San José-Santa Clara
Regional Wastewater Facility

CIP

CAPITAL IMPROVEMENT PROGRAM

Quarterly Status Report:
January – March 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 January to March 2021.

This is the first CIP status report being issued on the new quarterly schedule.

Supporting Local Jobs and the Economy: Annual CIP Vendor Open House Goes Virtual

By: Kerrie Romanow, ESD Director

The $1.4 billion, 10-year CIP is one of the largest public works programs in the South Bay. It utilizes the skills and expertise of many local and regional businesses. COVID-19 didn't stop the CIP's yearly Vendor Open House. Instead, the February event went virtual, attracting more than 40 participants from 27 firms. Showcasing the RWF and CIP, the open house reaches out to local general and small businesses so they can understand CIP projects, the business opportunities they can offer, and how the CIP helps provide local jobs and support the economy.

Instead of physically taking participants on a chartered bus tour of the RWF site, the event invited them on video tours of projects, including drone footage of construction underway. An aerial map provided an overview of project locations.

Presenters of the Vendor Open House.

The event, the seventh for the CIP, highlighted several projects, including the Digested Sludge Dewatering Facility, Fire Life Safety Upgrades, HVAC Improvements, and Storm Drain System Improvements projects. In addition, presenters focused on four studies that will inform the scope of future projects: Biosolids Management Strategy, Energy Management Strategic Plan Update, Primary Clarifier Condition Assessment, and Process Optimization.

"It was a good opportunity for the business community to connect directly with staff working on the CIP and have their questions about specific projects answered.", said Principal Engineer, Feng Chang.

With multiple projects underway, it's important to maintain safe RWF access routes and protect critical infrastructure. The RWF is located within a Federal Emergency Management Agency (FEMA) flood zone and is vulnerable to both regional and localized flooding. Deficiencies that a 2015 flood protection study found in the RWF's existing storm drain system have been confirmed by subsequent condition assessments. The Storm Drain System Improvements Project will address these deficiencies, including rehabilitating existing storm water pump stations; replacing deteriorated storm water pipes and sanitary sewer pipes; flushing and cleaning additional storm water and sanitary sewer pipes; and waterproofing tunnel entrances.

Localized flooding during heavy rainfall at the RWF in 1982 (left) and 2014 (right)

The project is in the detailed design stage, with construction contract advertisement expected in August 2021, construction start in February 2022, and Beneficial Use in fall 2023. The adopted budget for the project is $13.4 million.

CIP Spotlight – Reliable Water Quality Reporting at the Edge of the Bay

Once the RWF's highly treated wastewater flows down the outfall channel and spills over the weir into the Artesian Slough, it becomes one with the South San Francisco Bay. The treated wastewater enters its new environment after undergoing multiple treatment processes using sophisticated technology, and passing numerous monitoring and testing stations, of which the weir is the last. "It's a whole different world," said Scott Katric, project manager for the **Outfall Channel and Instrumentation Improvements Project**. "You see ducks, geese, pelicans, and lots of fish in the water. You're on the edge of the bay."

Highly treated wastewater pours over the weir structure, above, as it enters the Artesian Slough. Working on a project that's so close to nature can be satisfying. "I like the habitat-sensitive nature of the project," said Katric. "I also like working with different stakeholders to meet multiple objectives and providing our O&M staff with something that's easier to maintain and operate."

The environment, and compliance with the state's permit that allows the RWF to discharge highly treated wastewater to the bay, is at the heart of the project, along with the overall goal of protecting public health. Permit compliance depends on highly sensitive instruments that record and gather data on water quality, located at the weir structure and in the nearby sulfur dioxide building at the end of the outfall channel. Where the channel begins, flow meters inside two huge pipelines constantly measure treated effluent flow rates, along with other critical information. All of these instruments are essential for permit reporting on water quality, and all are reaching the end of their service lives after decades of exposure and use.

The project will replace older, radio transmitter technology with a fiber optic system; replace and install new instruments, including new electrical hubs and communications panels; construct a large vault structure to install new flow meter technology, making the meters more accessible to staff; and improve the integrity of the weir structure. Cascading water from the weir has eroded the existing rock riprap into the bay mud. Several feet of new riprap will be installed to protect the structure and prevent further erosion.

The project will particularly benefit Operations and Maintenance (O&M) staff, who rely on real-time data to run a vast array of treatment operations around the clock to meet high water quality standards. "To install a more reliable system for O&M staff is really important," said Principal Engineer **Alicia Alba**.

