San José-Santa Clara
Regional Wastewater Facility

CIP

CAPITAL IMPROVEMENT PROGRAM

Monthly Status Report:
October 2020

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 environment without interruption since 1956. The discharge of clean wastewater into the San Francisco South Bay contributes to diverse and thriving fish and wildlife ecosystems.

Much of the facility'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.

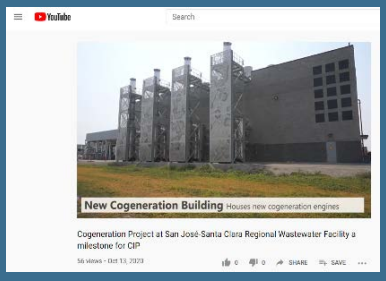
The first phase of the CIP is a 10-year plan that began in 2014, with a budget of $1.4 billion. This report summarizes the CIP's progress and highlights accomplishments for October 2020.

Ingenuity and Innovation Power the CIP Mission

By: Kerrie Romanow, ESD Director

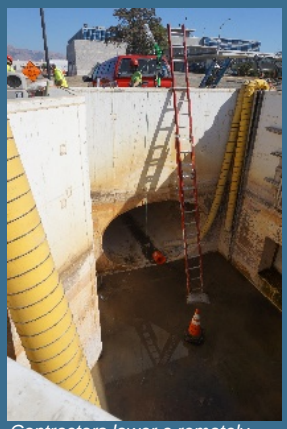
In October, CIP staff, contractors and vendors continued to accomplish excellent work under the leadership of CIP Deputy Director **Mariana Chavez-Vazquez**, despite COVID-19-related restrictions. During the pandemic, she and her team have been committed to keeping CIP projects moving forward safely. They are working closely with RWF Operations and Maintenance (O&M) staff to keep the RWF running, without interruption. Not an easy feat.

Nowhere was this more evident than on the Cogeneration Facility Project, which is upgrading the RWF's energy and heat production capabilities. Using biogas from the wastewater treatment process, the project will sustainably produce up to 12.5 MW of power and collect heat from the engines for RWF heating needs. The complex project involves procuring and starting up four large, new engine generators manufactured in Germany by Caterpillar Inc. Normally, Caterpillar technicians would travel here to make sure the engine startup went smoothly. However, with COVID-19 travel restrictions, the technicians had to work with project team engineers remotely, successfully sharing all necessary data by screen.



The new Cogeneration Building houses four new engines. Click here for video starring our stellar CIP Cogen Team.

Recently, at a presentation on CIP work over the last six months, I was amazed at the complicated work accomplishments – despite the pandemic. Right now, nine other projects are under construction.



Contractors lower a remotely-operated vehicle as part of repairs to a massive SES pipe.

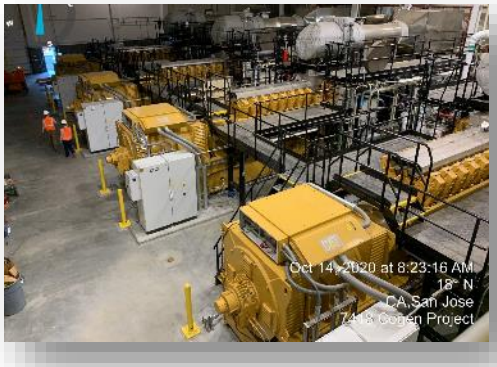
The 96-Inch and 87-Inch Settled Sewage Pipe Rehabilitation Project is one example. In 2015, a study found that about one-third of RWF's 67,000 linear feet of wastewater process pipes were in critical need of repair. Two of the pipe segments identified as high priority included the 96-inch settled sewage (SES) pipeline and the 87-inch by 136-inch SES pipeline. The two pipes are essential to daily RWF operations, as they carry more than 100 million gallons per day (mgd) of wastewater during dry weather. Inspections in 2018 revealed severe crown corrosion on both pipes. Urgent repairs were needed, but work on huge, underground wastewater pipes involves many challenges, including diverting a large volume of wastewater and completing the repair work in a tight timeframe. Construction substantially completed in late October 2020, thanks to the ingenuity and hard work of the RWF CIP and O&M staff, the contractor, and the designer, all of whom are adhered to strict COVID-19 safety requirements.

"Recently, at a presentation on CIP work over the last six months, I was amazed at the complicated work accomplishments – despite the pandemic."

We are making great progress on our mission to modernize the RWF. Innovation, perseverance and teamwork will continue to drive us forward.

