San José-Santa Clara Regional Wastewater Facility

Capital Improvement Program
Monthly Status Report: July 2017

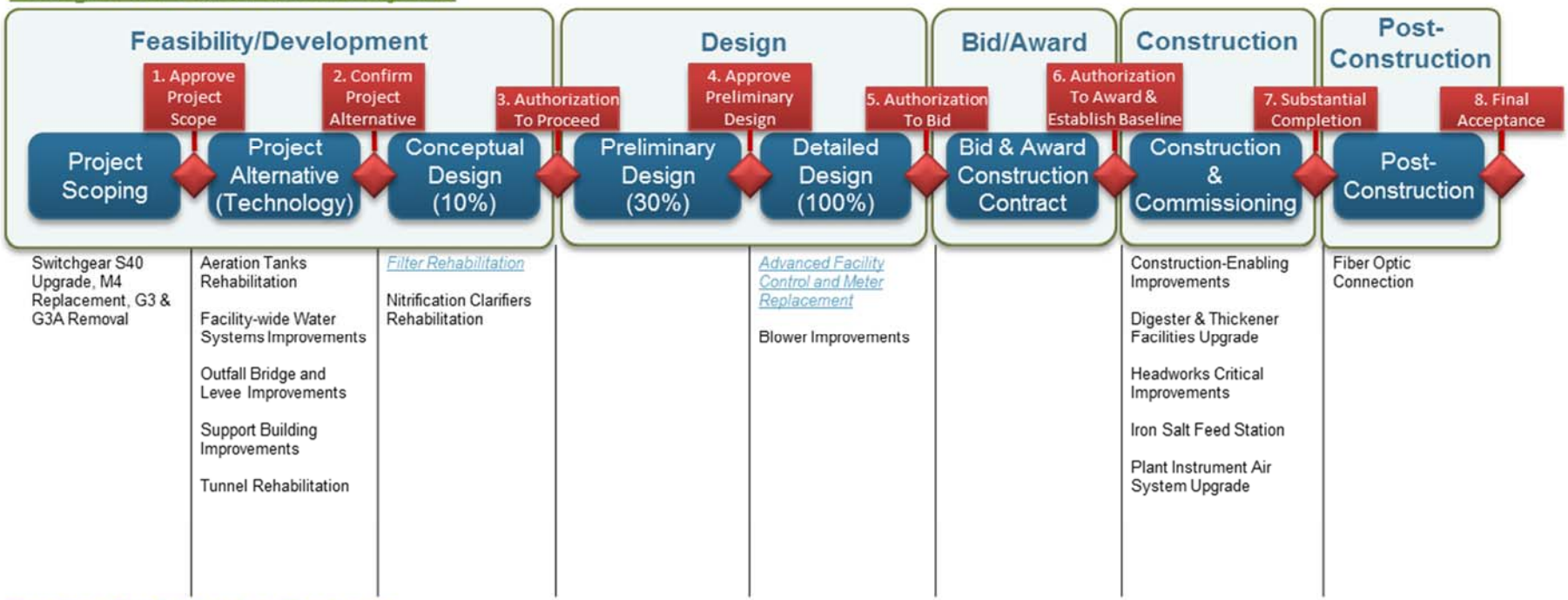
September 7, 2017

This report summarizes the progress and accomplishments of the Capital Improvement Program (CIP) for the San José-Santa Clara Regional Wastewater Facility (RWF) for July 2017.

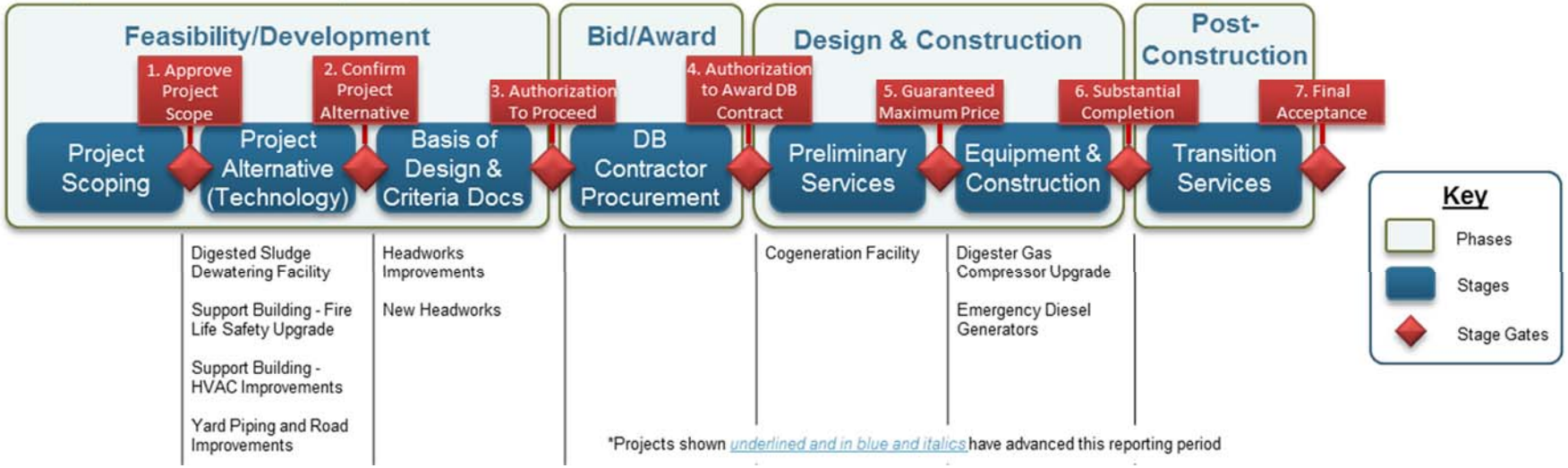
Report Contents

Project Delivery Model

Design-Bid-Build Active Projects



Design-Build Active Projects



*Projects shown underlined and in blue and italics have advanced this reporting period

Program Summary

July 2017

In July, the CIP successfully advanced the Filter Rehabilitation Project, Advanced Facility Control and Meter Replacement Project and Flow Management Study through the Project Delivery Model (PDM) stage gate process (Confirm Project Alternative, Approve Preliminary Design, and Final Acceptance stage gates, respectively).

