



San José-Santa Clara
Regional Wastewater Facility

Capital Improvement Program

Monthly Status Report: June 2019

July 5, 2019

This report summarizes the progress and accomplishments of the Capital Improvement Program (CIP) for the San José-Santa Clara Regional Wastewater Facility (RWF) for June 2019.

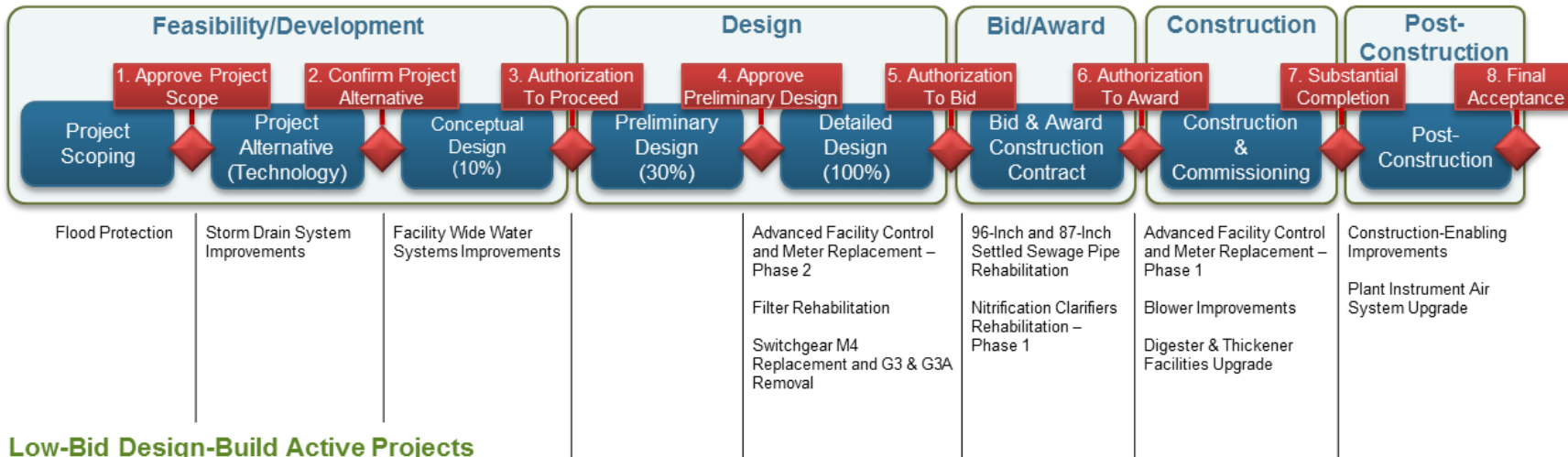
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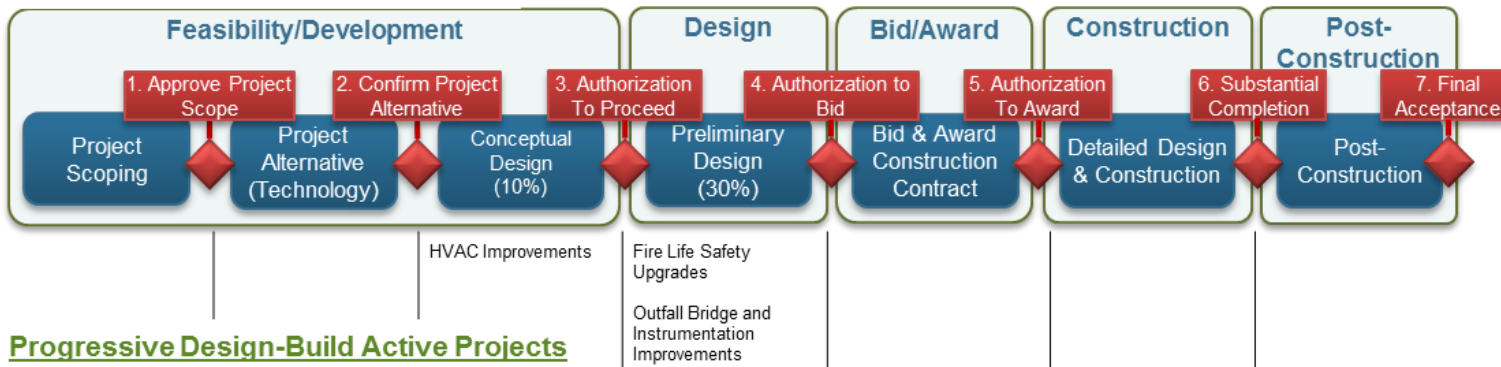