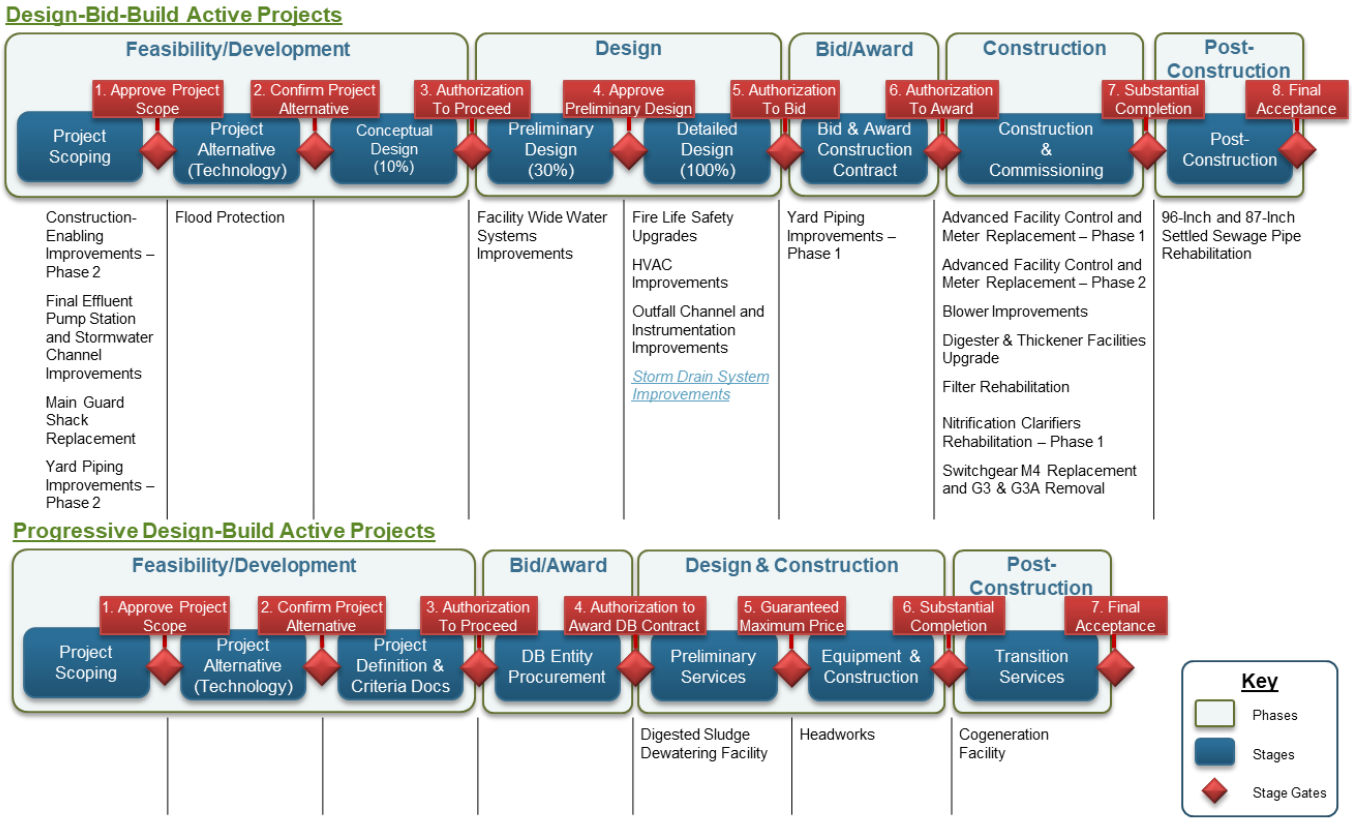
How the CIP Delivers Projects

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.

COVID-19 update: In January through March, 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.