The 17 active CIP projects continued to progress through the feasibility/development, design, and bid/award PDM stages. Alternatives analysis work continued for the Aeration Tanks Rehabilitation, Digested Sludge Dewatering Facility, and Facility-wide Water Systems Improvements projects. Of particular note, the Facility-wide Water Systems Improvements Project began field testing the four separate RWF water systems. Staff will carry out this work in conjunction with condition assessment studies prior to building an updated hydraulic network model of the water systems. Design work commenced this month (conceptual design phase) on the Nitrification Clarifiers Rehabilitation Project. Design also continued on the Advanced Facility Control and Meter Replacement, Blower Improvements, and Cogeneration Facility projects. With a combined project cost of approximately $169 million, each of these three projects is approaching the 60 percent design completion stage and will complete design and start construction in 2018. Technical panels began evaluating Statements of Qualification (SOQs) for the Yard Piping and Road Improvements Project (owner's advisor) and the Headworks Improvements and New Headworks projects (design-builder).

The seven active CIP construction projects also made significant progress in July. Testing, commissioning, and resolution of final outstanding items continued successfully on the Digester Gas Compressor Upgrade and the Emergency Diesel Generators projects, with the Emergency Diesel Generators Project achieving Beneficial Use this month. These two projects, with a combined construction cost of approximately $28 million, increase the RWF's ability to more reliably serve its customers and protect the South Bay environment. Mobilization and preparation of equipment submittals commenced this month on the Headworks Critical Improvements Project. Major construction activities continued on the Digester and Thickener Facilities Upgrade, Plant Instrument Air System Upgrade, Construction-Enabling Improvements, and Iron Salt Feed Station projects. On the Digester and Thickener Facilities Upgrade Project, staff continued to address the many unforeseen conditions that have been encountered during construction to maintain progress in the digester tanks, the dissolved air flotation tanks (DAFTs), the new elevated pipe rack, and the new sludge screening facility. As of the end of June, the City and contractor have discussed a critical-path delay of approximately four months due to these conditions. A new design issue affecting the seismic retrofit of the digester tanks was also identified this month. Solutions currently being evaluated will likely result in additional delays and costs. Staff will continue to evaluate impacts in the coming months and will provide additional updates as more information becomes available. A partnering workshop for the project was held this month, approximately one year after construction commenced on site.

Look Ahead

The following key activities are forecasted for August/September:

- The City will continue evaluating SOQs for the Yard Piping and Road Improvements and the Headworks Improvements and New Headworks projects. Staff expects to post notifications in August.
- A non-mandatory site conference for the Tunnel Rehabilitation Project consultant design procurement is scheduled for early August and SOQs are due to the City at the end of the month.
- Conceptual design work will commence for the Filter Rehabilitation Project.
- Condition assessment work will begin for Support Building - Fire Life Safety Upgrade and Support Building - HVAC Improvements projects.
- The City will advertise the prequalification document for the Advanced Facility and Control and Meter Replacement – Phase 1 construction contract.
- The Cogeneration Facility Project design builder CH2M will submit the 60 percent design package. The project team will seek approval of Early Work Package 2 for site work needed for the engine generators and expect to receive the Authority to Construct (ATC) from the Bay Area Air Quality Management District (BAAQMD).
- The City will partially accept the Construction-Enabling Improvements Project to allow contractors to begin using laydown areas.
- The City will hold a ribbon-cutting ceremony to celebrate completion of the Digester Gas Compressor Upgrade and the Emergency Diesel Generators projects in late September.
- The City will file the Notice of Completion and Acceptance for the Fiber Optic Connection Project.
- In September, staff will recommend amending the existing Master Consultant Agreement (MCA) with Stantec (formerly MWH) to TPAC and Council to extend program management services through June 2023 to align with the 10-year CIP.

Program Highlight – Progressive Design Build Delivery

Capital projects at the RWF have historically been delivered using the Design-Bid-Build (DBB) or Low-Bid Design Build (LBDB) methods. With conventional DBB, the designer takes the design to 100 percent completion level, prepares an Engineer's Estimate for bid and award, and then a construction contract is awarded to the lowest responsive bidder to construct the project. In the LBDB delivery method, a designer completes the preliminary design before the project is bid out to a design-builder that will complete the design and construct the project.

Many wastewater facilities nationally are moving to a Progressive Design-Build (PDB) approach, in which both the designer and contractor are procured together primarily based on the qualifications and the experience of the team. PDB benefits project owners by allowing for performance-based specifications with the design-builder (DB) working collaboratively with the owner to develop, design, and construct the best solution. Issues between design and construction are resolved within the DB team and conflicts and disputes are greatly reduced. Significant design and construction risks that can often accompany complex projects are transferred to the DB team. The project owner balances that risk transfer by accepting project risks that they are best placed to manage, such regulatory permits and process shutdowns. Furthermore, the project is designed with early constructability and pricing input from the design-builder, thus reducing the risk at the time of bid award and during construction.

Another benefit of the PDB process is that long lead-time purchases of major equipment systems can be ordered while other components of the project are still under design. This progressive design approach also allows for concurrent activities that can significantly shorten construction durations, thus saving money. Contract negotiations that are common to the PDB approach are typically absent in DBB projects. Contract negotiations involving balanced risk, performance guarantees, shared savings, fees, schedule, and scope are all negotiated items specific to each PDB project.

While the PDB process provides significant advantages in terms of risk allocation, performance, cost, and schedule benefits, it is not always the most suitable method for delivering low complexity projects or projects where there are limited opportunities to provide innovative solutions.