Project Delivery Models

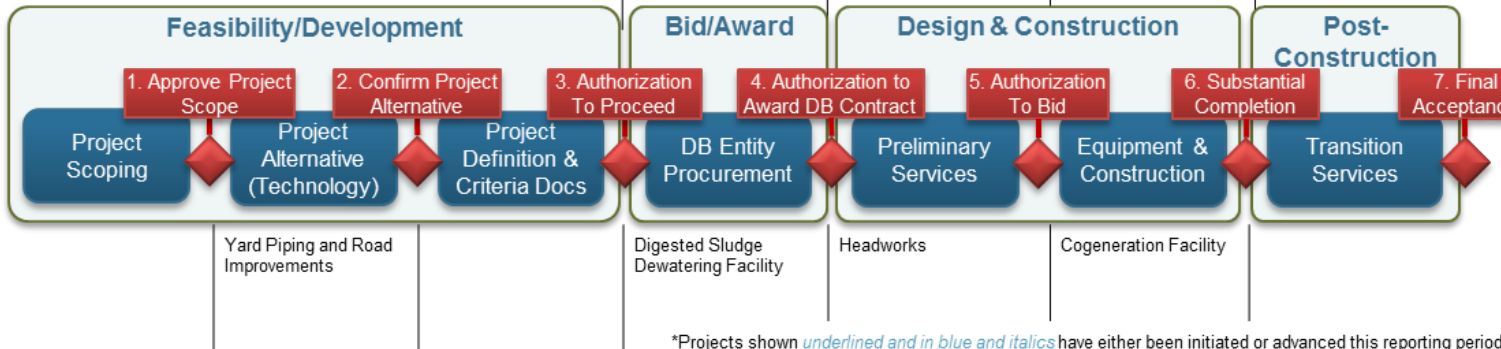
Design-Bid-Build Active Projects



Low-Bid Design-Build Active Projects



Progressive Design-Build Active Projects



Key

- Phases
- Project Scoping Stages
- ◆ Stage Gates

*Projects shown underlined and in blue and italics have either been initiated or advanced this reporting period



Program Summary

June 2019

In June, the Construction-Enabling Improvements Project passed Stage Gate 7: Substantial Completion, and the City issued the Notice of Completion and Acceptance (NOCA) for the project. The Digester Gas Compressor Upgrades and Emergency Diesel Generators projects both passed Stage Gate 8: Final Acceptance of the Project Delivery Model (PDM).

The Digester and Thickener Facilities Upgrade Project contractor installed PVC linings in Digesters 7 and 8 to protect the concrete structure from corrosion, and they continued preparation work for the seismic ring beams' final concrete pours. Pipe supports were installed inside Digesters 5 and 6 for transfer return sludge and digester overflow piping. The contractor continued to prepare for commissioning the Dissolved Air Flotation Thickener (DAFT) tanks, which will start in September 2019.

The Cogeneration Facility Project design-builder installed roof trusses and a bridge crane in the main generator building (see Figure 1). The design-builder also poured concrete slabs for the electrical and mechanical building, and installed foundations for the cooling towers and chillers.

The Blower Improvements Project contractor completed demolition of existing structures in Building 40 and the Tertiary Blower Building.

The Advanced Facility Control and Meter Replacement – Phase 1 Project contractor installed aeration tank influent flowmeters and new mounting stands for dissolved oxygen (DO) sensors and transmitters, as well as removed existing flowmeters and associated piping.