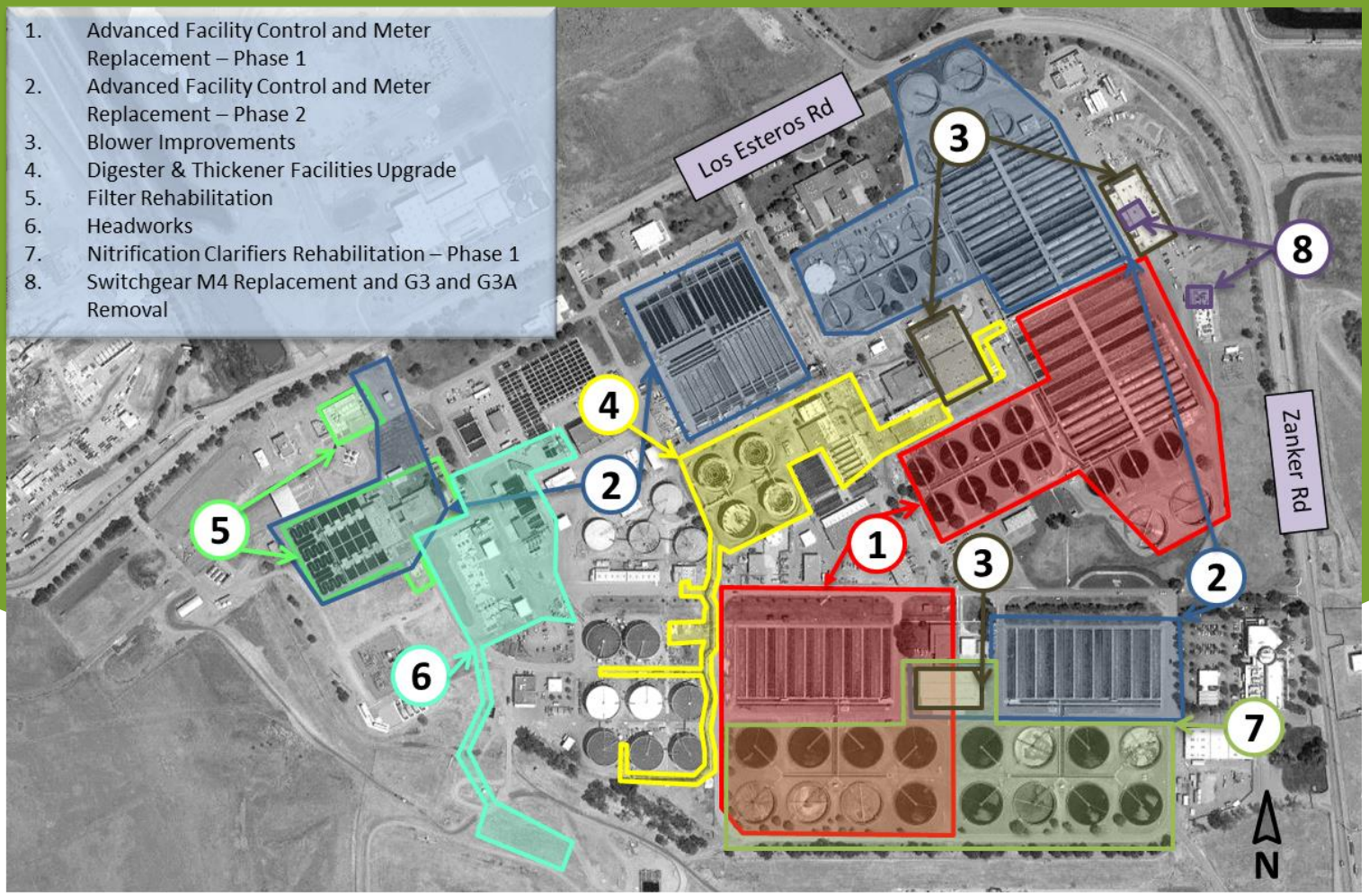
Projects in Design

- Construction-Enabling Improvements – Phase 2 Project
  CIP and O&M staff initiated the project, which will expand the material laydown area and install additional construction trailer hook-ups to accommodate the greater-than-expected contractor space needs. Scoping will be completed in May.
- Digested Sludge Dewatering Facility Project
  The City and design-builder Walsh established the major project performance requirements.

