San José-Santa Clara
Regional Wastewater Facility

CIP

CAPITAL IMPROVEMENT PROGRAM

Quarterly Status Report:
July – September 2021

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
0 Incidents

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. This report summarizes the CIP's progress and highlights accomplishments from July to September 2021.

Valuing What's Important: Safety at the RFW

By: Kerrie Romanow, ESD Director

Safety is a core value in everything we do at the RWF. Beyond safety considerations such as regulatory compliance and productivity, it's the people working at the RWF who are at the heart of our safety-positive culture. What happens to one person can have a profound effect on all, so practicing safety behaviors in the workplace is of prime importance.

Two programs—- the RWF CIP Safety Program and the RWF Industrial Safety Program—work in parallel to promote safety in all aspects of work at the facility. The CIP Health and Safety Team ensures that contractors meet the safety requirements set forth in contract documents and in the Owner Controlled Insurance Program; generates safety metrics for CIP leadership; and provides training and technical advice for field inspectors and construction management teams. The CIP safety team also coordinates a safety steering committee with contractors; members discuss leading indicators, lessons learned, and safety initiatives.

The RWF Industrial Safety program protects the health and safety of staff and vendors. Staff and contractors work simultaneously in RWF areas with the support of both programs. The two safety teams routinely communicate about planned activities, observations and concerns. They also coordinate activities through venues such as the monthly Safety Committee, biweekly Operations and Maintenance (O&M) coordination meetings, process shutdown request meetings, and COVID-19 stakeholders' meetings.

Safety sign outside the RWF Construction Enabling Entrance

Additionally, an ad-hoc committee of O&M and CIP stakeholders and a representative from ESD's Communications Division is working to keep safety at the forefront in RWF daily activities, building awareness and reducing behaviors that could lead to potential accidents. The ad-hoc committee was formed last year based on the recommendations of a CIP-wide safety review conducted by the program management consultant, Stantec Consulting Services, Inc. Overall, the review found that the CIP's safety program is working well, as the CIP achieved more than 1 million hours of safe work with zero reportable incidents to the Occupational Safety and Health Administration. Stantec's recommendations included strengthening RWF health and safety programs, including applying lessons learned; creating strong safety messaging and branding; and developing safety recognition initiatives.

Thanks to the committee's work, banners placed at RWF points of entry carry safety messages such as "Work safely so you can get home safely," and are frequently changed to maintain freshness. Some contractors have been inspired to post their own safety signage at construction sites, such as the Nitrification Clarifier Rehabilitation Phase 1 Project.

Safety message outside the front entrance of the RWF

Safety signage at Nitrification Clarifier Rehabilitation Project

In addition to the banners, two outdoor kiosks will be installed onsite this winter to serve as central communication points for a variety of safety-related content. RWF staff are encouraged to submit safety suggestions and nominate safety leaders through online forms. The ad-hoc committee is considering other initiatives to promote and recognize safety, such as decals and non-monetary awards.

RWF Industrial Safety Team
From Left: Richard Whaley, RWF safety officer; Behilma Magday, ESD safety officer; Jennifer Voccola-Brown, manager, Sustainability & Compliance Division; Adriana Imbre, associate ESS; Nick Garza, associate ESS

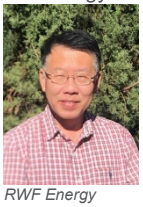
CIP Health and Safety Team
Jose Armesto, safety and security manager and Anthony LoBaido, assistant safety specialist

RWF Spotlight – Studies Plan Ahead for Future Changes

To discharge its highly treated wastewater to the South San Francisco Bay, the RWF must meet stringent permit requirements from the San Francisco Bay Area Regional Water Quality Control Board (RWQCB). In early 2020, CIP staff initiated the Process Optimization Study to evaluate the RWF's liquids treatment process (preliminary through tertiary) and determine potential changes required to meet anticipated future permit requirements, including a proposed load cap on total inorganic nitrogen (TIN) expected to be included in the 2024 Nutrient Watershed Permit. The study was concluded in July 2021 and found that proposed and existing technologies for most of the RWF liquids treatment areas were adequate, except for the secondary treatment process. The study recommended implementation of the simultaneous nitrification and denitrification (SND)/inDENSE technology in the RWF secondary treatment process, with advantages such as enhanced nitrogen removal over a smaller footprint and lower energy consumption.

As a result of the study's findings, the CIP initiated the Aeration Basin Modifications Phase 1 project, which will evaluate initial implementation of the proposed technology as well as assess the extent of rehabilitation required for a limited number of aeration tanks. After the project is complete, RWF process engineering and O&M staff will conduct a technology demonstration to determine the best method for implementing SND/inDENSE technology in a phased manner to meet the upcoming TIN load cap, taking into consideration future plant flows and loads.