On the Headworks Project, the project team completed reviewing the 30 percent design submittal. Review of the design-builder's cost model continued, as did the subsurface investigation to verify the location of existing utilities.



Figure 1: Cogeneration Main Generator Building roof truss installation

The Yard Piping and Road Improvements Project team and Operations and Maintenance (O&M) performed inspections of the 66- and 84-inch settled effluent, 24-inch mixed liquor, and 24- and 54-inch return activated sludge (RAS) pipelines.

The Filter Rehabilitation Project design consultant continued 90 percent design with the submittal due in July. The Switchgear M4 Replacement and G3 & G3A Removal Project team reviewed the 90 percent design submittal. The design consultant for the HVAC Improvements Project completed the hazardous materials survey in RWF buildings.

Look Ahead

The following key activities are forecasted for July and August 2019:

- The City will accept the Plant Instrument Air System Upgrade Project.
- The City will open bids for the Nitrification Clarifiers Rehabilitation – Phase 1 Project.
- The City will advertise the 96-Inch and 87-Inch Settled Sewage Pipe Rehabilitation Project and Switchgear M4 Replacement and G3 & G3A Removal Project construction contracts.
- The City will advertise the Advanced Facility Control and Meter Replacement – Phase 2 and Filter Rehabilitation projects' contractor pre-qualification documents.
- Six projects will seek to advance through stage gates including:
 - Storm Drain Systems Improvements Project – Stage Gate 2: Confirm Project Alternative;
 - HVAC Improvements Project – Stage Gate 3: Authorization to Proceed;
 - Digested Sludge Dewatering Facility Project – Stage Gate 4: Authorization to Award DB Contract;
 - Switchgear M4 Replacement and G3 & G3A Removal Project – Stage Gate 5: Authorization to Bid;
 - Fire Life Safety Upgrades Project - Stage Gate 4: Authorization to Bid; and
 - Advanced Facility Control and Meter Replacement - Phase 2 Project - Stage Gate 5: Authorization to Bid.

Program Highlight – Project Initiation

In early 2014, the CIP implemented the PDM approach (see page 2; also see the May 2019 Monthly Status Report Program Highlight for more information) to systematically deliver capital projects at the RWF. Before work begins on any project at the RWF, it must be formally initiated (see Figure 2). The project initiation process ensures staff is working on projects that have defined need, scope, staffing resources, budget, and stakeholder visibility.