  Walsh completed the design for the Early Work Package (site preparation), and began 60 percent design for the project.
- Facility Wide Water Systems Improvements Project
  Contractor Westland Contractors, Inc., began exploratory trenching work in February. Field activity was completed in March.
- HVAC Improvements Project
  In January, design consultant Kennedy/Jenks began detailed design drawings and specifications.
- Main Guard Shack Replacement Project
  CIP and O&M staff initiated the project, which will replace the existing, aging guard shack with a new, larger building, enhance site security elements, and improve traffic circulation.
- Outfall Channel and Instrumentation Improvements Project
  Consultant AECOM completed the 50 percent bid documents in January and conducted a workshop for the 100 percent design documents in March. The project team will seek approval to advertise the project in May.
- Storm Drain System Improvements
  In March, the project received approval to proceed with detailed design. Consultant AECOM began work on the 100 percent contract documents, which are expected to be completed in August.
- Yard Piping Improvements - Phase 1 Project
  In March, Council approved award of the construction contract to Michels Pipeline Construction. The City will issue the Notice to Proceed (NTP) to the contractor in April.

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 testing new flow meters.

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: September 2021

Update:

- Contractor Overaa completed the 28-day operational testing of eight new flow meters installed at four secondary clarifiers.
- Overaa installed process piping, valves, and flow meters in the nitrification battery B area.

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

Contractor performing a test on a turbidity meter.

The second 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:

- Contractor Kiewit removed and replaced the two chlorine analyzers in the filter building basement.
- Kiewit completed the installation, pre-operational testing, and functional testing of 13 turbidity meters and four chlorine residual analyzers.

3 Blower Improvements Project: Oxygenating wastewater with greater energy efficiency

Valve installation at the Tertiary Blower Building basement.

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: March 2023

Update:

- Contractor Monterey Mechanical began demolition of the Building 40 Blower #3. Demolition of the skid was completed, and the switchgear door modifications began.
- Monterey Mechanical began installation of 4-inch conduit throughout the Tertiary Blower Building.

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

Operational testing at the DAFT.

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: November 2021

Update:

- Contractor Walsh began work on the digester overflow tie-in and started operational testing of the newly rehabilitated dissolved air flotation thickener tanks.
- The required 28-day operational testing was completed for the nine thickened sludge pumps and one bottom sludge pump.

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 began reviewing submittals for major equipment and requests for information from contractor Walsh.
- The project team began coordinating dedicated process shutdowns with O&M staff for future work.

6 Headworks Project: Pretreating wastewater with better performance and reliability

Contractors next to a section of the 96-inch pipe.

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 environmental pre-construction surveys for the Emergency Overflow Basin (EOB).
- CH2M completed the external wall placements on the influent screening structure, cable room wall placement on the electrical building, and lime treatment of the EOB.
- The first section of the 96-inch pipe from Headworks 3 to Headworks 2 was placed into the excavated trench in March.
- The City continued interagency coordination with the City of Milpitas and the City of Santa Clara on upcoming interceptor and force main shutdowns.

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

Contractors inside an empty 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 completed sampling and testing of the existing scum piping materials. The demolition of the scum piping began in March.
- Overaa completed piping liner and coating repair and the installation of the new piping, valves, and flow meters in five influent valve boxes.

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

Aerial view of the current Switchgear M4.

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:

- Contractor Blocka completed installation and pressure testing the new waterline and tie-in to existing 4-inch main.
- In March, the factory acceptance test was witnessed virtually for various electrical panels that will be installed in the M4 enclosure.
- Staff continued to review and process contractor submittals for trench backfill, paint/coating, battery unit enclosure and charger, and structure calculations.

Cogeneration Facility Project ribbon cutting at February TPAC (top) and the new Cogeneration Facility lighting at night (bottom).

What's Ahead?

In April - June 2021:

- Advertise the construction contract for the Outfall Channel and Instrumentation Improvements Project;
- Issue the NTP to contractor Michels Pipeline Construction for Yard Piping Improvements Phase 1 Project;
- Seek Council approval of the third construction contingency increase for the Digesters and Thickener Facilities Upgrade Project;
- Seek Council approval of the amendment to the MSA with Kennedy/Jenks for the Facility-Wide Water Systems Improvements Project; and
- Seek Council approval of the RWF's dewatered biosolids management strategy.