CIP Spotlight – Creating Power and Heat Sustainably

The Cogeneration Facility Project is generating a lot of excitement after four years of hard work. When complete, the project will replace the RWF's existing cogeneration engines, worn out from nonstop use over 35 years. Using a combination of biogas, which occurs naturally during wastewater treatment, and natural gas, four new engine generators will produce electricity to power the RWF. A treatment system will clean the biogas used in the engines. A team with diverse backgrounds and expertise collaborated on the complex project. The team was able to witness the first testing of the engines in September. Project Engineer **Karen Vences** said, "I'm glad to be part of this intricate project; it meets our goals of efficiently reusing energy resources and optimizing operating costs."



As part of the Cogeneration Facility Project, four new engine generators will produce power for treatment process and heat RWF buildings.

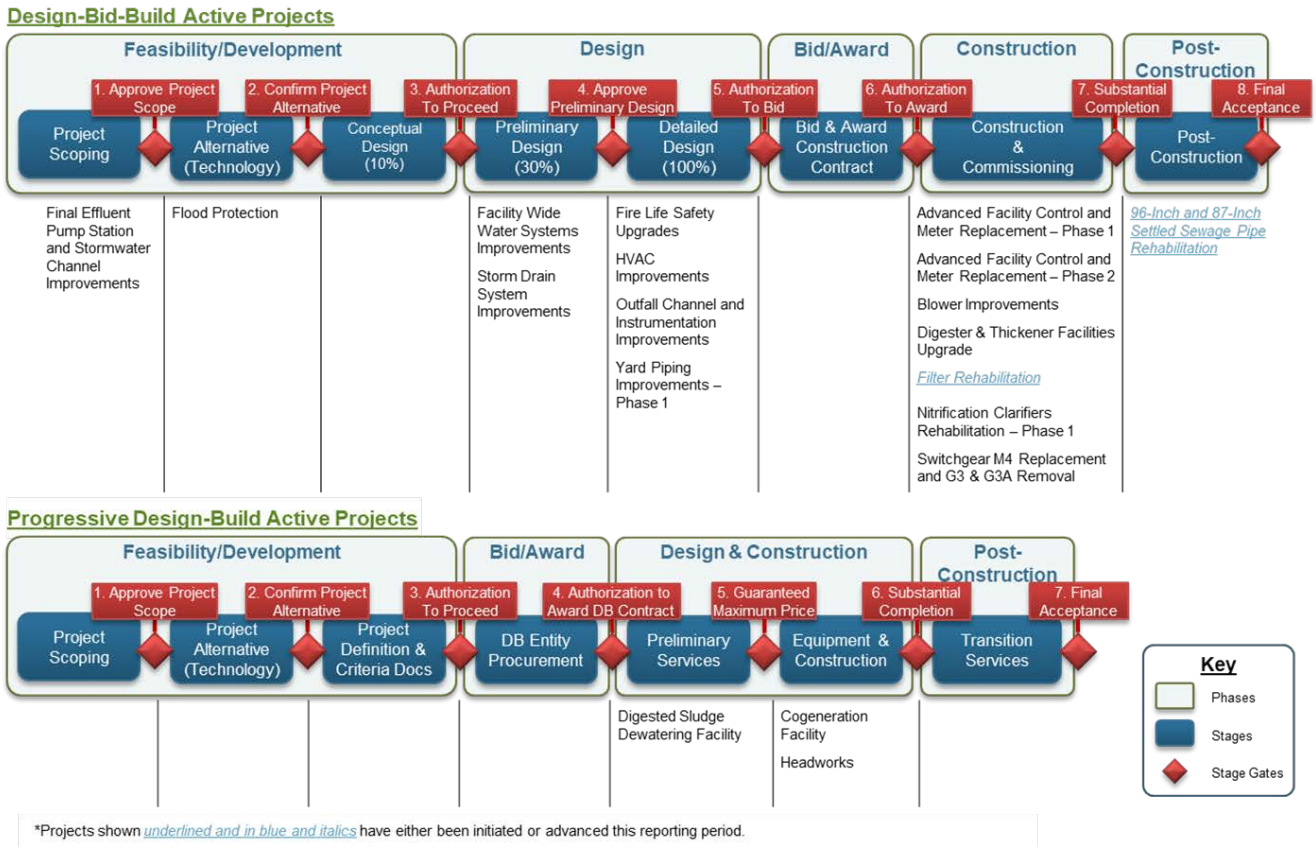
How the CIP Delivers Projects

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.