In June 2020, CIP staff launched the RWF Energy Management Strategic Plan Update to evaluate the existing RWF energy system and to propose energy management strategies. Goals include energy reliability, cost reduction, renewable energy source utilization and greenhouse gas reduction. The study assessed current RWF energy supply-demand data, evaluated potential energy impacts due to prospective CIP projects, and developed future energy management plans to meet RWF energy requirements until 2050.



RWF Energy Management Strategic Plan Update Project Manager, Austin Pao

The study also evaluated short and long-term energy generation and consumption based on RWF's projected flows and loads growth. In addition, it analyzed the availability of supplemental energy sources to meet RWF power consumption requirements and energy goals. Staff expect the final report and recommendations in January 2022. "I found it rewarding interacting with my colleagues in all of the departments and projects, analyzing all the inputs, finding the path forward, and delivering the results," said **Austin Pao**, project manager.

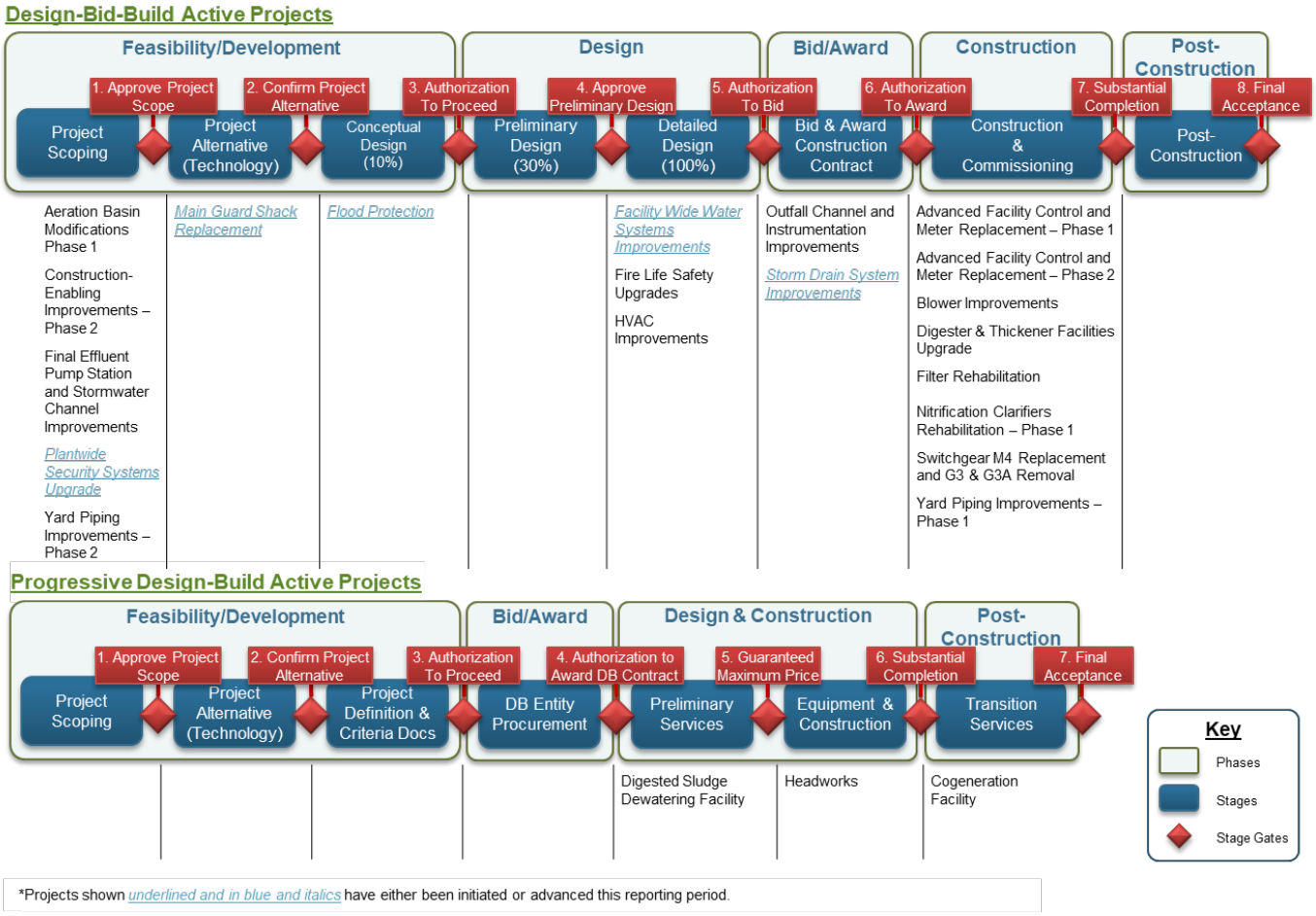
How the CIP Delivers Projects

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 July through September, 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 at each RWF entrance, followed by screening questions at individual work sites. All other CIP staff continued to work remotely. Environmental Services and Public Works 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.

