San José-Santa Clara
Regional Wastewater Facility

CIP

CAPITAL IMPROVEMENT PROGRAM

Monthly Status Report:
December 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 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 for December 2020.

Exciting New Technologies Take the RWF Into the Future

By: Kerrie Romanow, ESD Director

December at the RWF saw dedicated staff and contractors continuing to make progress on important CIP projects, even as the COVID-19 pandemic continued to significantly impact San José, our state, and the rest of the nation.

Taking extra precautions has become second nature for everyone, with many staff continuing to work remotely. Construction-related, on-site personnel are routinely wearing masks, maintaining physical distance, and frequently washing hands.

One of the key factors that energizes and motivates us is that we help the RWF provide an essential service: cleaning our region's wastewater and protecting public and environmental health. That work never stops, and neither does the relentless impact on the RWF's facilities and equipment. The CIP's critical projects are refurbishing and modernizing the RWF so that its vital work can continue, around the clock, into the future.

Many CIP projects are intricate, involving new technology and overlapping scheduling challenges. One such undertaking is the Headworks Project, which exemplifies innovative thinking and the use of modern technology to improve the treatment process. Headworks facilities pre-treat incoming, raw wastewater by removing grit, stones and other material. The original Headworks 1 has been in operation for more than 50 years and needs replacement. Headworks 2, commissioned in 2008, requires modifications.

A new facility, Headworks 3, is now under construction and, when completed, will serve as the lead headworks. It will use sophisticated headcell technology to remove grit more efficiently. Headworks 3 will be capable of treating the projected wastewater flows through 2040. When in service with Headworks 2, both facilities will be able to readily treat wastewater, even during major storm events, for the next 20 years.

The Headworks Project is being delivered using the progressive design-build (PDB) method, an approach the CIP takes for its most complex work. PDB involves the design-builder from an early stage of the design. This promotes collaboration between parties, encourages innovation, shares risk, improves constructability and enhances cost and schedule certainty.

Early design-builder involvement on this project has allowed for:

- Collaboration in selecting the most suitable site from a constructability and cost perspective;
- Extensive subsurface investigations during the design phase, which optimized routing a 96-inch diameter pipe through an area heavily congested with underground utilities; and
- Procurement of state-of-the-art equipment, including high-capacity multi-rake bar screens, powerful vertical turbine solids-handling pumps, and sophisticated grit removal equipment. This new equipment will be more efficient and reliable, and will have better performance than the current equipment.

The Headworks Project's adopted budget is $174.8 million, with completion expected by June 2023. Learn more by watching this video.

CIP Spotlight – Rehabilitating Critical RWF Piping

The RWF has approximately 300,000 linear feet (LF) of piping that varies in age, size, material and condition. About 67,000 LF are process pipes that carry gas, liquids, sludge, air, steam and other process streams to and from the various treatment areas. Seventy percent of RWF pipes are more than 25 years old, and another 10 percent are more than 50 years old. Based on a 2015 desktop study of RWF process pipes, 16 pipe systems, totaling about 21,000 LF, were identified to be in poor condition and at high risk of failure.

Assessing the condition of a 54-inch pipe.

Project Manager Tie Feng.

The **Yard Piping Improvements - Phase 1 Project** is the first in a series of projects that will assess the condition of and rehabilitate high-risk pipes throughout the RWF. In December, staff advertised the construction contract. The timeline for advertising and awarding the project is critical to ensuring that the contractor can take advantage of the upcoming dry season (May – October 2021) to rehabilitate the deteriorated pipe segments safely, with minimal impact to RWF operations. **"Working on this project makes me understand the strategic importance of process pipes in RWF Operations," said Tie Feng, project manager**.