The City has successfully used the PDB process to deliver the Airport Terminal Area Improvements, Convention Center Expansion, and the U.S Patent and Trademark Office projects. These PDB projects were authorized under the City's charter authority. However, the RWF is a regional facility, and state law governs its procurement rules. Until recently, the DBB and LBDB process were the only two methods available to deliver RWF projects. In January 2015, a new state law: Public Contract Code Section 22160, took effect, authorizing the use of PDB for water and wastewater facilities. In March 2015, Council approved a RWF procurement strategy that allows for the use of PDB when staff analysis concludes it to be more beneficial.

The Cogeneration Facility Project is the first project at the RWF to use the PDB delivery method. In May 2016, a PDB contract was awarded to CH2M Hill to design and construct a new cogeneration facility. Since being awarded the PDB contract, CH2M Hill has developed the basis of design and 30 percent design documents. An early work package (EWP1) was approved in May 2017 that authorized $24 million to procure the engine generators and gas purification systems. This allowed the project to move ahead on these long lead time items much earlier than a conventional DBB project, providing price and schedule certainty. Design continues to progress around this equipment package, and staff expects the 60 percent design package in late August 2017. In October, the design-builder will submit a price proposal, or Guaranteed Maximum Price, that upon negotiation and approval will allow the project to proceed to completion. This concurrent procurement and design effort—made possible by using a PDB approach—will result in approximately seven months of schedule savings, compared to the conventional DBB delivery method.

Figure 1: Cogeneration Facility Computer Rendition

Several other complex projects at the RWF, such as the Headworks Improvements, New Headworks, Digested Sludge Dewatering Facility, and Yard Piping and Road Improvements, are also utilizing the PDB process to manage risk, cost, and schedule. While the traditional DBB approach has worked well on certain projects, the PDB delivery method provides another option for delivering capital projects at the RWF.

Program Performance Summary

Eight key performance indicators (KPIs) have been established to measure overall CIP success. Each KPI represents a metric that will be monitored on a regular frequency. Through the life of the CIP, KPIs that best reflect the current program will be selected and measured. KPIs have been reset for this fiscal year.

Program Key Performance Indicators – Fiscal Year 2017-2018

KPI	Target	Fiscal Year to Date			Fiscal Year End		
		Actual	Status	Trend	Forecast	Status	Trend
Stage Gates	80%	100% 3/3 [1]			100% 22/22		
Measurement: Percentage of initiated projects and studies that successfully pass each stage gate on their first attempt. Target: Green: >=80%; Amber: 70% to 80%; Red: < 70%							
Schedule	90%	0% 0/1 [2]			60% 3/5 [3]		
Measurement: Percentage of CIP projects delivered within 2 months of approved baseline Beneficial Use Milestone.[4] Target: Green: >=90%; Amber: 75% to 89%; Red: < 75%							
Budget	90%	NA 0/0			86% 6/7 [5]		
Measurement: Percentage of CIP projects that are accepted by the City within the approved baseline budget.[4] Target: Green: >=90%; Amber: 75% to 89%; Red: < 75%							
Expenditure[6]	$249M	NA			$294M		
Measurement: CIP FY17-18 committed costs. Target: Committed cost meets or exceeds 70% of planned Budget. 70% of $356M = $249M. Therefore Green: >=$249M; Amber: $196M to $249M; Red: < $196M							
Procurement	80%	NA 0/0			100% 4/4		
Measurement: Number of consultant and contractor procurements advertised compared to planned for the fiscal year. Target: Green: >=80%; Amber: 70% to 79%; Red: < 70%							
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							
Staffing[7]	80%	NA 0/0			100% 15/15		
Measurement: Number of planned positions filled for the fiscal year. Target: Green: >=80%; Amber: 70% to 79%; Red: < 70%							

