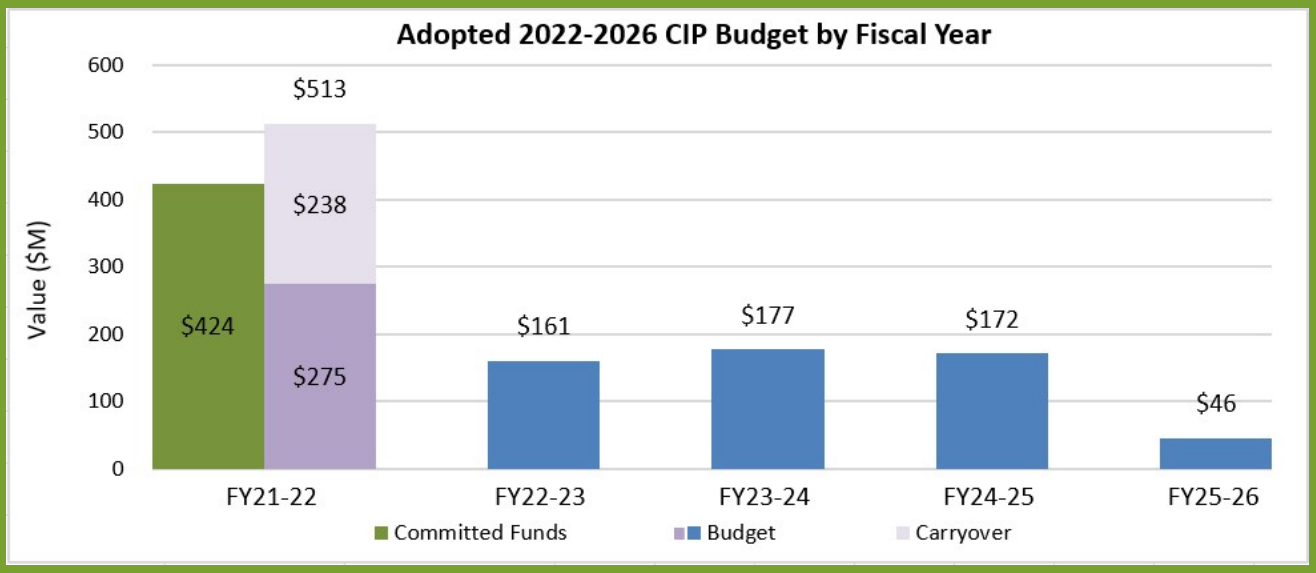
KPI	Target	Fiscal Year to Date			Fiscal Year End		
		Actual	Status	Trend	Forecast	Status	Trend
Stage Gates	90%	100% 15/15 [2]			100% 15/15 [3]		
Measurement: Percentage of initiated projects and studies that successfully pass each stage gate on their first attempt. Target: Green: >= 90%; Amber: 75% to 90%; Red: < 75%							
Schedule	90%	33% 1/3 [4]			33% 1/3		
Measurement: Percentage of CIP projects delivered within 2 months of approved baseline Beneficial Use Milestone.[1] Target: Green: >= 90%; Amber: 75% to 90%; Red: < 75%							
Budget	90%	100% 1/1 [5]			100% 1/1 [6]		
Measurement: Percentage of CIP projects that are accepted by the City within the approved baseline budget.[1] Target: Green: >= 90%; Amber: 75% to 90%; Red: < 75%							
Expenditure	$359M	$424M			$424M [7]		
Measurement: CIP FY21-22 committed costs. Target: Committed costs meets or exceeds 70% of planned budget. 70% of $513M = $359M. Therefore Fiscal Year End Green: >=$359M; Red: < $359M							
Safety	0	1 [8]			1		
Measurement: OSHA reportable incidents associated with CIP Delivery for the fiscal year.[9] Criteria: Green: zero injuries requiring hospitalization, zero fatality; Amber: 1 to 2 injuries requiring hospitalization, zero fatality; Red: >2 injuries requiring hospitalization, any fatality							
Environmental	0	0			0		
Measurement: Number of permit violations caused by CIP delivery for the fiscal year. Target: Green: zero incidents; Amber: 1 to 2; Red: > 2							
Vacancy Rate[10]	10%	14% 11/80			14% 11/80		
Measurement: Ratio of the number of vacant approved positions to approved positions. Target: Green: <= 10%; Amber: 10% to 20%; Red: > 20%							

[Program KPI – Fiscal Year 2021-2022 information]

Program Budget Performance

This section summarizes the cumulative monthly budget performance for FY21-22 based on the Adopted 2022-2026 CIP Budget.