Program Performance Summary

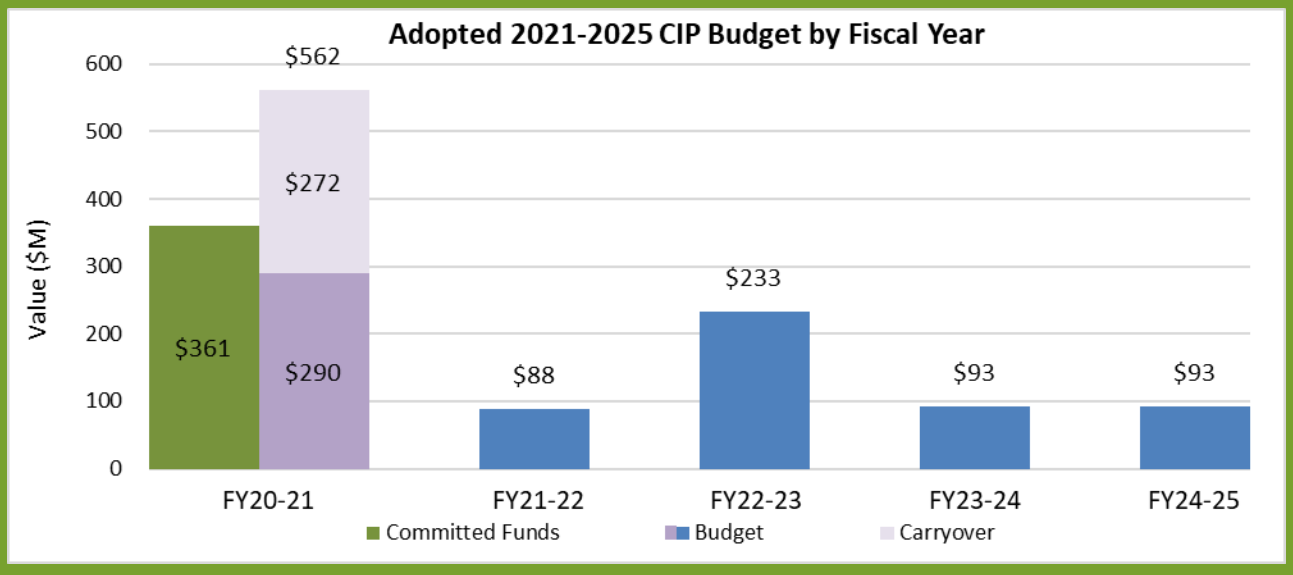
KPI	Target	Fiscal Year to Date			Fiscal Year End		
		Actual	Status	Trend	Forecast	Status	Trend
Stage Gates	90%	89% 8/9 [2]	▲	↑	93% 13/14 [3]	●	↓
Measurement: Percentage of initiated projects and studies that successfully pass each stage gate on their first attempt. Target: Green: >= 90%; Amber: 75% to 90%; Red: < 75%							
Schedule	90%	50% 1/2	◆	→	50% 1/2 [4]	◆	↓
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	●	→	50% 1/2	◆	→
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	$393M	$361M	●	↑	$407M [5]	●	↑
Measurement: CIP FY20-21 committed costs. Target: Committed costs meets or exceeds 70% of planned budget. 70% of $562M = $393M. Therefore Fiscal Year End Green: >=$393M; Red: < $393M							
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 [6]	10%	13% 11/88 [7]	▲	↓	9% 8/88	●	→
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 2020-2021 information

Program Budget Performance

This section summarizes the cumulative monthly budget performance for FY20-21 based on the Adopted 2021-2025 CIP Budget.