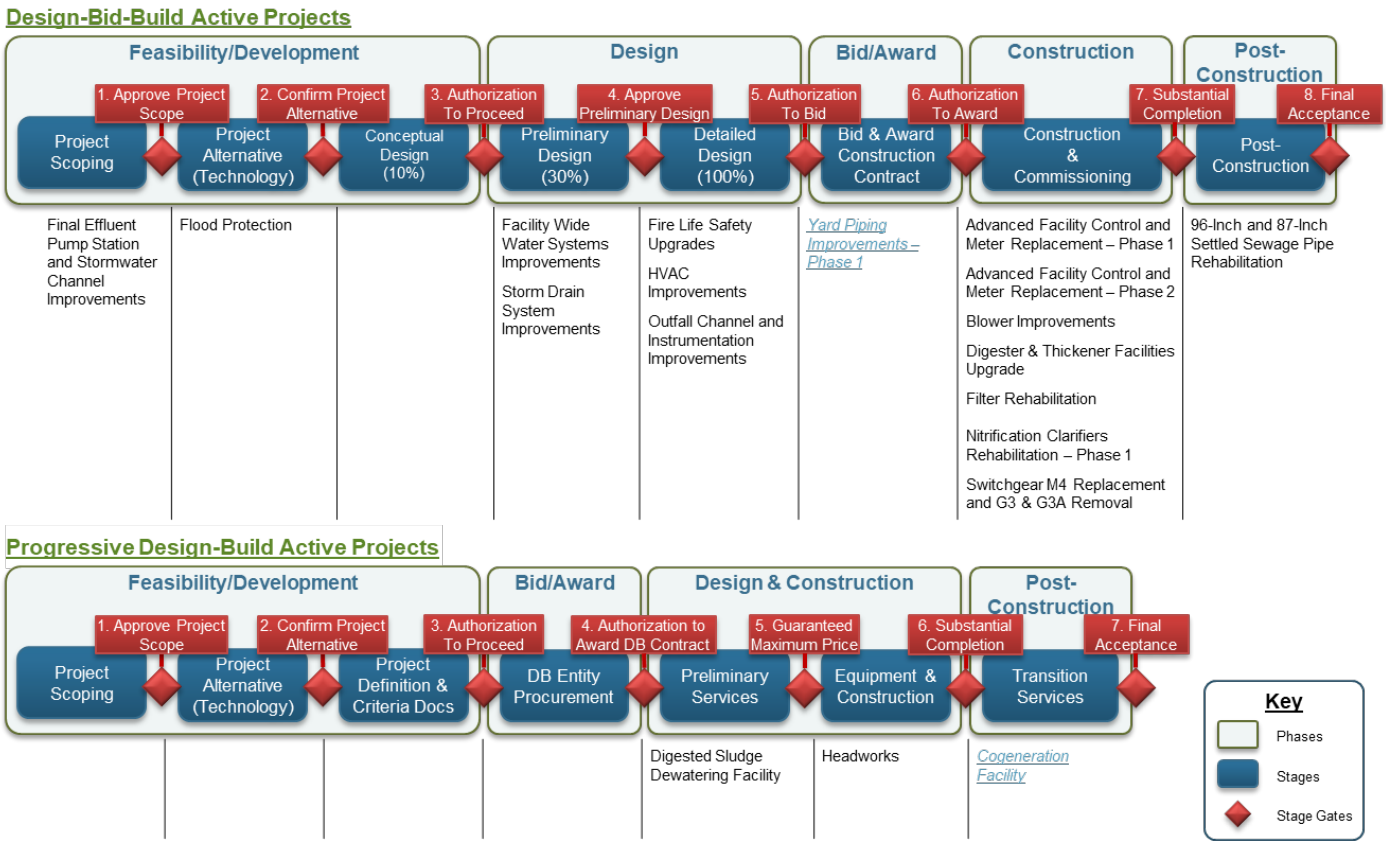
How the CIP Delivers Projects

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 Operation and Maintenance (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 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.

COVID-19 update: In December, 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.