Adopted 2022-2026 CIP Expenditures and Encumbrances

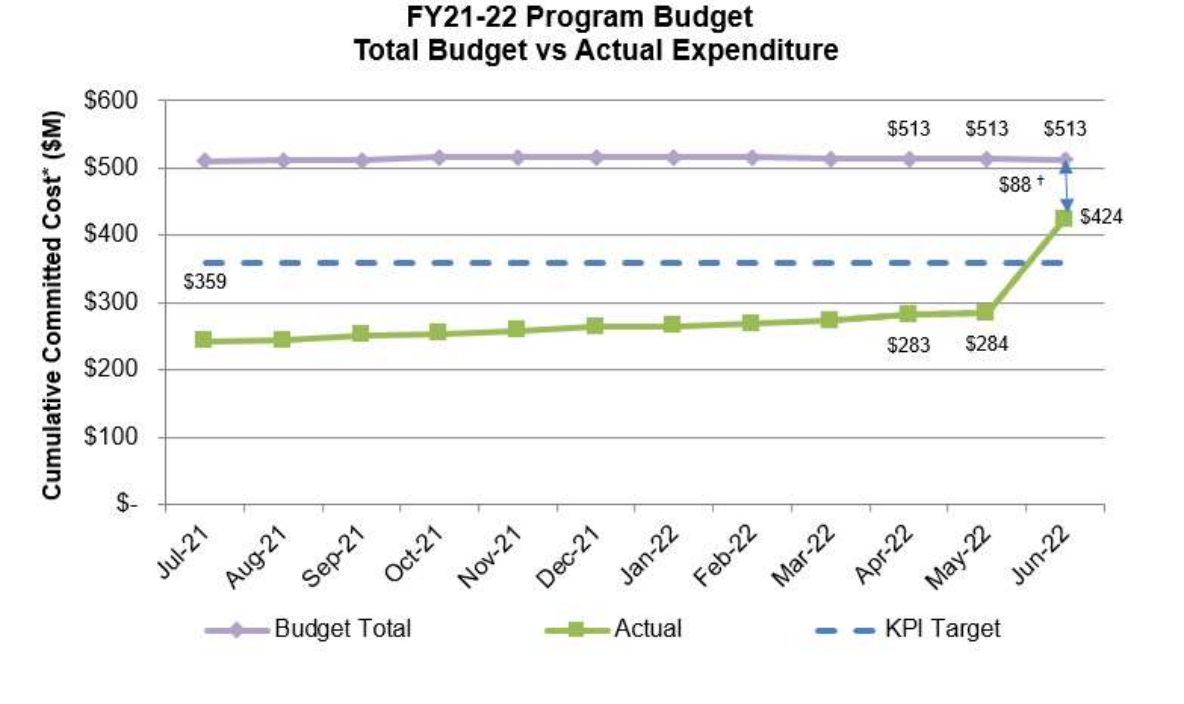


Budget performance information

Fiscal Year 2021-2022 Program Budget Performance

The FY21-22 CIP budget is comprised of approximately $275 million in new and re-budgeted funds, plus encumbered carryover of $238 million, for a total of $513 million.

FY21-22 Program Budget



CIP program budget information

How does the wastewater facility clean wastewater?