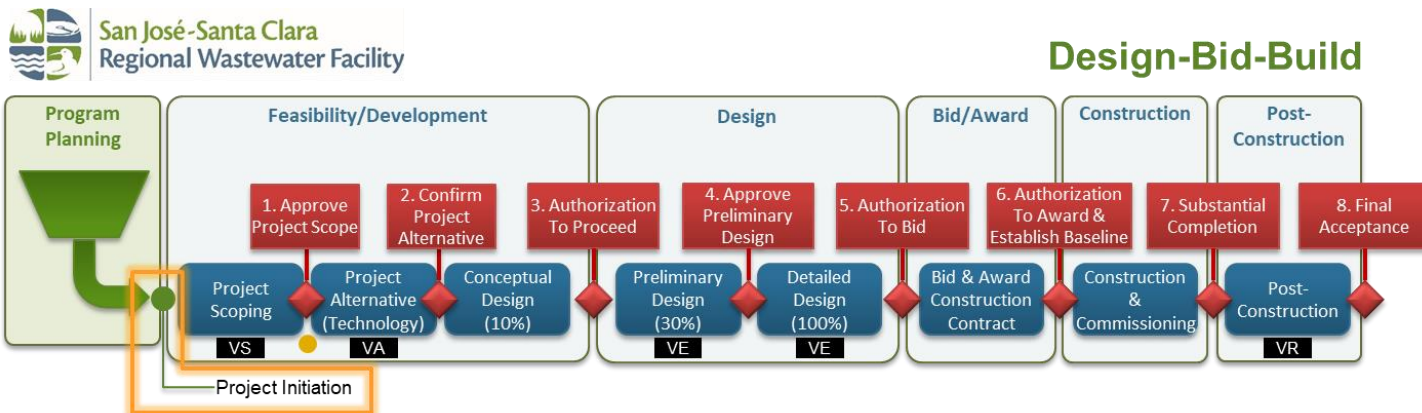


Figure 2: PDM with Project initiation highlighted

Proposed projects originate from either the CIP or O&M and are either planned or unplanned/emergency. The majority of planned CIP projects were identified during the program validation exercise, completed in early 2014, and are started according to current program priorities. A few planned projects are gap projects that were identified subsequent to validation. Planned CIP projects are initiated based on CIP project prioritization, resource constraints, and budget availability. Planned O&M projects are scheduled as facilities reach the end of their known useful life. Once in a long while, an unplanned/emergency CIP or O&M project is needed to repair or replace equipment or infrastructure at the RWF.

Appropriate staff complete the project initiation form, which summarizes the proposed project's key elements, including:

- Project name;
- Project scope, highlighting any variation of scope, schedule, or cost from the validation project summary, if applicable;
- Project urgency and if CIP or O&M will deliver the project;
- Proposed project resources, including project manager, project engineer, O&M support, environmental team lead, and other resources as needed;
- Project schedule, including major milestones;
- Project budget including a high level summary of the estimated total project cost, proposed budget appropriation(s), and current fiscal year budget;
- Project classification defined in terms of total project cost and complexity, which results in an overall project classification of high, medium or low. This information will be used to define the recommended project manager experience level and the stage gate, schedule, and risk management requirements;
- Preliminary environmental permitting expectations;
- Impacts on treatment processes and other facilities; and
- Any other pertinent considerations.

After the project initiation form is completed, it is agendaized and discussed at the monthly RWF CIP/O&M Coordination Meeting. Attendees include ESD Assistant Director; CIP, O&M and Public Works Deputy Directors; and the CIP and O&M Division Managers. If there is consensus to initiate the project, the identified project manager will begin moving the project through the project scoping stage of the PDM. The project will also be formally set up in various program control tools, to allow proper tracking and management of budget and schedule. For CIP projects, a project team site will be created on the program's collaborative SharePoint site to facilitate document management.

The project initiation process serves as a tool to collect and organize the project details needed to facilitate effective CIP or O&M project delivery. This process ensures all stakeholders are aware of the project so the needed resources and budget are available and the program is able to successfully complete the project. The process also allows CIP and O&M leadership the opportunity to express any initial concerns and vote on whether to move ahead with the project before the project officially begins.

Program Performance Summary

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

Program Key Performance Indicators – Fiscal Year 2018-2019

KPI	Target	Fiscal Year to Date			Fiscal Year End		
		Actual	Status	Trend	Forecast	Status	Trend
Stage Gates	90%	95% 19/20 ¹			95% 19/20		
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%	33% 1/3			33% 1/3		
Measurement: Percentage of CIP projects delivered within 2 months of approved baseline Beneficial Use Milestone. ² Target: Green: >= 90%; Amber: 75% to 89%; Red: < 75%							
Budget	90%	100% 3/3 ³			100% 3/3 ⁴		
Measurement: Percentage of CIP projects that are accepted by the City within the approved baseline budget. ² Target: Green: >= 90%; Amber: 75% to 89%; Red: < 75%							
Expenditure	\$250M	\$277M			\$277M ⁵		
Measurement: CIP FY18-19 committed costs. Target: Committed cost meets or exceeds 70% of planned Budget. 70% of \$358M = \$250M. Therefore Fiscal Year End Green: >=\$250M; Amber: \$197M to \$250M; Red: < \$197M							
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 Rate⁶	10%	17% 14/83 ⁷			17% 14/83 ⁸		
Measurement: Ratio of the number of vacant approved positions to approved positions. Target: Green: <= 10%; Amber: 10% to 20%; Red: > 20%							