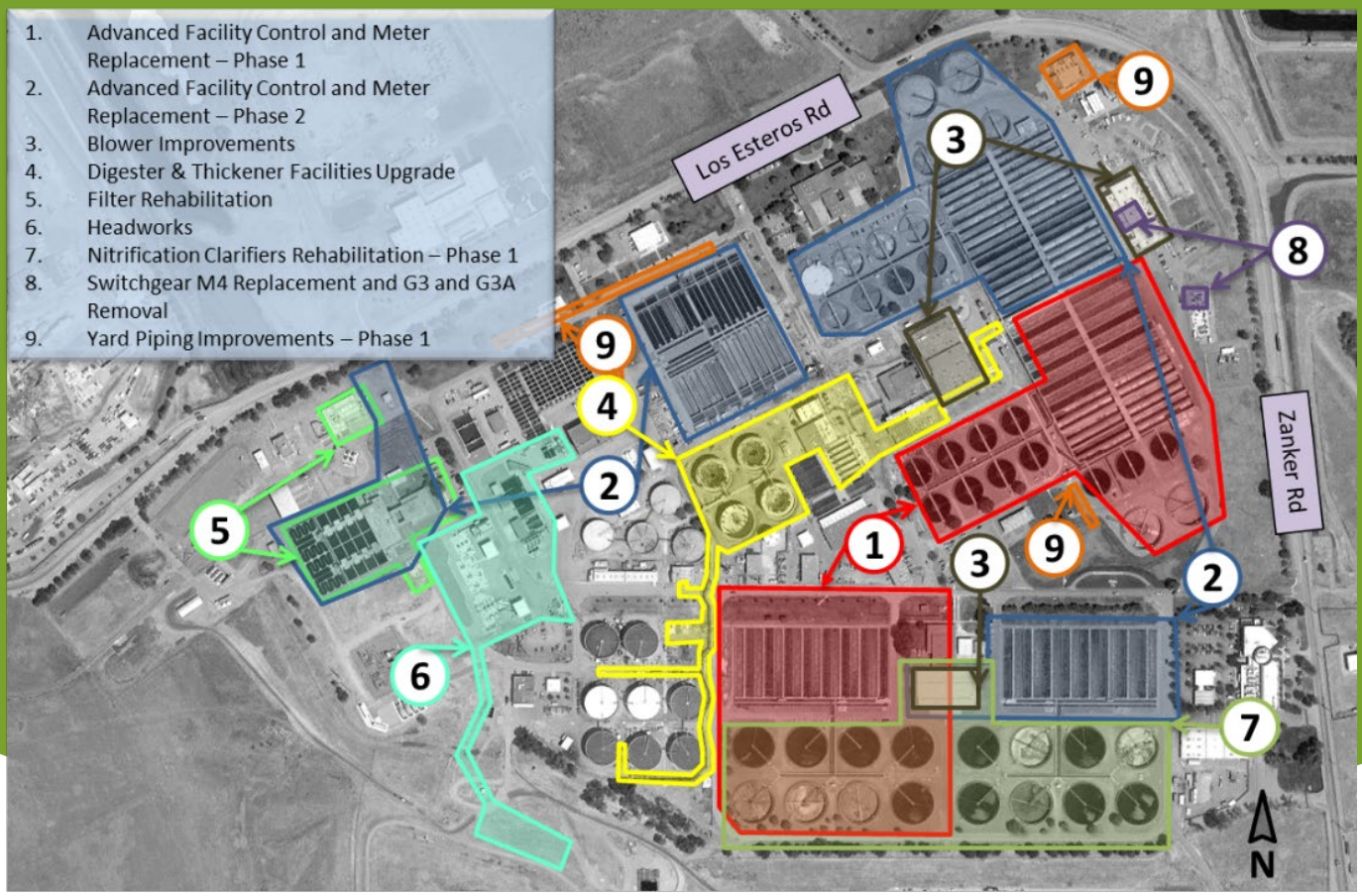
Projects in Design

- Digested Sludge Dewatering Facility Project
  In August, design-builder Walsh began site improvement work as part of an early work package. Walsh completed the temporary perimeter fencing and silt fence and began clearing and grubbing of the site.