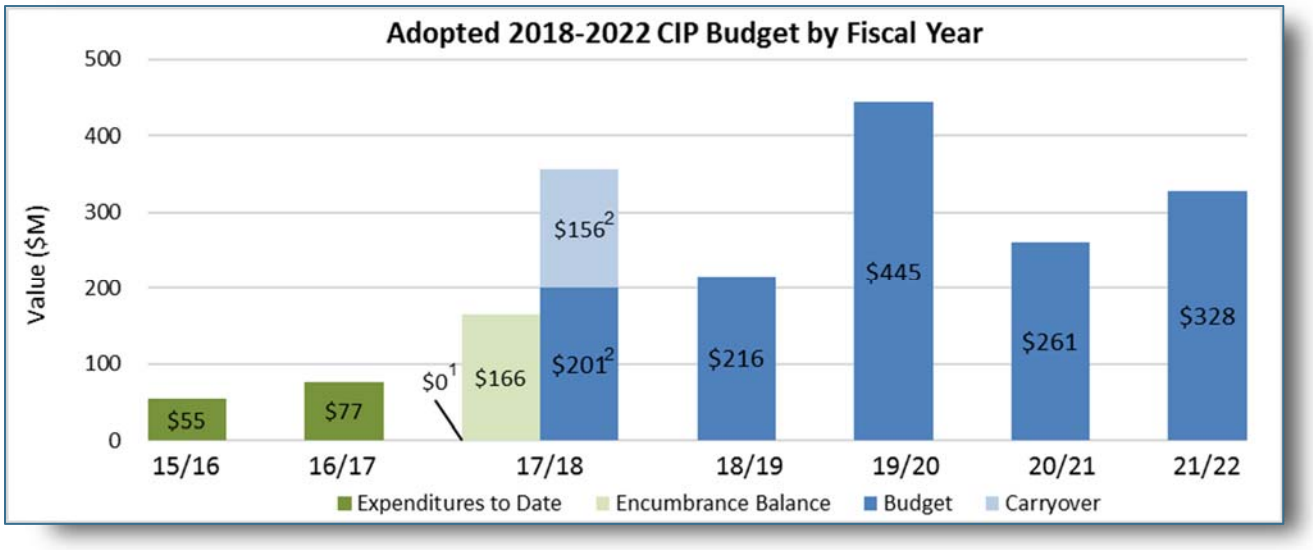
Notes

1. The Filter Rehabilitation Project and Advanced Facility Control & Meter Replacement Project successfully completed Stage Gate 2: Confirm Project Alternative and Stage Gate 4: Approve Preliminary Design, respectively. Flow Management Study successfully completed Stage Gate 2: Final Acceptance.
2. The Emergency Diesel Generators Project reached Beneficial Use this month, but was more than two months late.
3. The Construction-Enabling Improvements Project is expected to be delivered this fiscal year more than two months late.
4. The baseline Beneficial Use date and the baseline budget for each project are established at construction contract award and execution.
5. The Digester Gas Compressor Upgrade Project is expected to be accepted this fiscal year, but is currently over budget.
6. Due to the reversal of 2016-2017 accruals, actual expenses in July are negative and not stated in this report. These negative expenses will be offset when the 2016-2017 invoices are paid.
7. The staffing KPI represents CIP recruitments planned for the fiscal year and is measured quarterly. This KPI measurement does not account for staff turnover throughout the fiscal year.

Program Cost Performance Summary

This section summarizes CIP cost performance for all construction projects and non-construction activities for fiscal year (FY) 17-18 and for the 2018-2022 CIP.

Adopted 2018-2022 CIP Expenditure and Encumbrances



Notes

1. Due to the reversal of 2016-2017 accruals, actual expenses in July are negative. These negative expenses will be offset when the 2016-2017 invoices are paid.
2. Actual Budget: $200.5M; Actual Carryover Balance: $155.9M; rounded total: $356M.

Expenditure: Actual cost expended, either by check to a vendor or through the City's financial system, for expenses such as payroll or non-personal expenses that do not require a contract.

Encumbrance**:** Financial commitments, such as purchase orders or contracts, that are committed to a vendor, consultant, or contractor. An encumbrance reserves the funding within the appropriation and project.

Encumbrance Balance: The amount of the remaining encumbrance committed after payments.

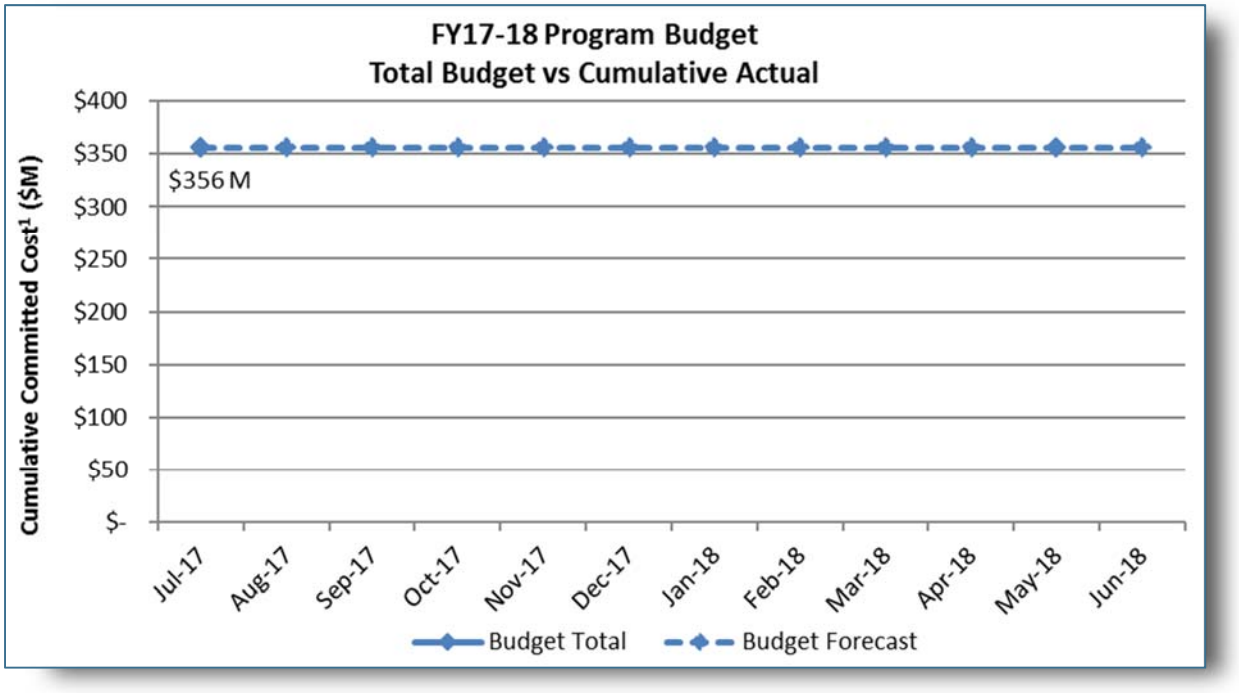
Budget: Adopted 2018-2022 CIP Budget, which is new funding plus rebudgeted funds in FY17-18.

Carryover: Encumbrance balances at the end of a fiscal year become carryover funding. Carryover is different from rebudgeted funds in that it automatically utilizes funding that was previously committed, but not yet paid.

Fiscal Year 2017-2018 Program Budget Performance

This budget comprises the FY17-18 budget of $200.5 million, plus carryover of $155.9 million. The budget excludes Reserves, Ending Fund Balance, South Bay Water Recycling, Public Art, and Urgent and Unscheduled Rehabilitation items.

The committed costs forecast for Fiscal Year 2017-18 are currently being finalized and will be included in next month's report.



Notes

1. Committed costs are expenditures and encumbrance balances, including carryover (encumbrance balances from the previous fiscal year).

Project Performance Summary

There are currently eight active projects in the construction or post-construction phases, with an additional 17 projects in feasibility/development, design, bid and award, or design and construction (design-build projects) phases (see PDM, page 2). All active projects are listed in the tables below. Projects in the construction phase have established cost and schedule baselines and are monitored using the City's Capital Project Management System (CPMS). Green/red icons are included in the table below to indicate whether these projects are on budget and schedule, using CPMS data as a source.