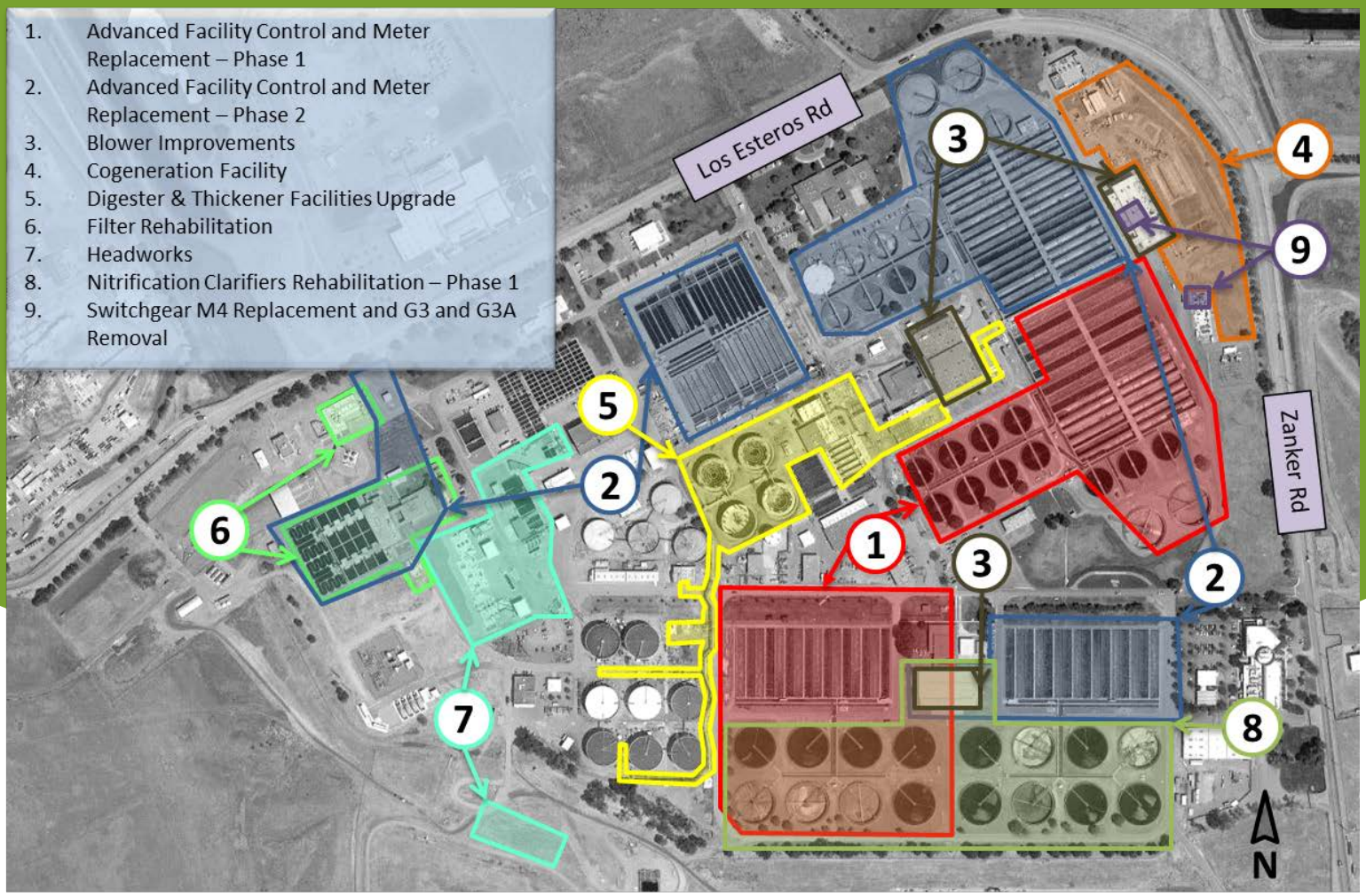
Projects in Design

- Digested Sludge Dewatering Facility Project
  Design-builder Walsh submitted the 30 percent project deliverables including plans, specifications, design technical memorandum (TM), as well as construction sequencing and phasing TM.

  The City and Walsh agreed to major performance requirements for wastewater cake and polymer dosing.
- Facility Wide Water Systems Improvements Project
  The exploratory trenching construction contract was executed and staff will issue the Notice to Proceed (NTP) in January. This contract will locate underground utilities to reduce the risk of unforeseen site conditions, which could impact project budget and schedule.
- Outfall Channel and Instrumentation Improvements Project
  Consultant AECOM completed a diver inspection of the outfall bridge and weir structure to assess the extent of erosion scouring under the weir and the condition of the bridge's wooden structure. The consultant also completed a preliminary hazardous materials investigation of the project site.
- Storm Drain System Improvements Project
  Consultant AECOM submitted the first draft of the 50 percent design documents for the City's review.
- Yard Piping Improvements - Phase 1 Project
  The project was approved to bid and the construction contract was advertised on December 23. Bids will be opened in January.