  In September, Walsh completed the 60 percent design and began the 100 percent design.
- Facility Wide Water Systems Improvements Project
  In August, the 30 percent design was completed and the project team began detailed design.
- Flood Protection Project
  In August, the project team completed the alternative analysis and began conceptual design of a proposed berm along the western and southern boundaries of the RWF to protect it from riverine flooding. However, because of uncertainties around the timeline of the Shoreline Levee Project, staff will also evaluate alternatives for additional improvements to protect the RWF from tidal flooding due to sea level rise.
- Main Guard Shack Replacement Project
  Project scoping was completed in July and the project team began alternative analysis.

  In September, the project team conducted a site walk to introduce the project to proposed design consultant Jacobs.
- Outfall Channel and Instrumentation Improvements Project
  The project received three bids on August 5 and staff will recommend award of the construction contract to TPAC and Council in October 2021.
- Storm Drain System Improvements Project
  The construction contract was advertised for bids on September 15. The bid opening is scheduled for November and construction award is anticipated in January 2022.
- Yard Piping Improvements – Phase 2
  Design consultant Black & Veatch conducted the condition assessments for several pipe segments to determine the scope of pipe rehabilitation. Condition assessments are anticipated to be completed in October.

Projects in Construction



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

City staff conducting a final walkthrough in the Second Battery B area.

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: February 2022

Update:

- The City and Contractor Overaa conducted the final walk through of the new equipment installed in the Secondary Battery B area and created a punch list.
- Overaa completed coating repair work on the pipelines and continued installation of pipe supports in the Nitrification Battery B tunnel. The installation is anticipated to be finished in November.

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

Testing diffuser replacements in the Nitrification Tanks.

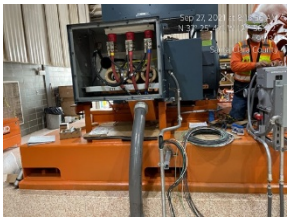
The second part of a two-phased project, this project will replace aging and outdated RWF control equipment such as flow meters, valves, actuators, and sensors. Original manufacturers no longer provide support for the existing equipment.

Project Budget: $15.0 million
Expected Beneficial Use: March 2023

Update:

- In July, Contractor Kiewit began the 28-day operational testing of the new instruments installed in the filter area. Testing was completed in August.
- Kiewit completed installation and pre-operational testing of piping, valves, dissolved oxygen meters and flow meters in the Nitrification Battery A tanks in August.

3 Blower Improvements Project: Oxygenating wastewater with greater energy efficiency



Contractor at the Tertiary Building Blower #5

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:

- Contractor Monterey Mechanical completed pre-operational testing of Building 40 Blower #3 in August and began 28-day operational testing in September.
- Monterey Mechanical completed Tertiary Building Blower #3 pre-operational testing in September and began a functional test in October.

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

Contractors completing grading and draining near Digester 5.

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
Expected Beneficial Use: April 2022

Update:

- Contractor Walsh completed testing of the heating system from the Cogeneration Facility, digester loop pumps, and the new primary sludge screens between July and September.

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

Aerial view of the current filtration area.

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:

- The project team is reviewing contractor submittals and requests for information, with major construction expected to begin in May 2022.
- In August, Contractor Walsh began equipment procurement and performed site investigations to confirm utility locations and field-verify as-built drawings.

6 Headworks Project: Pretreating wastewater with better performance and reliability

Contractors re-constructing the berm for the Emergency Overflow Basin

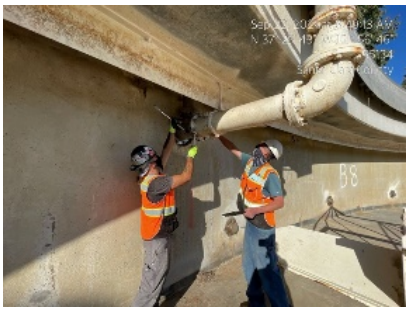
Headworks pretreatment of raw wastewater enhances and protects downstream treatment processes. This project will replace Headworks 1, the oldest facility in the RWF, with a new Headworks 3, and also modify Headworks 2. The new pretreatment system will be more reliable and will be able to treat projected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

Project Budget: $172.6 million
Expected Beneficial Use: June 2023

Update:

- Design-builder CH2M completed all below-grade structural work and hydro-testing at the new Headworks 3 influent screens, pump station, and grit facility. Following completion of this work, the area was backfilled and restoration of the Emergency Overflow Basin berm commenced.
- As of September, the majority of the 96-inch diameter yard piping had been installed and the new electrical building construction completed. Electrical equipment is now being installed in the electrical building.