Project Performance – Baselined Projects

Project Name	Phase	Estimated Beneficial Use Date[1]	Cost Performance [2]	Schedule Performance[2]
1. Fiber Optic Connection	Post-Construction	Jan 2017[3]	●	●
2. Digester Gas Compressor Upgrade	Construction	Apr 2017[3]	◆	◆
3. Emergency Diesel Generators	Construction	Jul 2017[3]	●	◆
4. Construction-Enabling Improvements	Construction	Nov 2017	●	◆
5. Iron Salt Feed Station	Construction	Nov 2017	●	●
6. Plant Instrument Air System Upgrade	Construction	May 2018	●	●
7. Headworks Critical Improvements	Construction	Jun 2018	●	●
8. Digester and Thickener Facilities Upgrade	Construction	Aug 2020	●	◆

KEY:

Cost:	● On Budget	◆	>1% Over Budget
Schedule:	● On Schedule	◆	>2 months delay

Notes

1. Beneficial Use is defined as work that is sufficiently complete, in accordance with contract documents, that it can be used or occupied by the City. Beneficial Use dates are reviewed as part of project schedule reviews.
2. An explanation of cost and schedule variances on specific projects identified in this table is provided on page 11.
3. Actual Beneficial Use date.

Project Performance – Pre-Baselined Projects

Project Name	Phase	Estimated Beneficial Use Date[1]
1. Cogeneration Facility	Design & Construction	Aug 2019
2. Blower Improvements	Design	Oct 2020
3. Adv. Facility Control & Meter Replacement	Design	Dec 2022
4. Outfall Bridge and Levee Improvements	Feasibility/Development	Oct 2020
5. Headworks Improvements	Feasibility/Development	May 2021
6. Switchgear S40 Upgrade, M4 Replacement, G3 & G3A Removal	Feasibility/Development	Feb 2022
7. Digested Sludge Dewatering Facility	Feasibility/Development	Jul 2022
8. Filter Rehabilitation	Feasibility/Development	Sep 2022
9. New Headworks	Feasibility/Development	Sep 2022
10. Support Building - Fire Life Safety Update	Feasibility/Development	Sep 2022
11. Support Building - HVAC Improvements	Feasibility/Development	Sep 2022
12. Facility-wide Water Systems Improvements	Feasibility/Development	Feb 2023
13. Nitrification Clarifiers Rehabilitation	Feasibility/Development	Nov 2023
14. Aeration Tanks Rehabilitation	Feasibility/Development	Aug 2025
15. Tunnel Rehabilitation	Feasibility/Development	Dec 2025
16. Support Building Improvements	Feasibility/Development	May 2026
17. Yard Piping and Road Improvements	Feasibility/Development	Aug 2026

Notes

1. Beneficial Use is defined as work that is sufficiently complete, in accordance with contract documents, that it can be used or occupied by the City. Beneficial Use dates are reviewed as part of project schedule reviews.

Significant Accomplishments

Biosolids Package

Digester Thickener and Facilities Upgrade

- Contractor Walsh Construction is continuing the structural rehabilitation of the digesters. All concrete work inside the digesters has been completed and the installation of post-tensioning cables has been initiated. All foundation work for elevated pipe rack columns is completed. The contractor has started work on the sludge storage tank for the new sludge screening facility.

Facilities Package

Cogeneration Facility

- The project team held a value engineering workshop on July 12. The design-builder will incorporate the comments into the 60 percent design.

Facility-wide Water Systems Improvements

- Design consultant Kennedy/Jenks commenced field testing of the four water systems at the RWF. As part of the projects alternative analysis stage this work is being carried out in conjunction with condition assessment studies prior to development of an updated hydraulic model of the water systems.

Yard Piping and Road Improvements

- The technical panel evaluated SOQs and interim rankings were posted for owner's advisor services. Interviews will be conducted in August and staff anticipates awarding an MCA in November.

Liquids Package

Advanced Facility Controls and Meter Replacement

- The project team successfully passed Stage Gate 4: Approve Preliminary Design and has moved into the detailed design stage. To better align construction with planned maintenance shutdowns, the project was divided into two phases with the 100 percent design of the first phase anticipated to be completed in the fall.

Blower Improvements

- The project team hosted a Vendor Day to familiarize prospective bidders with the project and solicit interest. Attendees included general contractors, subcontractors, and equipment suppliers.

Filter Rehabilitation

- The project team successfully completed Stage Gate 2: Confirm Project Alternative and obtained approval to begin conceptual design. The project team will develop plans to rehabilitate all 16 filters, including new filter media and air scour systems.

Headworks Critical Improvements

- Contractor Overaa Construction began work, including mobilization and preparation of critical equipment submittals.

Headworks Improvements and New Headworks

- The City received SOQs from four design-build teams. The Technical Evaluation Panel will evaluate the proposals and issue a Notice of Determination by the end of August.

Nitrification Clarifiers Rehabilitation

- The project team initiated the conceptual design work with the design consultant, HDR.

Power and Energy

Emergency Diesel Generators

- The project reached Beneficial Use on July 7.

Plant Instrument Air System Upgrade

- Contractor Anderson Pacific installed the building footing. The building slab is scheduled to be poured next month.

Studies and Programwide Services

Flow Management Study

- The team successfully completed Stage Gate 2: Final Acceptance.

Explanation of Project Performance Issues

Construction-Enabling Improvements

This project was originally scheduled to be substantially complete by mid-February 2017. Due to the extremely wet winter season, contractor Teichert Construction was unable to perform substantial site work for several weeks from October through April. Teichert has been granted 47 extra work days for weather-related delays. Teichert has also been granted additional time for the removal and replacement of asphalt pavement in damaged areas of Zanker Road; installing traffic-rated pull boxes for the streetlight system; installing underground conduits for the fiber optic system; and additional changes.