Projects in Construction

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



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

Installation of the nitrification B-side influent flowmeter.

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: June 2021

Update:

- Contractor Overaa completed the functional testing of eight secondary clarifier flow meters. Operational testing of the flow meters is anticipated to start in January.

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

Current RWF control equipment.

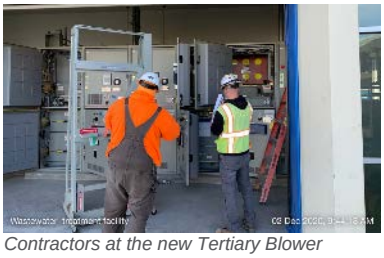
The second of a two-phased project, this project will replace aging and outdated RWF control equipment such as flow meters, valves, actuators, and sensors. Original manufacturers no longer provide support for the existing equipment.

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

Update:

- The project team continued to coordinate with contractor Kiewit and O&M staff in preparation for installation of equipment in the filtration area, expected to begin in January.

3 Blower Improvements Project: Oxygenating wastewater with greater energy efficiency



Contractors at the new Tertiary Blower Building electrical room.

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: January 2022

Update:

- Contractor Monterey Mechanical completed construction of the air exhaust box extension walls.
- Electricians continued coring holes within the interior basement walls between the rooms for conduit penetrations.
- A minor oil leak from Building 40 Blower #2 was investigated and is expected to be repaired in January.

4 Cogeneration Facility Project: Powering the RWF with renewable biogas

Cogeneration engine during commissioning.

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
Beneficial Use: December 2020

Update:

- The O&M power and air group operated all four engines over the holiday period.
- The project successfully completed all acceptance testing, as well as performing island mode, hybrid mode, and pressure mode testing.
- The project reached Beneficial Use on December 17

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

Preparing pavement to the new Sludge Screening Building.

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: October 2021

Update:

- Contractor Walsh transferred primary process power from the old switchgear to the new east electrical building.
- Walsh completed programming for the HVAC and fire systems in the new sludge screening building.
- Pressure flow pump testing and programming of the remaining controls was completed in preparation for commsissioning of the dissolved air flotation thickener (DAFT) tanks, anticipated in January 2021.

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

Update:

- The NTP was issued to contractor Walsh on December 2.
- The project team drafted a Council memo to amend the Kennedy Jenks consultant agreement, anticipated in January 2021.

7 Headworks Project: Pretreating wastewater with better performance and reliability

Pouring concrete for the influent structure wall.

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 the first hydrotest of the lower pump station wet wells.
- CH2M began excavation for the installation of the new 96-inch pipe. The majority of the 96-inch steel pipe sections have been delivered and are onsite, ready for installation.

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

Contractors in the return activated sludge gallery.

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 work on the replacement return activated sludge gallery pipe spools, valves and supports.

9 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:

- The City approved contractor Blocka's submittal for fabrication of the preliminary switchgear enclosure layout and battery enclosure.

Installation of duct bank conduits for power connection from Headworks 2.

What's Ahead?

In January and February 2021:

- Bids will be opened for the Yard Piping Improvements – Phase 1 Project, with construction contract award anticipated in March 2021;
- Staff will propose the initiation of the Yard Piping Improvements – Phase 2 and Construction-Enabling Improvements – Phase 2 Projects;
- Staff will recommend the following items to TPAC and Council:
    - Approval of an increase to the construction contingency for the Cogeneration Facility project for remote testing, transition services, and impacts due to COVID-19.
    - Approval of an amendment to the consultant agreement with Kennedy Jenks to provide engineering services during construction for the Filter Rehabilitation Project.