Project Delivery Models



CIP PROJECTS

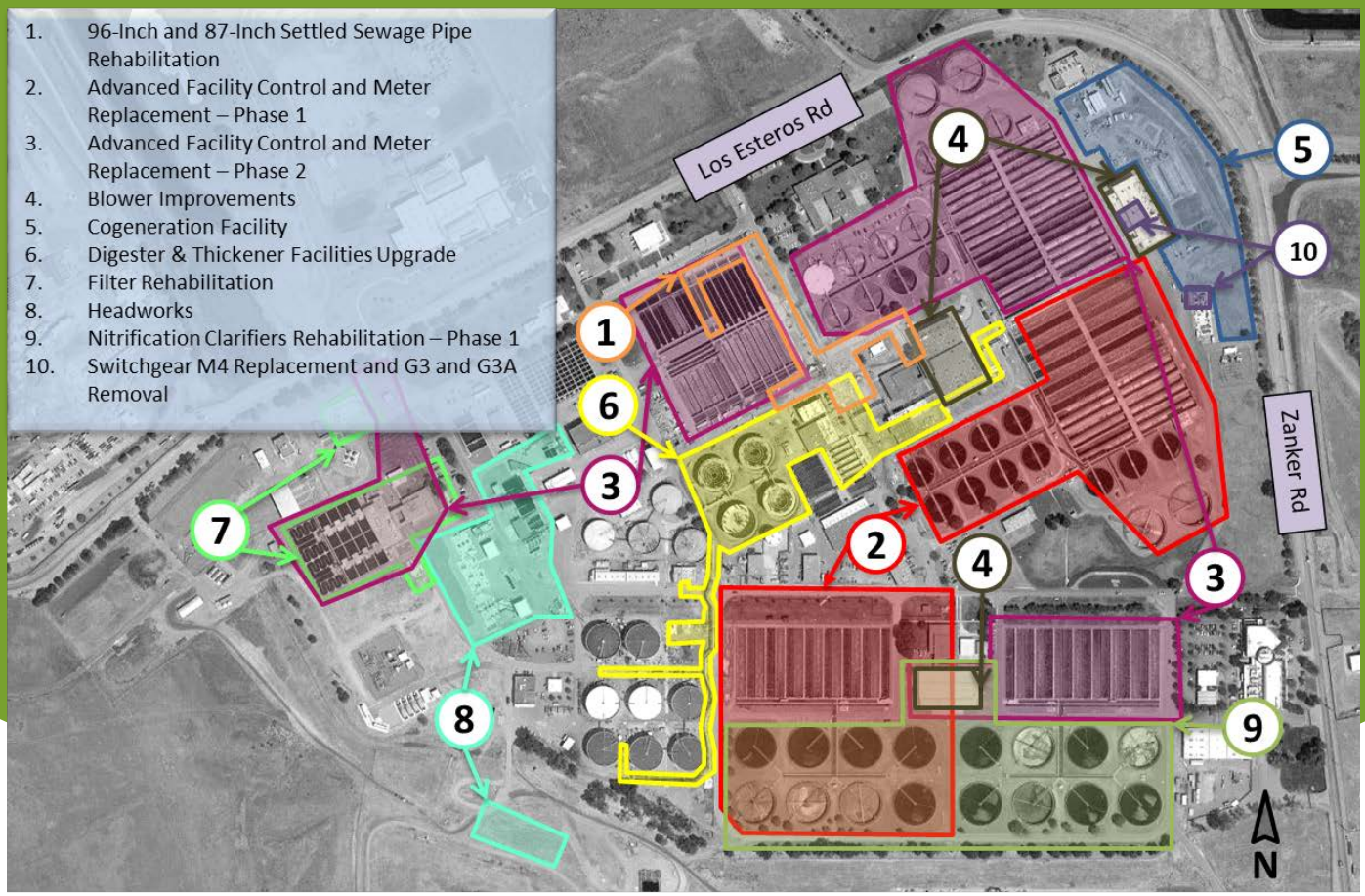
The CIP includes projects in both design and construction. CIP accomplishments for this month are outlined in two sections: Projects in Design and Projects in Construction. The CIP's projects in construction and post-construction phases have cost and schedule baselines that are monitored using the City's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

Projects in Design

- Digested Sludge Dewatering Facility Project
  The RWF CIP and O&M teams collaborated to make decisions on key issues such as centrate discharge, O&M staffing space layout, and power feed options.
- Facility Wide Water Systems Improvements Project
  Council approved the trenching construction contract to the low bidder, Westland Contractors, Inc. Construction. The Notice to Proceed (NTP) is anticipated to begin in December.
- Storm Drain System Improvements Project
  A NTP was issued to the design consultant, AECOM, to begin the 50 percent design, which is expected to be completed February 2021.
- Yard Piping Improvements – Phase 1 Project
  The project team presented at Stage Gate 5: Authorization to Bid and was directed to further develop the control strategy and obtain Operations and Maintenance approval before repeating stage gate, which is anticipated in December 2020.