Delays in the fabrication and delivery of the trailers continue to impact the schedule. Teichert now estimates that trailers required for the project will be delivered in late September. Installation and furnishing of the trailers, plus final inspection, should take another four to six weeks, placing the Beneficial Use date in early November 2017.

Digester and Thickener Facilities Upgrade

Numerous unforeseen conditions are impacting the project schedule. The conditions, detailed below, are resulting in an estimated delay to the Beneficial Use date of four months. The project team continues to evaluate the schedule delays.

- Major corrosion of an existing, below-ground 78-inch settled sewage (SES) pipeline and junction structure was encountered during construction. This corrosion has impacted the DAFT tank piping connections, two new pressurization flow boxes, and utility relocation work. All repairs have been postponed until the 2018 dry season, when a bypass pumping system can be safely installed to allow repair work to continue. Pricing and submittal review of bypass pumps and piping is in progress.
- An unidentified, 36-inch biochemical oxygen demand pipe was discovered during preparation of the foundation for the new sludge screen building. The contractor removed this pipe and relocated several unforeseen digester and landfill gas drain vaults and associated piping.
- Multiple unforeseen utility conflicts with water, natural gas, digester gas, landfill gas, storm drain, and sanitary sewer pipelines have impacted progress. These conflicts have caused multiple utility pipe, conduit, and duct bank relocations across the site, and have also impacted the new digester gas pipe rack footings, causing rerouting and other design changes.
- Digester gas bypass work has been delayed approximately six months due to BAAQMD venting restrictions. Work on digester gas bypass connections has begun, with the installation of the bypass anticipated to be completed later this fall.

Digester Gas Compressor Upgrade

This project is over budget by approximately 3 percent due to higher than anticipated project delivery costs associated with increased construction inspection requirements and an extended project timeline.

The contractor achieved Beneficial Use in April 2017 and final acceptance is scheduled for October. This schedule delay was primarily due to the following factors:

- The compressor skids needed to be reclassified from Class 1, Division 2 to Class 1, Division 1. This issue was resolved in May 2015.
- BAAQMD delayed approval of the digester gas flaring during the tie-in of the new gas piping. This issue was resolved in November 2016.
- Functional testing of the automation system took longer than anticipated.
- Multiple competing process shutdowns with other projects contributed to the delay.

Emergency Diesel Generator

The project reached Beneficial Use this month and final acceptance is scheduled for October. The schedule shows a project completion delay of approximately one year from the Notice to Proceed (NTP) completion date. The City granted a schedule addition of 179 working days through the change order process, due to additional scope. The project has extended beyond the original schedule due to the following factors:

- Caterpillar, the supplier of the emergency diesel generator system, has taken longer than expected to develop the controls and network switches that interface with existing RWF controls. Caterpillar and Peterson Control are in the process of completing all outstanding items. A problem was found with the new network switches during the factory acceptance test. The City and the design-build team completed an engineering study and found a solution to the problem. Additional switches have been installed for the existing network system. Caterpillar's completion of the Level 2 process load tuning testing for four new emergency diesel generators also took longer than anticipated.
- Additional time was required for PG&E to review the third-party report on the protective devices testing and to schedule the witness test for the new emergency diesel generators. PG&E has now completed this work.
- A no-cost time extension change order was required to split the commissioning sequence into two phases and ensure RWF backup power during engine modification work. The contractor completed the first two phases of the project,

including modifications to the existing EG1 engine; an eight-hour load test for the four new generators; installation of the fueling and diesel exhaust fluid systems; and upgrades to the existing EG2 and EG3 engines and M4 switchgear. The project was completed in July and is moving into the post-construction phase for completion of remaining minor outstanding items and necessary training.

Project Profile – Blower Improvements

The RWF secondary treatment process consists of two separate biological nutrient removal (BNR) systems, BNR-1 and BNR-2. These systems include a biological treatment process that removes organics from the incoming primary effluent. The main system components include the blowers and aeration tanks' air headers and diffusers. The air provided by the blowers is used to accelerate the biodegradation of organic material in the biological nutrient removal process.

BNR-1 and BNR-2 were originally constructed in 1961 and 1975, respectively. The blowers that serve the secondary treatment system have aged beyond their useful lives and require rehabilitation to ensure long-term operations while minimizing maintenance requirements. The 14 aeration blowers serving BNR-1 and BNR-2 are located throughout the RWF in three separate buildings: the Process & Air Building; the Secondary Blower Building; and the Tertiary Blower Building.

The project's key goals are to extend the useful life of the RWF's blower aeration system by another 30 years and to achieve improved energy efficiency. The project scope includes the design, fabrication, and installation of new motors, new variable frequency drives/reduced voltage soft starters, and new instrumentation and controls, as well as the decommissioning and demolition of four SBB blowers. This will result in increased reliability and redundancy for the entire blower aeration production system, using modern controls and instrumentation upgrades.

The program management consultant, Stantec/Carollo, completed a comprehensive condition assessment of the blower system in April 2016 and the conceptual design in September 2016. The designer, Brown and Caldwell, advanced the preliminary design to the 30 percent completion stage in March 2017. A value engineering analysis performed in April 2017 identified more than $3.5 million in savings for an investment of less than $120,000, using an independent firm, Hazen & Sawyer. The latest construction cost estimate prepared at the 30 percent design stage is approximately $28.8 million.

The project will be delivered using conventional DBB approach. The project is scheduled to complete the 60 percent detailed design by the early September, and 100 percent design by late January 2018. The team anticipates awarding the project in summer 2018 and beginning construction in fall 2018. Beneficial Use is expected to be achieved in early 2021.

It is estimated that the aeration blower system improvements in combination with the replacement of coarse bubble diffusers will result in a significant reduction of energy usage. This is in comparison with current energy usage.