Program Performance Summary

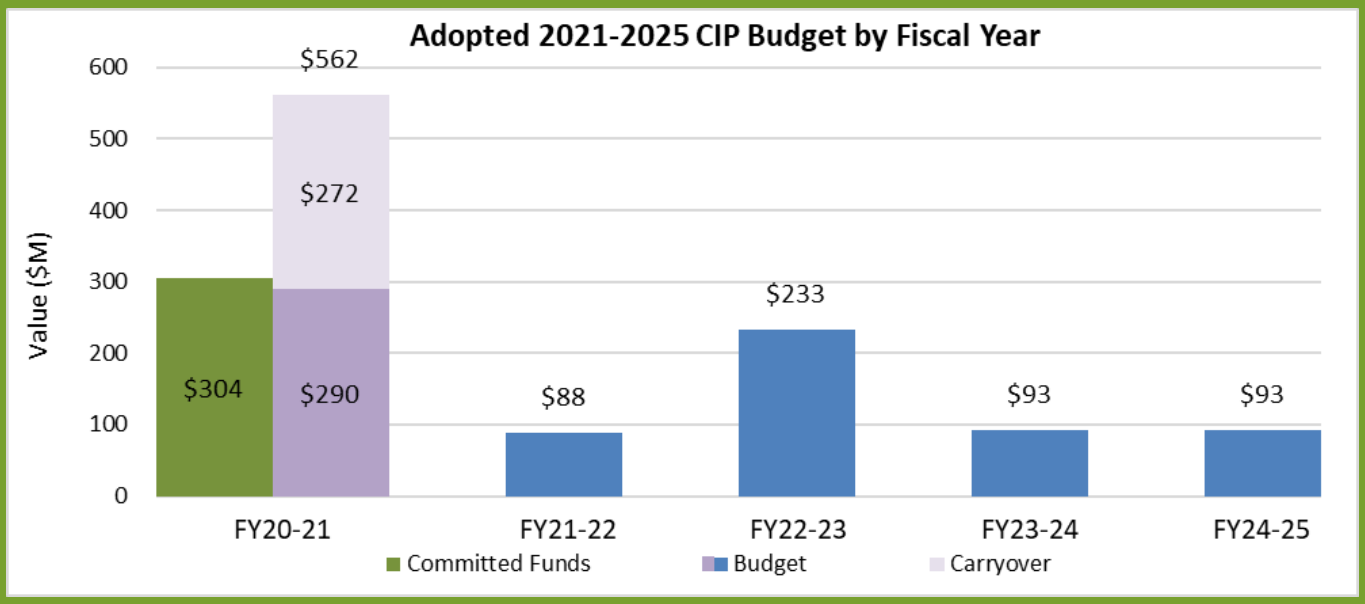
KPI	Target	Fiscal Year to Date			Fiscal Year End		
		Actual	Status	Trend	Forecast	Status	Trend
Stage Gates	90%	80% 4/5	▲	→	94% 15/16 [2]	●	↑
Measurement: Percentage of initiated projects and studies that successfully pass each stage gate on their first attempt. Target: Green: >= 90%; Amber: 75% to 90%; Red: < 75%							
Schedule	90%	50% 1/2 [3]	◆	↓	67% 2/3	◆	→
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	●	→	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	$304M	●	↑	$395M	●	→
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[4]	10%	14% 12/88	▲	→	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