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



Contractor reconnecting scum piping in a clarifier.

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 life. 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: January 2023

Update:

- Contractor Overaa continued to install the pipe inserts for groundwater relief valves in the Nitrification Battery B clarifiers.
- Overaa began pre-operational testing in September and is anticipates completion in October.

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

Contractors testing in the new battery enclosure.

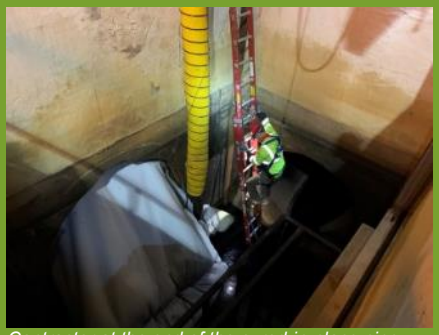
For the last 10 years, the RWF has been implementing a series of electrical reliability projects to strengthen the RWF electrical distribution system. This project will replace the aging M4 switchgear with a new switchgear with 3,000-amp breakers. The M4 switchgear replacement will have protective relays 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
Expected Beneficial Use: January 2023

Update:

- The new M4 Switchgear enclosure was set in place by crane and installed in July by Contractor Blocka. Functional testing began in August and was completed in September.
- In September, Blocka installed and tested the new battery enclosure and batteries.

9 Yard Piping Improvements – Phase 1: Repairing and replacing important pipelines at the RWF



Contractor at the end of the cured-in-place pipe liner at the 96-inch primary effluent junction box.

The RWF has 67,000 linear feet of process pipes that carry gas, liquids, sludge, air, steam, and other process streams to and from the various treatment areas. These networks of pipeline are critical to RWF operations. Seventy percent of the pipes are more than 25 years old, and 10 percent are more than 50 years of age. This is the first of a multi-phased project to repair or replace pipe systems that have been identified as high priority or at high risk of failure.

Project Budget: $5.4 million
Expected Beneficial Use: November 2021

Update:

- Contractor Michels Pipeline Construction completed the installation of the new 96-inch gate guides in July.
- In August, Michels completed the cured-in-place pipe installation for the 78-inch and 96-inch pipes.

Aerial view of the Digester and Thickener Facilities Upgrade Project.

What's Ahead?

In October - December 2021:

- Obtain Council approval to award the construction contract for Outfall Channel and Instrumentation Improvements project
- Open bids for the Storm Drain Systems Improvement project

Program Performance Summary

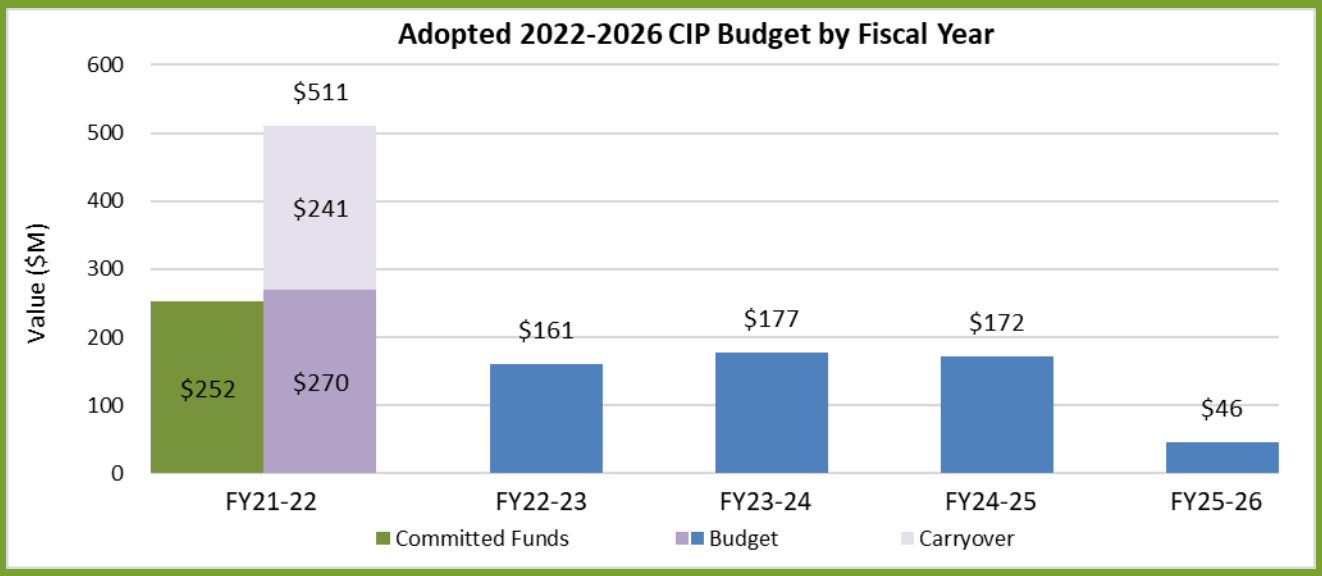
KPI	Target	Fiscal Year to Date			Fiscal Year End		
		Actual	Status	Trend	Forecast	Status	Trend
Stage Gates	90%	100% 5/5[2]			100% 25/25		
Measurement: Percentage of initiated projects and studies that successfully pass each stage gate on their first attempt. Target: Green: >= 90%; Amber: 75% to 90%; Red: < 75%							
Schedule	90%	N/A 0/0			33% 1/3[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%	N/A 0/0			33% 1/3[4]		
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	$358M	$252M			$430M		
Measurement: CIP FY20-21 committed costs. Target: Committed costs meets or exceeds 70% of planned budget. 70% of $511M = $358M. Therefore Fiscal Year End Green: >=$358M; Red: < $358M							
Safety	0	0			0		
Measurement: Number of OSHA reportable incidents associated with CIP delivery for the fiscal year. Criteria: Green: zero incidents; Amber: 1 to 2; Red: > 2							
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[5]	10%	14% 12/84			10% 8/84		
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