Figure 2: Existing Engine Blower

Regional Wastewater Facility Treatment – Current Treatment Process Flow Diagram

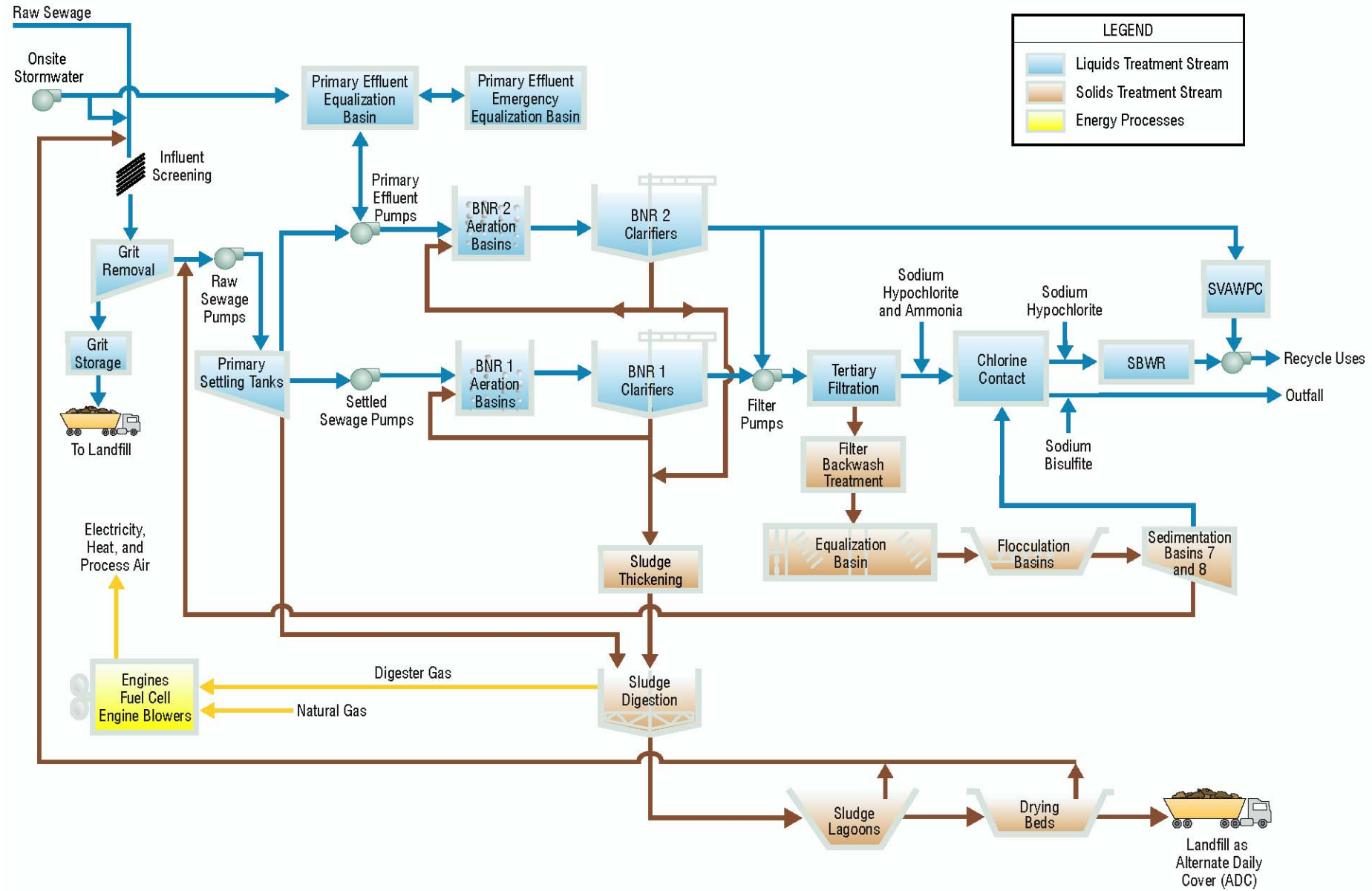


Figure 3 – Current Treatment Process Flow Diagram

Regional Wastewater Facility Treatment – Proposed Treatment Process Flow Diagram