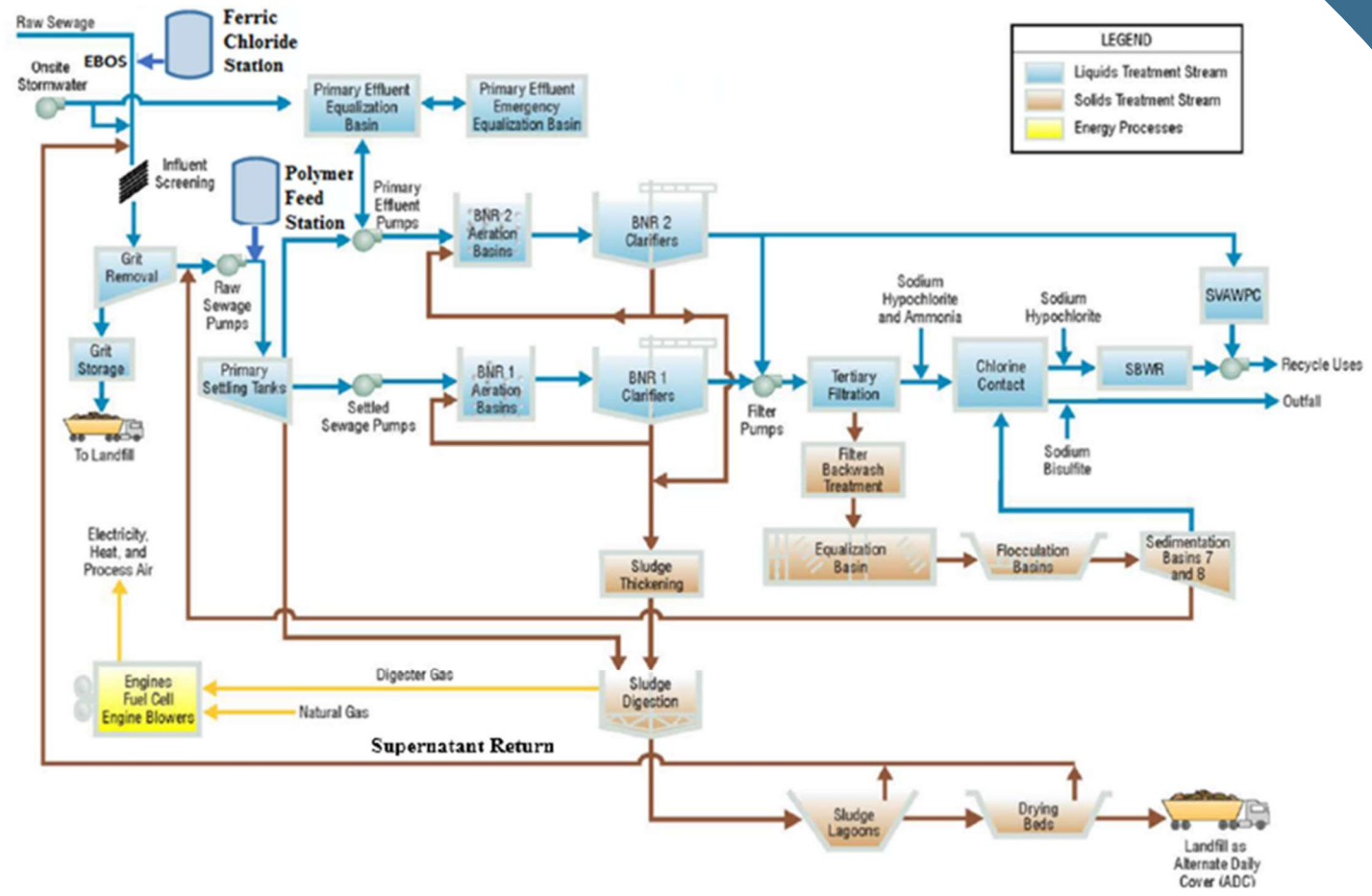
This award-winning video describes the process and equipment used to treat wastewater and protect public health and the environment.

Want to learn more?