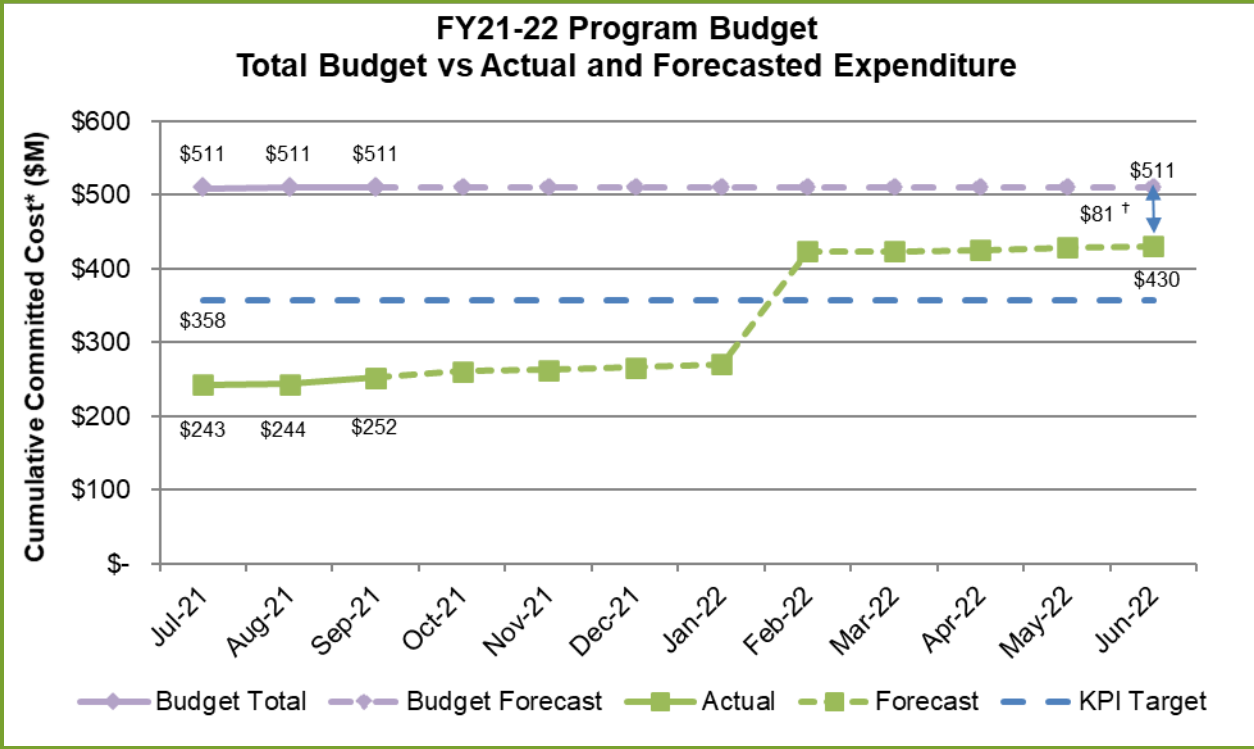


Budget performance information

Fiscal Year 2021-2022 Program Budget Performance

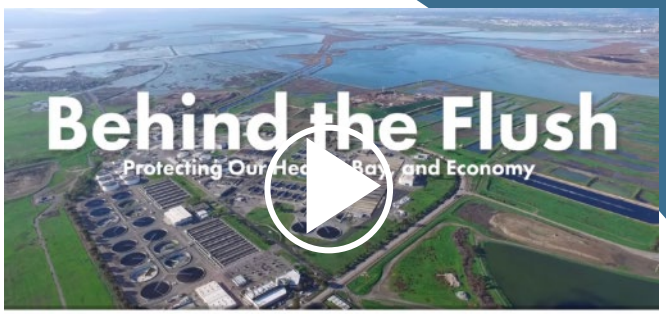
The FY21-22 CIP budget is comprised of approximately $270 million in new and re-budgeted funds, plus encumbered carryover of $241 million, for a total of $511 million.

FY21-22 Program Budget