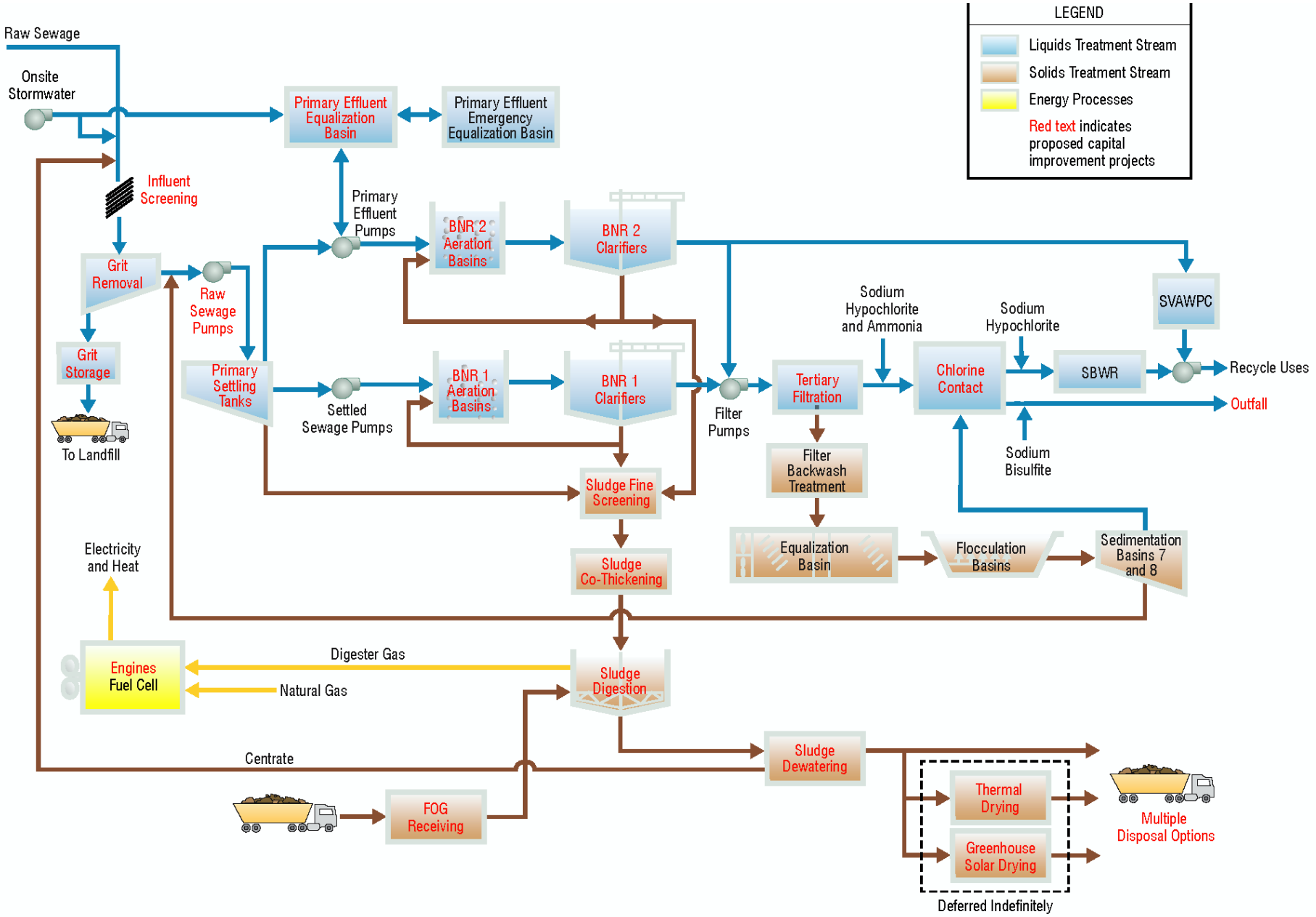


Figure 4 – Proposed Treatment Process Flow Diagram

Active Construction Projects – Aerial Plan

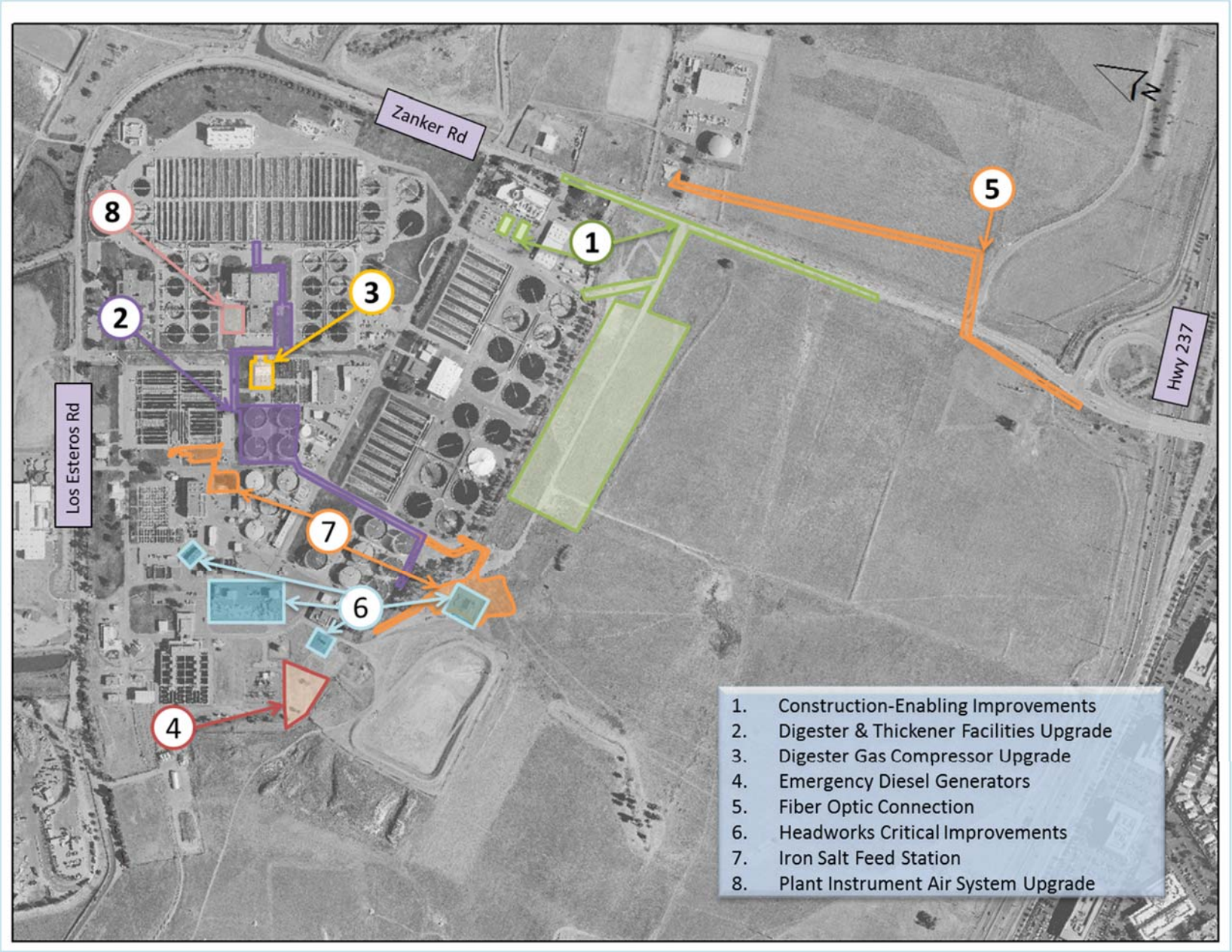


Figure 5 – Active Construction Projects