Adopted 2021-2025 CIP Expenditures and Encumbrances

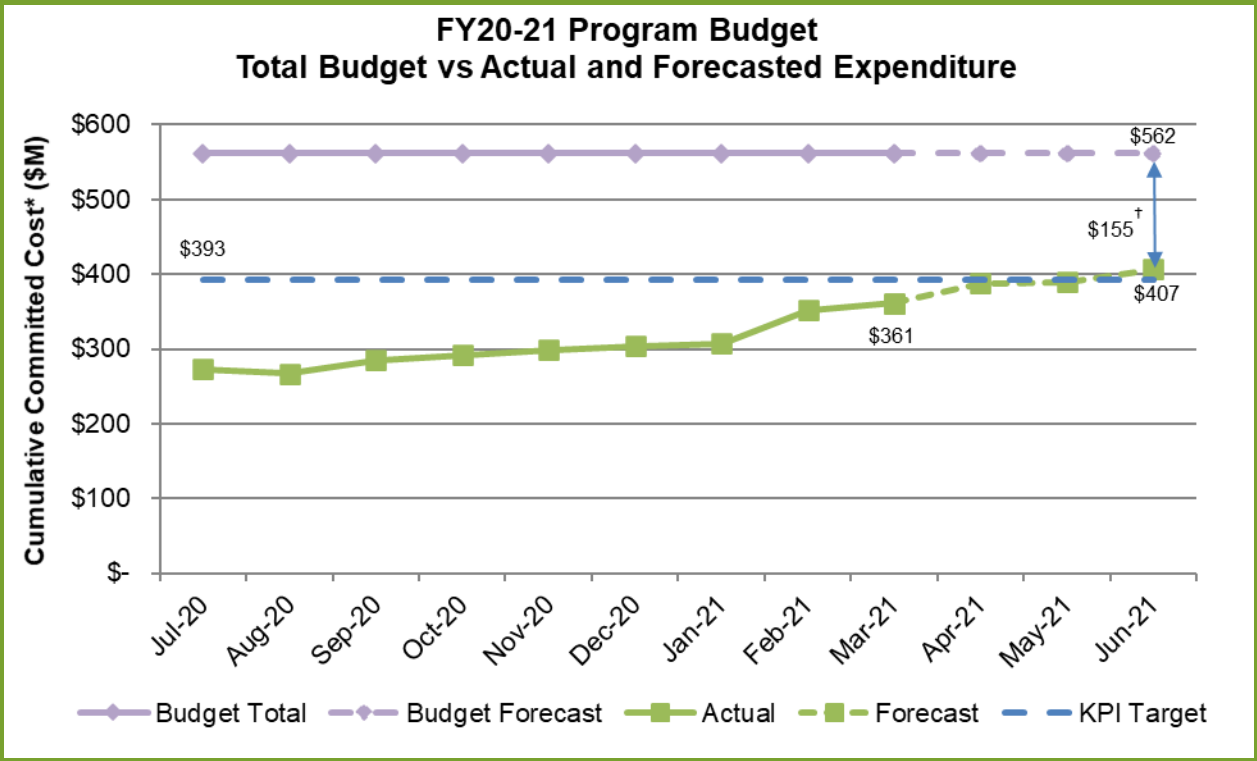


Budget performance information

Fiscal Year 2020-2021 Program Budget Performance

The FY20-21 CIP budget is comprised of approximately $289.6 million in new and re-budgeted funds, plus encumbered carryover of $272.2 million, for a total of $561.8 million.

FY20-21 Program Budget



CIP program budget information

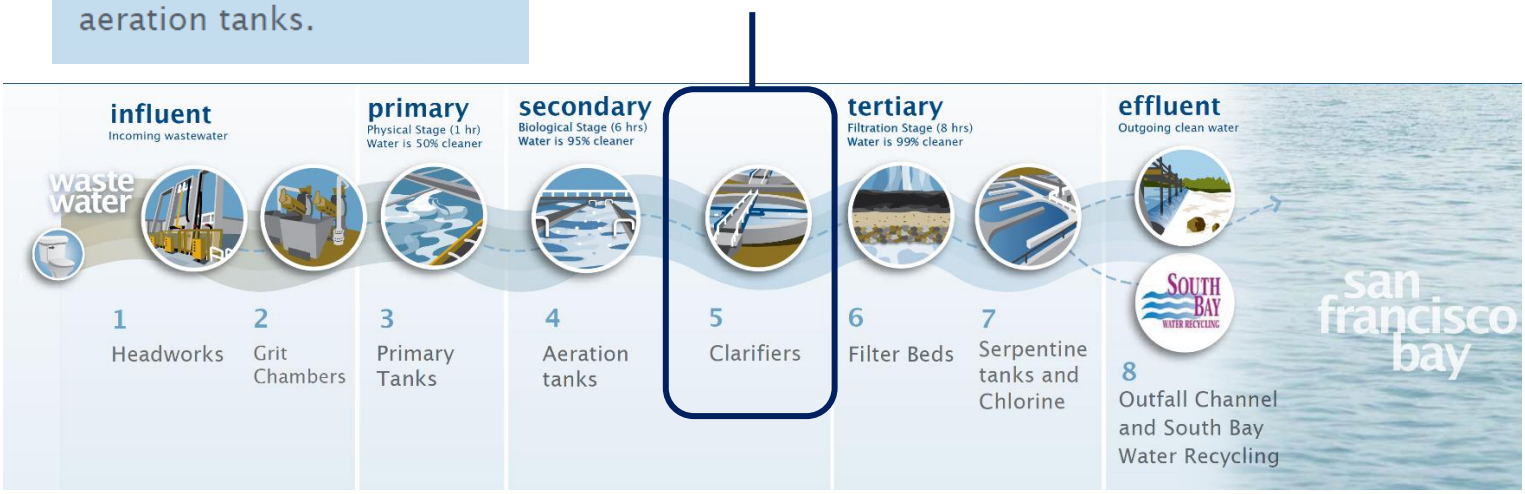
How does the wastewater facility clean wastewater?