CIP program budget information

How does the wastewater facility clean wastewater?



Seventh Step: Chlorine

tertiary
Filtration Stage (8 hrs)
Water is 99% cleaner

7

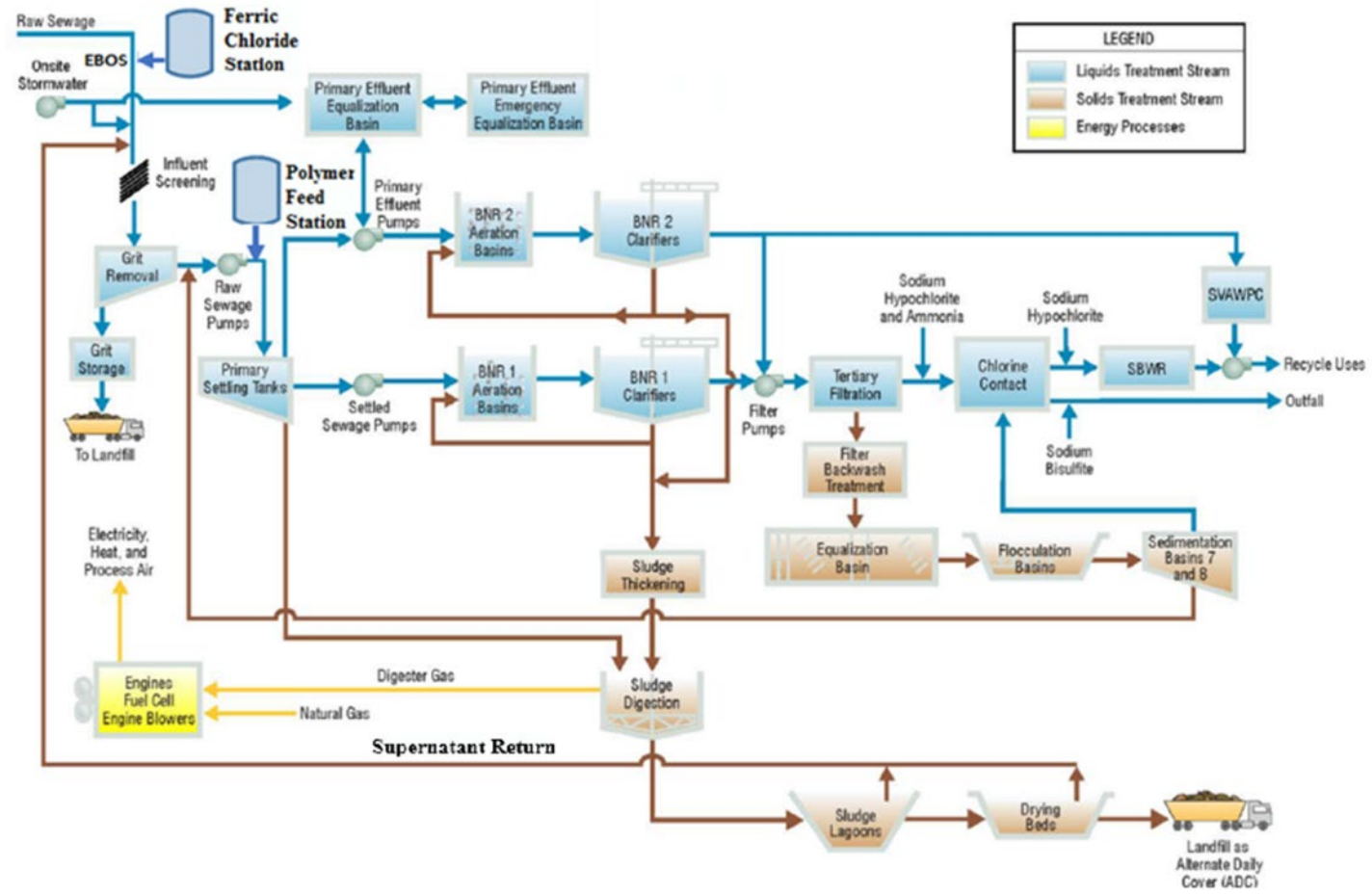
The water flows through serpentine tanks where **chlorine** is used to kill any remaining viruses or bacteria. The chlorine is then neutralized to protect aquatic life.