Projects in Construction

COVID-19 update: In October, 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.



1 96-Inch and 87-Inch Settled Sewage Pipe Rehabilitation Project: Keeping wastewater flowing

Contractors performing crown repair on a section of the 96-inch pipeline.

The RWF's settled sewage pipelines have been in place for more than a quarter-century. Condition assessments have shown significant deterioration of several pipelines. The 96-inch and 87-inch pipelines in particular are critical to RWF operations, as they carry more than 100 million gallons per day of wastewater during dry weather. This project will rehabilitate the 96-inch pipeline using cured-in-place pipe (CIPP), and the 87-inch by 136-inch settled sewage pipeline using concrete crown repair.

Project Budget: $8.6 million
Beneficial Use: October 2020

Update:

- Contractor Michels completed the CIPP lining installation on the 96-inch pipeline and the concrete crown repairs on the 87-inch pipeline.
- Michels reached substantial completion on October 30.

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

Contractors completing work in the nitrification tunnel.

This is the first of a two-phase 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: June 2021

Update:

- Contractor Overaa completed the new piping, valves and flow meter installation for nitrification tank B7 and B8 influent lines.
- In the Secondary Battery B side, operational testing of six aeration tanks and nine clarifiers began in October and is anticipated to be completed in December.

3 Advanced Facility Control and Meter Replacement – Phase 2 Project: Reliably controlling secondary treatment processes

Current RWF control equipment

This is the second of a two-phase 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.

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

Update:

- Contractor Kiewit discussed process shutdown requests for the instrumentation replacement work in the filter area with O&M staff. The replacement work is scheduled to begin in December.

4 Blower Improvements Project: Oxygenating wastewater with greater energy efficiency

New electric motor installed on an existing blower

RWF's aeration blower systems supply the oxygen needed for the breakdown of 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 began the Building 40 Blower #2 28-day operational test on October 23.
- The Tertiary Blower Building Blower #3 discharge piping demolition and modifications began.

5 Cogeneration Facility Project: Powering the RWF with renewable biogas

New Cogeneration Building 41.

Pursuant to the City's 2012 Energy Management Strategic Plan, this project will upgrade and improve the RWF's aging power equipment, much of which is more than 35 years old. The project will install four new engine generators, a heat recovery system and gas treatment system to improve equipment reliability, energy efficiency, and enable full reuse of digester biogas.
Project Budget: $112.5 million
Expected Beneficial Use: December 2020

Update:

- A parallel test between the cogeneration engines and the emergency generators was completed on October 21.
- A catalyst was loaded into the engine emissions system in preparation for commissioning the exhaust treatment system.

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

Aerial view of four anaerobic digesters at the RWF.

The RWF's 16 digesters use anaerobic digestion to break down sludge. The 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: October 2021

Update:

- Contractor Walsh installed the thickened sludge pipes and the major structural supports for the hot water supply and return pipes between the pumps and elevated pipe rack.
- Walsh extended the pipe from the new polymer tanks into the gallery. Walsh also installed additional pipe supports and hangers in the tunnel for the primary and waste activated sludge piping.

7 Filter Rehabilitation: Making critical process improvements for advanced treatment

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 instrumentation elements of the system.
Project Budget: $58.3 million
Expected Beneficial Use: July 2024

Update:

- Council awarded the construction contract to the lowest bidder, Walsh Construction Company. Construction is anticipated to begin in December.

8 Headworks Project: Pretreating wastewater with better performance and reliability

Installing vertical walls for the future grit basin building.

Headworks pretreatment of raw wastewater enhances and protects downstream treatment processes. The project will replace Headworks 1, the oldest facility in the RWF, with a new Headworks 3 and 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 Hill (CH2M) completed several concrete wall pours at the influent screening facility and at the grit basin building.
- CH2M continued excavation of the new raw sewage pump station as well as the 96-inch pipe installation near Headworks 1 and 2.

9 Nitrification Clarifiers Rehabilitation – Phase 1 Project: Improving secondary treatment infrastructure and efficiency. For Secondary Treatment

Rebar Assembly at Clarifier B2

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 installed rebar at the nitrification clarifier B4 launder wall. Overaa also began to sandblast pipe fittings in the nitrification influent valve boxes, remove existing scum valves and flap valves and perform concrete crack repairs in the clarifiers.

10 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, once the new cogeneration facility is operational, is also in the project scope.
Project Budget: $9.6 million
Expected Beneficial Use: January 2023

Update:

- The City reviewed contractor Blocka's submitted baseline schedule and requested a revision.