Fifth Step: Clarifiers

secondary
Biological Stage (6 hrs)
Water is 95% cleaner

5

The wastewater is then piped into **clarifiers**, where the aerobic bacteria settle. Mechanical arms scrape away the settled material to transfer to the digester tanks or reuse again in the aeration tanks.

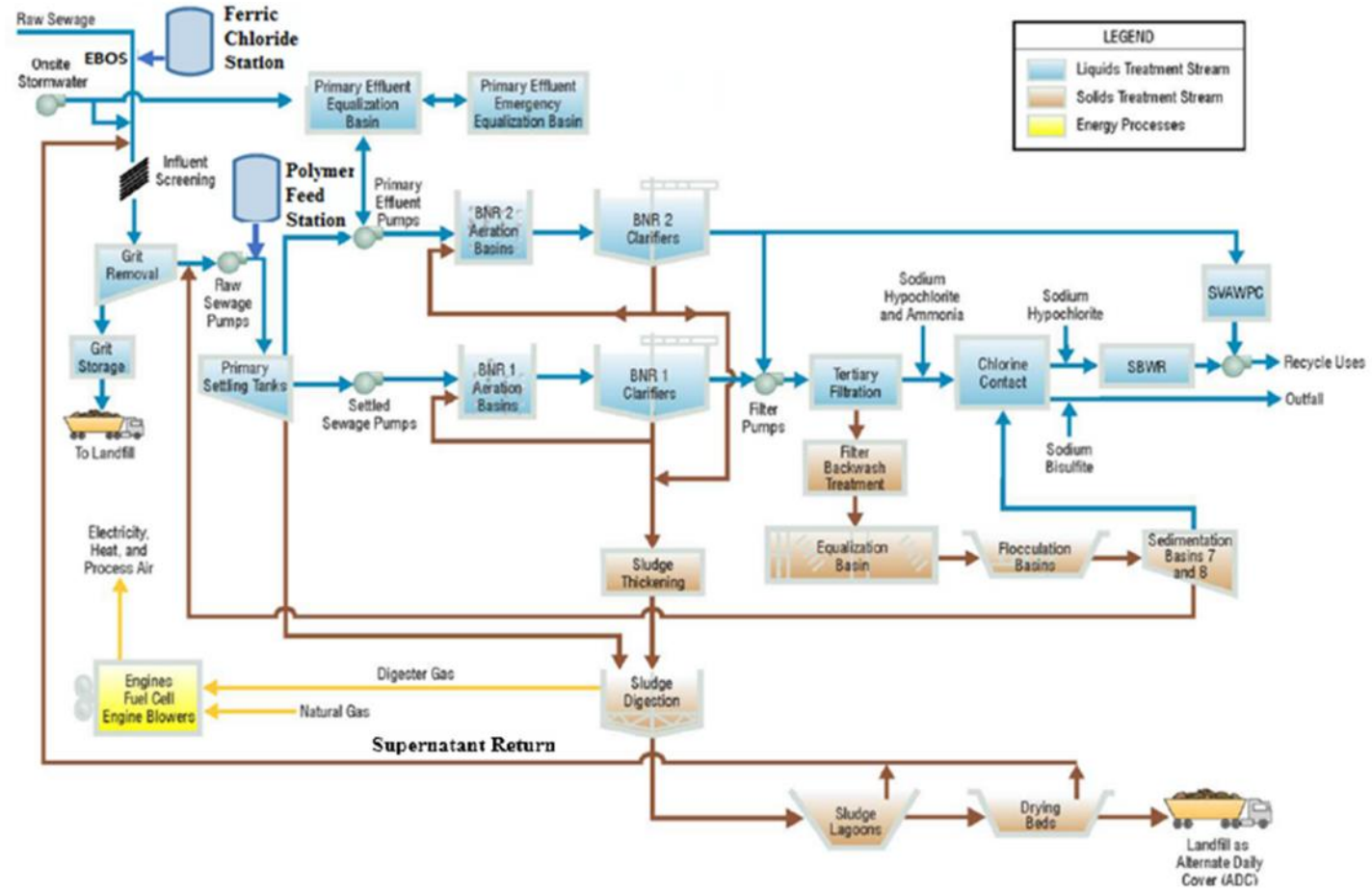


Want to learn more?