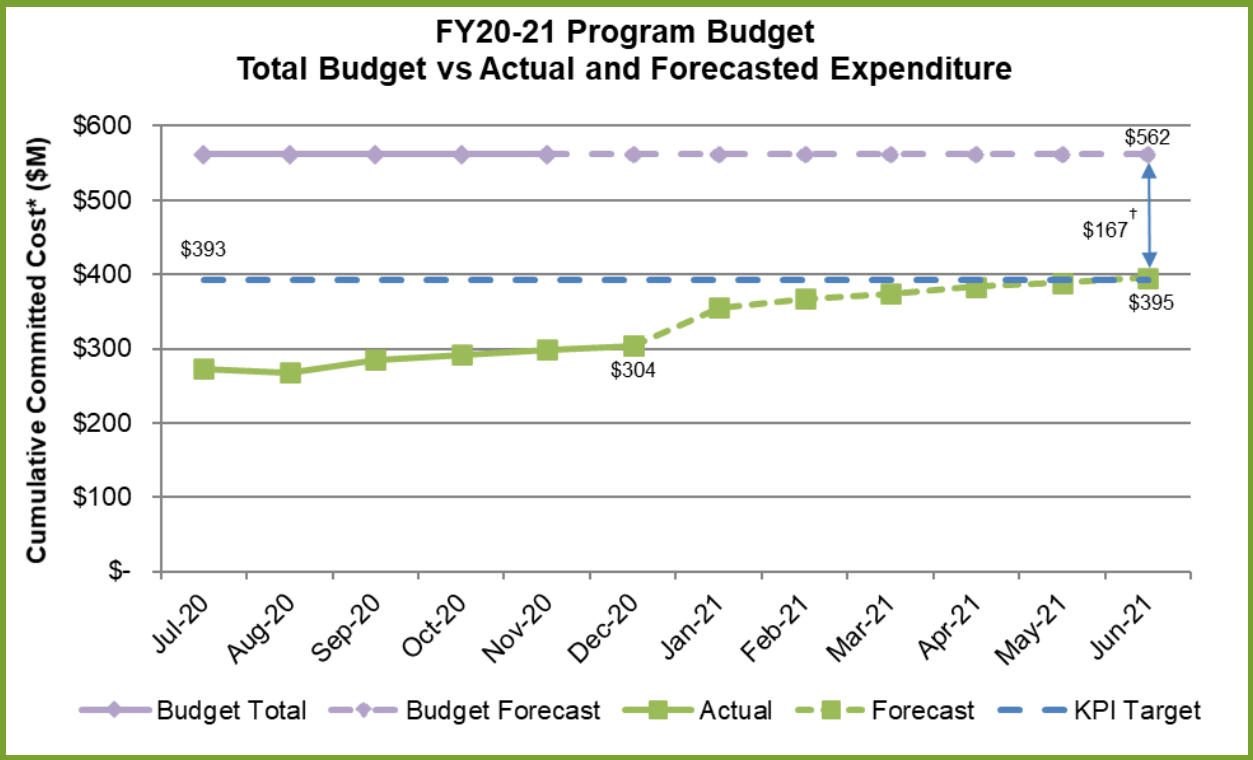


Budget performance information

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

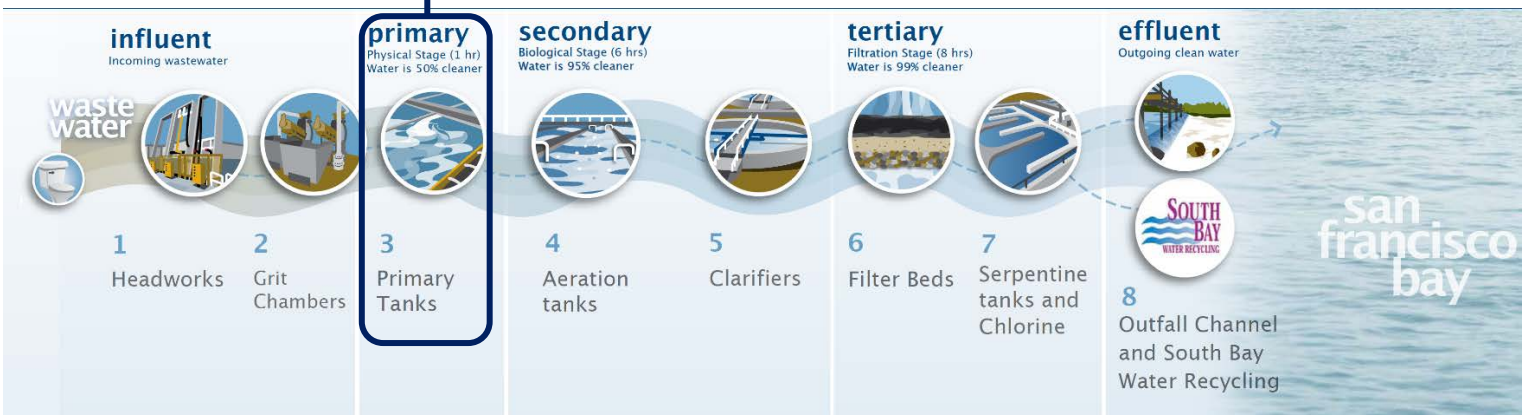
How does the wastewater facility clean wastewater?