What's Ahead?

In November and December 2020:

- The Advanced Facility Control and Meter Replacement – Phase 1 Project is anticipated to complete operational testing of six aeration tanks and nine clarifiers in the secondary battery B area.
- The Advanced Facility Control and Meter Replacement – Phase 2 Project is scheduled to begin instrumentation replacement work in the filter area.
- The Cogeneration Facility Project is expected to achieve Beneficial Use.
- Staff will recommend the award of two construction management controls master agreements to TPAC and Council.
- One project and one study will seek to advance through the following stage gates:
    - Yard Piping Improvements Phase 1 Project - Stage Gate 5: Authorization to Bid; and
    - Primary Clarifiers and Pump Station Condition Assessment Study - Stage Gate 1: Approve Project Scope.
- Two projects will begin construction:
    - Filter Rehabilitation Project; and
    - Facility Wide Water Systems Improvements Project trenching.

Program Performance Summary

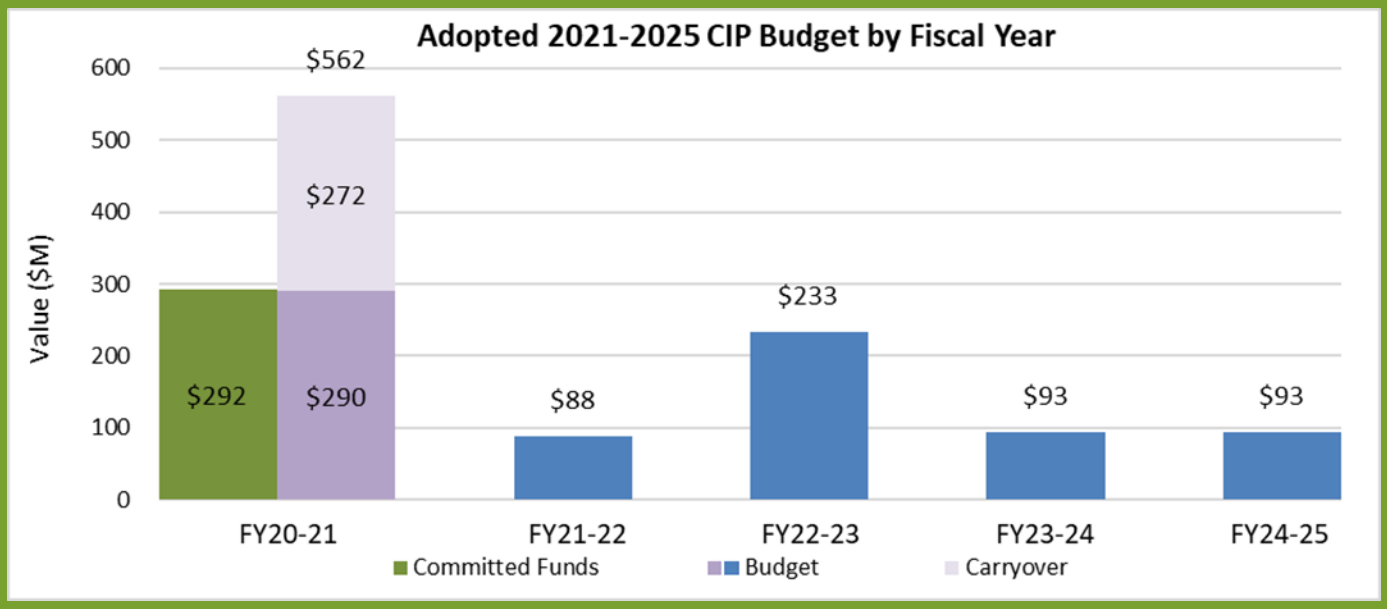
KPI	Target	Fiscal Year to Date			Fiscal Year End		
		Actual	Status	Trend	Forecast	Status	Trend
Stage Gates	90%	80% 4/5[1]	▲	↓	92% 11/12	●	↓
Measurement: Percentage of initiated projects and studies that successfully pass each stage gate on their first attempt. Target: Green: >= 90%; Amber: 75% to 90%; Red: < 75%							
Schedule	90%	100% 1/1[3]	●	↑	67% 2/3[4]	◆	↓
Measurement: Percentage of CIP projects delivered within 2 months of approved baseline Beneficial Use Milestone.[2] Target: Green: >= 90%; Amber: 75% to 90%; Red: < 75%							
Budget	90%	N/A 0/0	●	→	33% 1/3[5]	◆	↓
Measurement: Percentage of CIP projects that are accepted by the City within the approved baseline budget.[2] Target: Green: >= 90%; Amber: 75% to 90%; Red: < 75%							
Expenditure	$393M[6]	$292M	●	↑	$399M[7]	●	↓
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[8]	10%	11% 10/88[9]	▲	↓	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 fiscal year 20-21 based on the Adopted 2021-2025 CIP Budget.