Want to learn more?

@sjenvironment @sjenvironment @sjenvironment

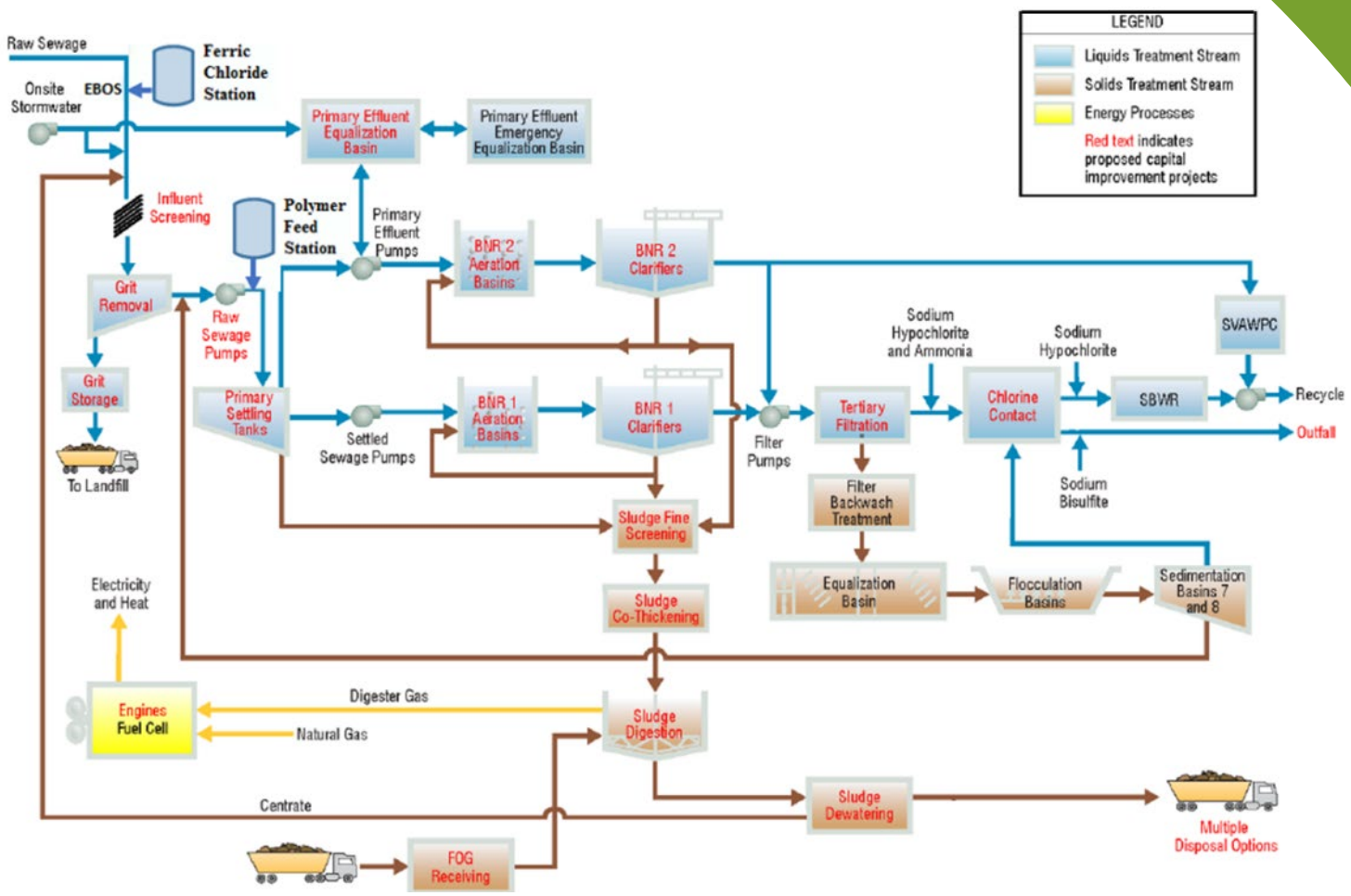
Regional Wastewater Facility Treatment

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.