Third Step: Primary Tanks

primary
Physical Stage (1 hr)
Water is 50% cleaner

3

In large **primary tanks**, gravity settles the solids in the wastewater. **Flights**, or fiberglass bars, rotate to skim off floating fats, oils, and grease from the surface of the water and to scrape out solids that sink to the bottom.

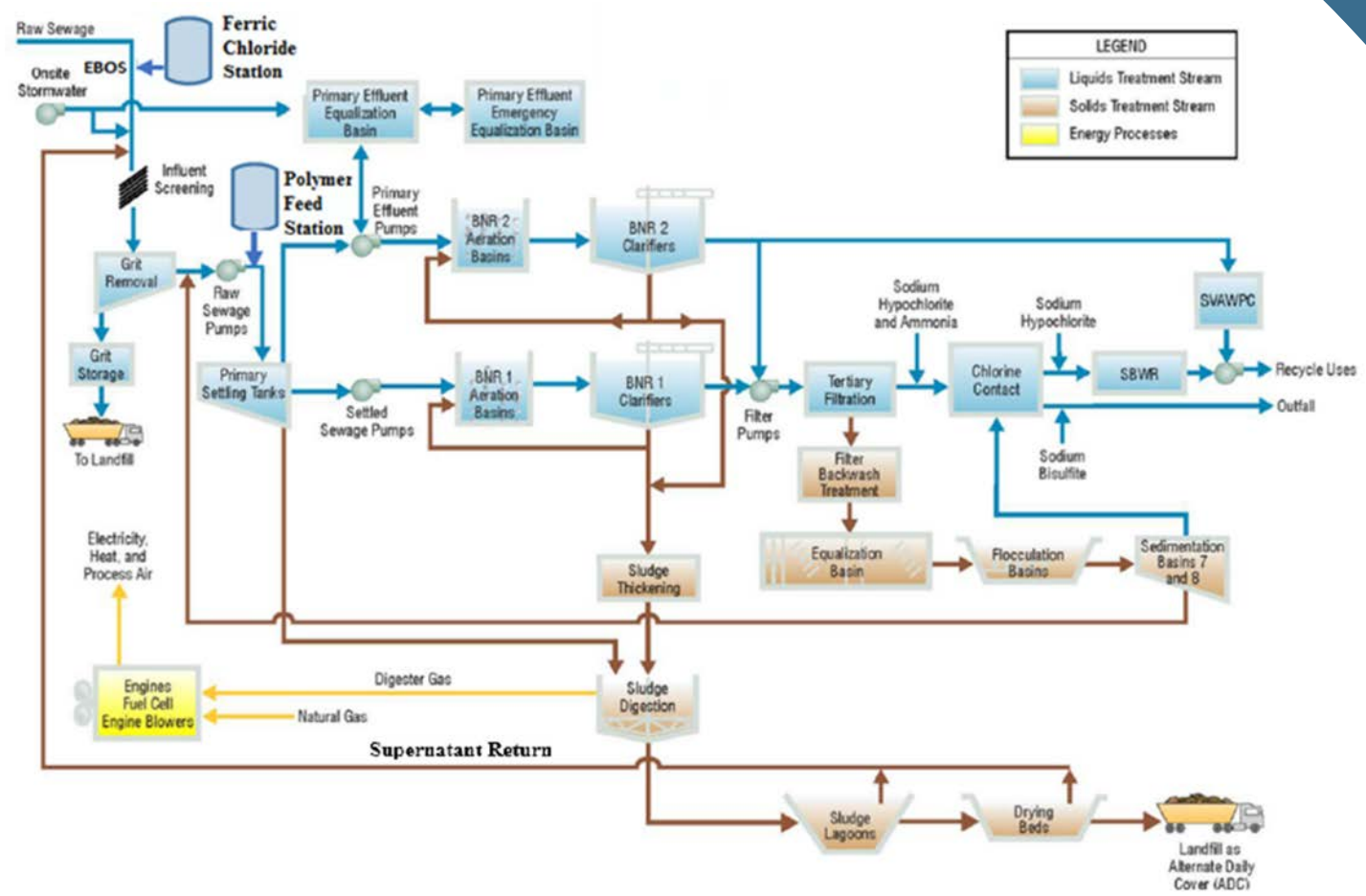


Want to learn more?