Adopted 2021-2025 CIP Expenditures and Encumbrances

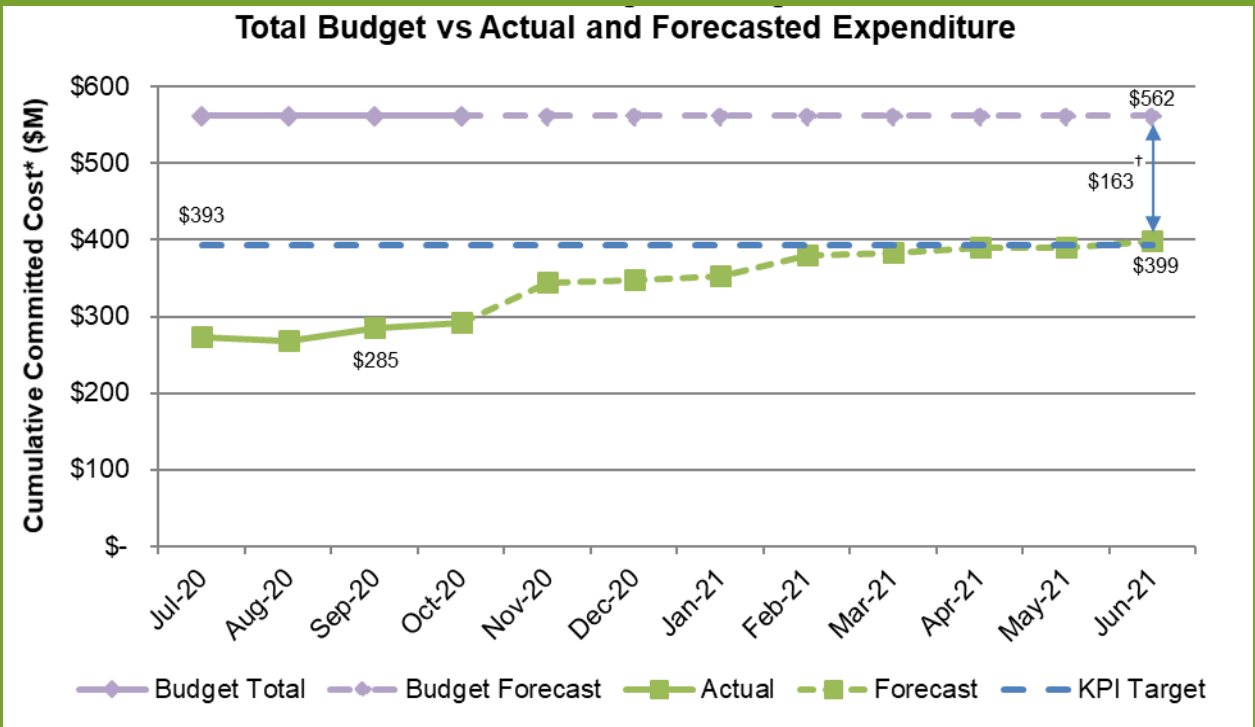


Budget Performance information

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

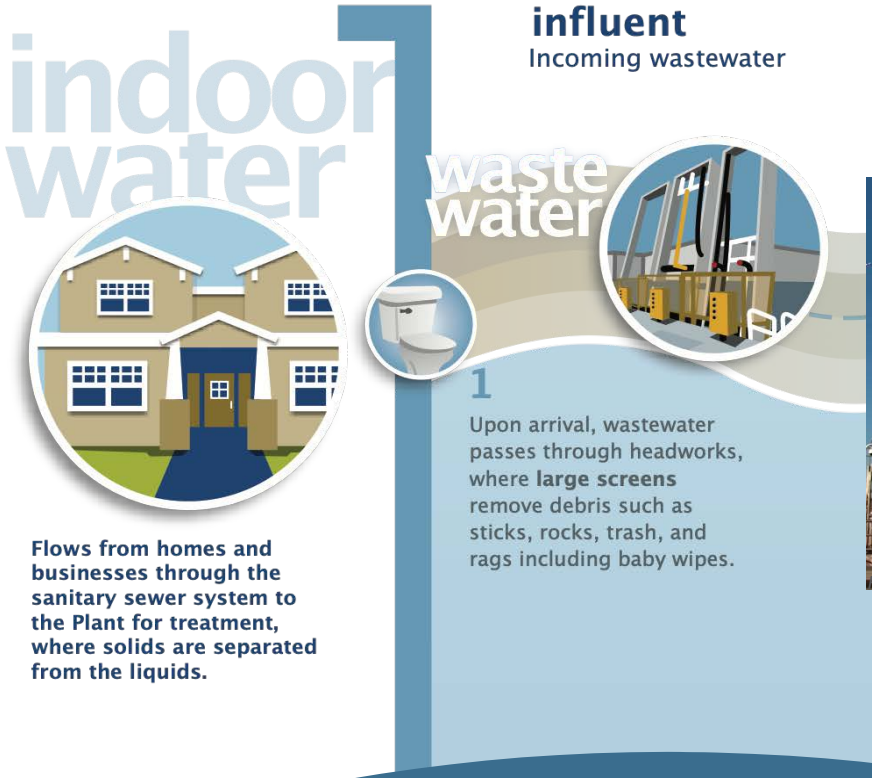


CIP Program Budget information