@sjenvironment @sjenvironment @sjenvironment

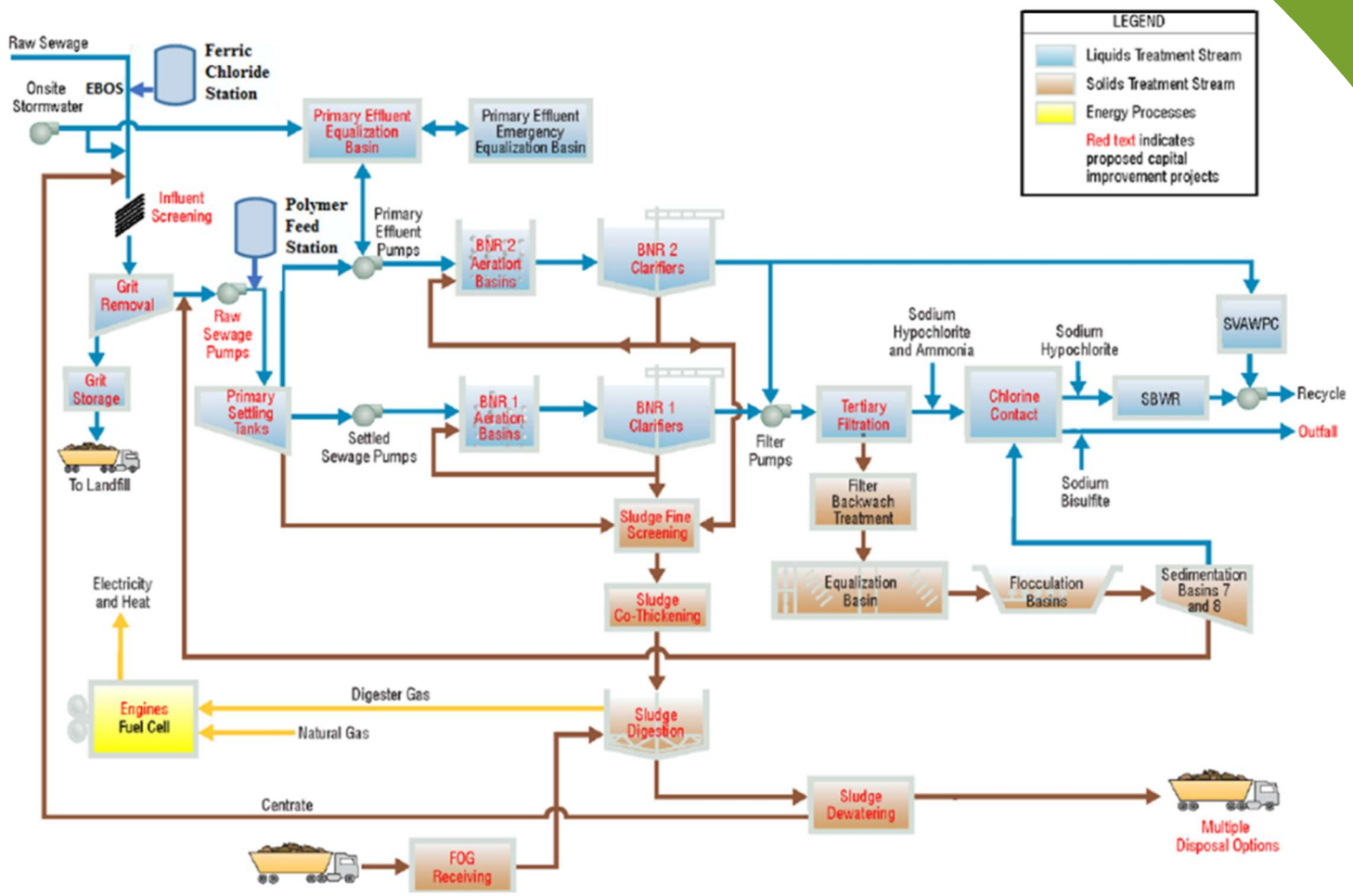
Regional Wastewater Facility Treatment

Current Treatment Process Flow Diagram



Regional Wastewater Facility Treatment

Proposed Treatment Process Flow Diagram



Glossary

Beneficial Use	When a CIP project is complete in accordance with contract documents and can be used or occupied by the City, it has achieved Beneficial Use.
Biogas	A renewable energy source produced by the breakdown of sewage waste in the absence of oxygen. Biogas is comprised of methane, carbon dioxide and small amounts of hydrogen sulfide.
Biosolids	Treated sewage sludge.
Bufferlands	Open acreage used by wastewater treatment plants as a buffer between plant operations and nearby communities. Bufferlands minimize odor and operational impacts on plant neighbors, and often serve as wildlife habitat.
Commissioning	The process of assuring that all systems and components of a facility, building or plant are designed, installed, tested, operated and maintained according to the owner's requirements.
DAFT	Dissolved air flotation thickener tanks. Dissolved air flotation, or DAF, is a treatment process that clarifies wastewater by removing suspended matter.
DCS	A distributed control system (DCS) is a computerized system that allows treatment plant staff to remotely monitor and control treatment processes.
EIR	An Environmental Impact Report (EIR) is a public document required under the California Environmental Quality Act to describe potential environmental impacts associated with a project. An EIR also describes measures to mitigate the impacts.
Effluent	Treated wastewater that is discharged from a treatment plant.
Influent	Raw or untreated wastewater that flows into a treatment plant.
FOG	The Fats, Oils and Grease Program administered by the City of San José's Environmental Services Department.
Headworks	Facilities that first receive influent at a wastewater treatment plant. The headworks screen and remove sticks, grit, and other solid material from influent to protect downstream equipment in the treatment process.
NPDES permit	Under the federal Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) Permit Program regulates point sources such as pipes and other conveyances that discharge pollutants into water. In California, NPDES permits for the discharge of treated wastewater are issued by the Regional Water Quality Control Boards.
Polymer	Primarily used to help manage the process of drying and consolidating sludge.
Preliminary treatment	The preparatory wastewater treatment stage, in which influent passes through headworks, which screen and remove sticks, rocks and debris; and grit chambers, which remove sand and gravel.
Primary treatment	The initial treatment for incoming wastewater, in which gravity settles solid material and rotating bars skim floating fats, oil and grease from influent.
Secondary treatment	The second stage of wastewater treatment, in which aeration tanks pump air into wastewater to promote the growth of naturally occurring bacteria that remove organic pollutants.
Stormwater	Water from rain that does not seep into the ground but instead flows into storm drains as runoff.
Tertiary treatment	The final stage in advanced wastewater treatment, in which wastewater flows through filter beds, then through chlorinated tanks to become 99 percent clean.
Wastewater	Water that enters the sanitary sewer system for treatment at a pollution control plant.
Wastewater Cake	Sludge that is compressed after dewatering.
WAS	Waste-activated sludge, or the excess quantity of bacteria and microbes removed from the secondary wastewater treatment process.