@sjenvironment @sjenvironment @sjenvironment

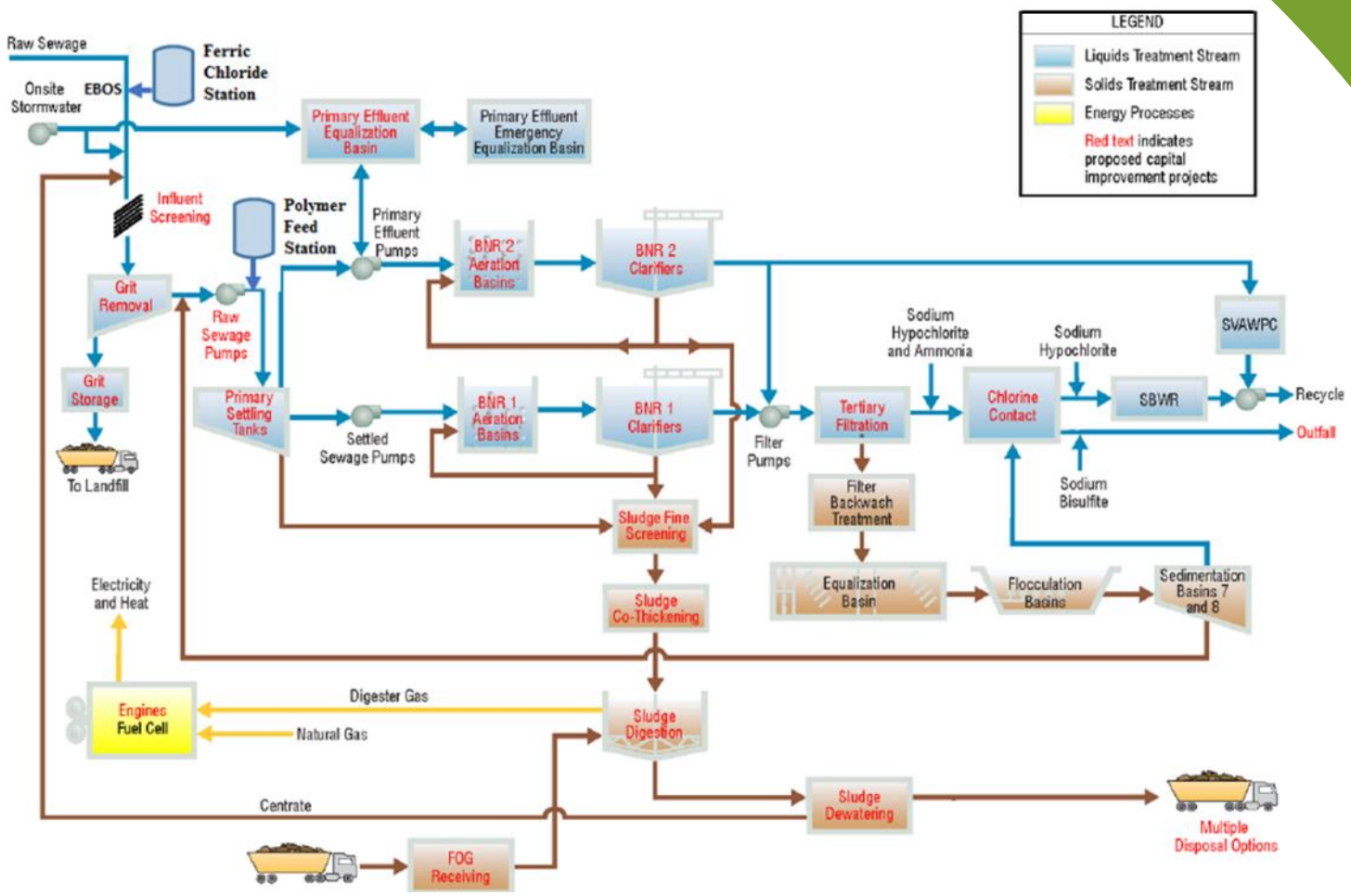
Regional Wastewater Facility Treatment

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.