How does the wastewater facility clean wastewater?

An ongoing series about our wastewater process

First Step: Headworks (Video)



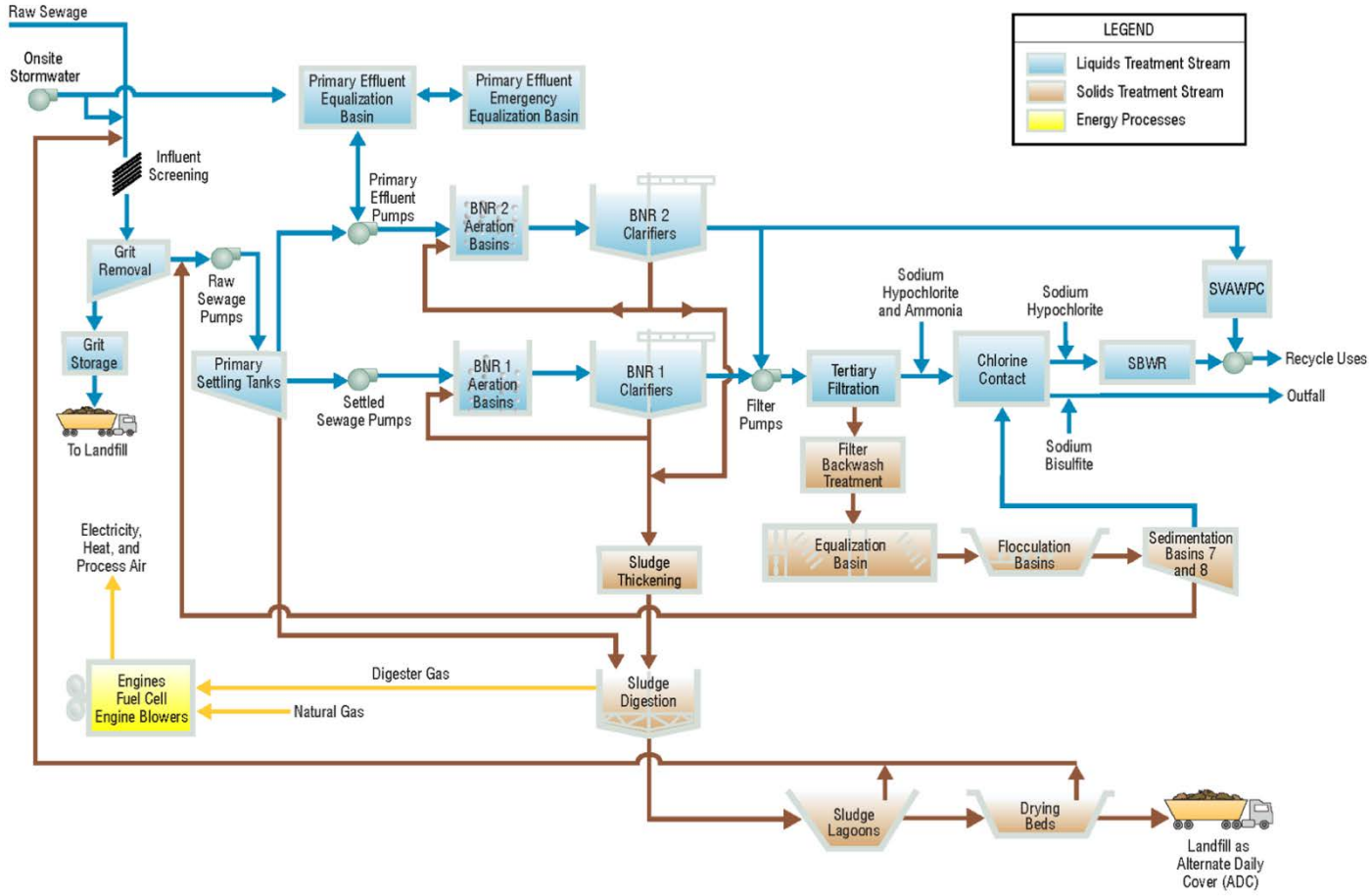
This award-winning video describes the process and equipment used to treat wastewater and protect public health and the environment.