@sjenvironment @sjenvironment @sjenvironment

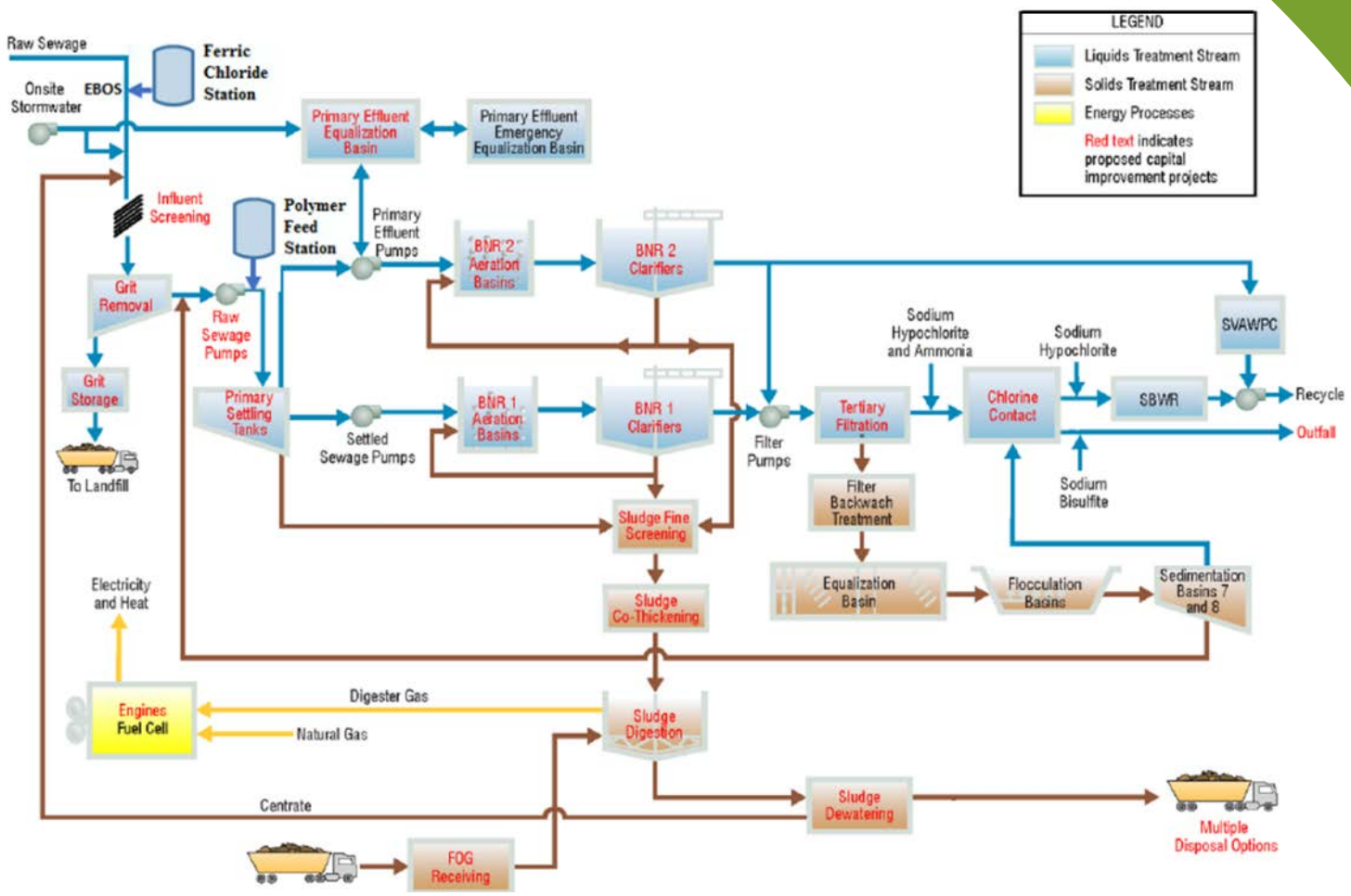
Regional Wastewater Facility Treatment

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	The sludge after dewatering that is cake like, compressed
WAS	Waste-activated sludge, or the excess quantity of bacteria and microbes removed from the secondary wastewater treatment process.