Want to learn more?

@sjenvironment @sjenvironment @sjenvironment

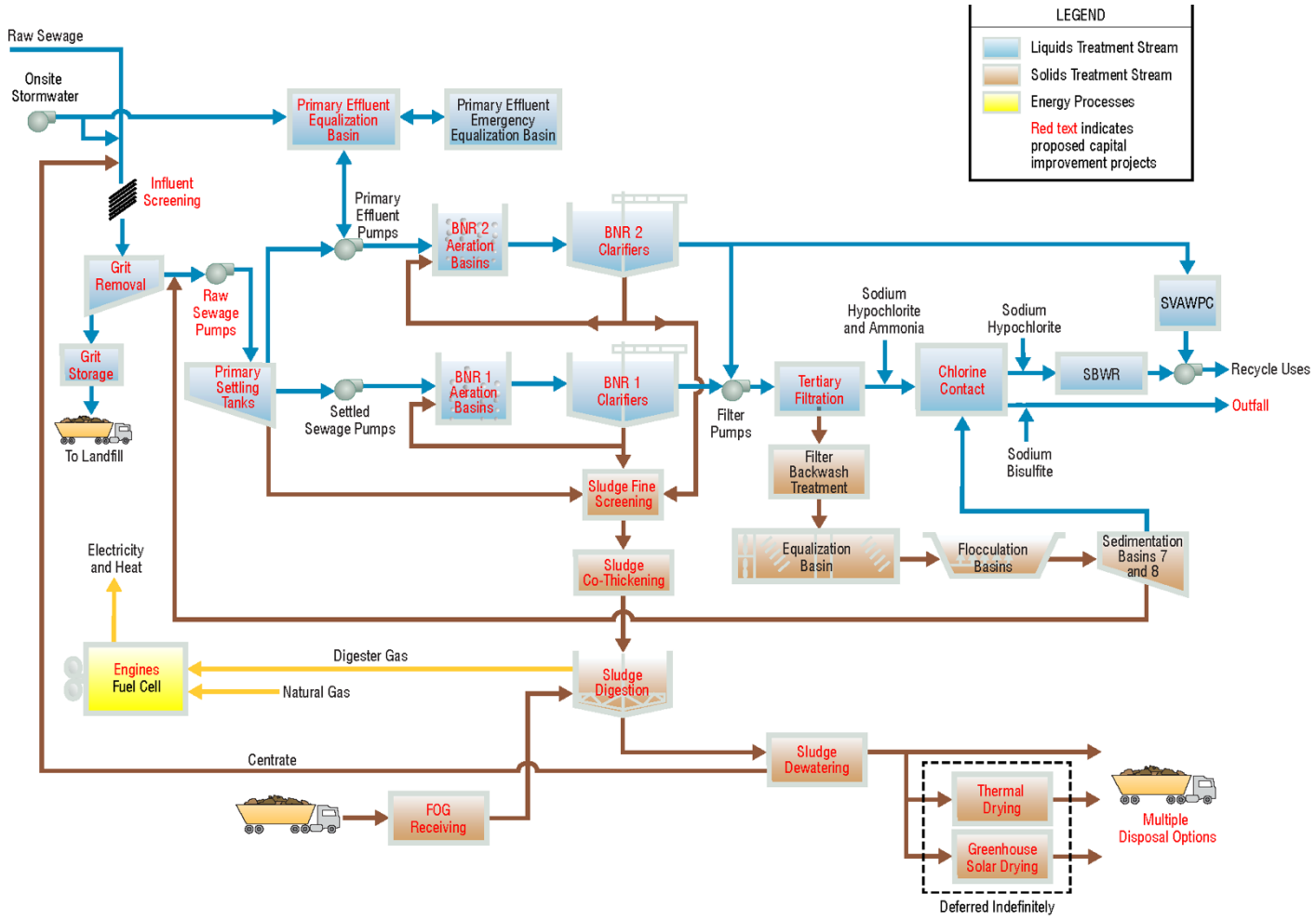
Regional Wastewater Facility Treatment

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.
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.
WAS	Waste-activated sludge, or the excess quantity of bacteria and microbes removed from the secondary wastewater treatment process.