Notes

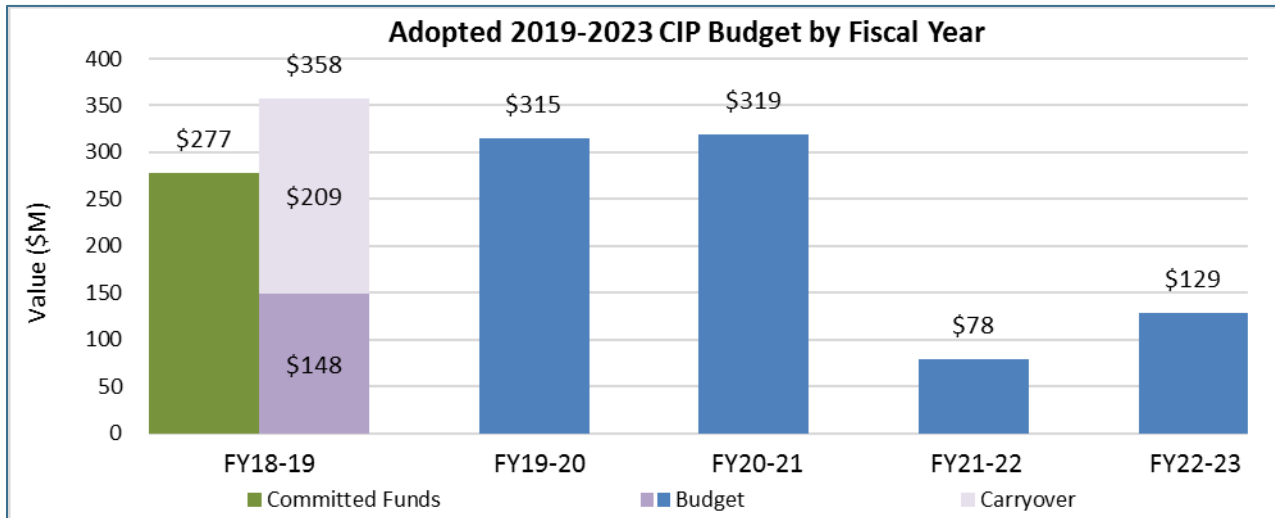
1. The Construction-Enabling Improvements Project passed Stage Gate 7: Substantial Completion and the Emergency Diesel Generators and Digester Gas Compressor Upgrades projects passed Stage Gate 7: Final Acceptance.
2. The baseline Beneficial Use date and the baseline budget for each project are established at construction contract award and execution.
3. The City accepted the Construction-Enabling Improvements Project with project costs within 1 percent of the baseline value.
4. The Plant Instrument Air System Upgrade Project was originally anticipated to be accepted this fiscal year.
5. The fiscal year-end expenditure KPI decreased due to anticipated Owner Controlled Insurance Program costs coming in under budget.
6. The vacancy rate KPI measures CIP-approved positions (ESD and Public Works) and program management consultant full-time staff.
7. The vacancy count decreased by two.
8. The fiscal year-end Vacancy KPI increased as less positions were filled than originally anticipated.



Program Budget Performance Summary

This section summarizes the cumulative monthly budget performance for fiscal year (FY)18-19 based on the Adopted 2019-2023 CIP.

Adopted 2019-2023 CIP Expenditure and Encumbrances



Notes:

Committed Funds: Total of expenditures and encumbrances.

Expenditure: Actual cost expended, either by check to a vendor or through the City's financial system, for expenses such as payroll or for 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.

The FY18-19 budget is \$185 million, which consists of \$131 million in new funds and \$54 million in rebudgets. For purposes of this monthly report, the adopted FY18-19 budget is adjusted from \$185 million to \$148 million due to the exclusion of certain appropriations that are not measured as part of the expenditure KPI. Excluded appropriations include City Hall Debt Service Fund; Clean Water Financing Authority Debt Service Payment Fund; Debt Service Repayment for Plant Capital Improvement Projects (San José only debt service); Equipment Replacement Reserve; Ending Fund Balance; Public Art; SBWR Extension; State Revolving Fund Loan Repayment; and Urgent and Unscheduled Treatment Plant Rehabilitation. Similar adjustments have been made to the budgets for FY19-20 through FY22-23.

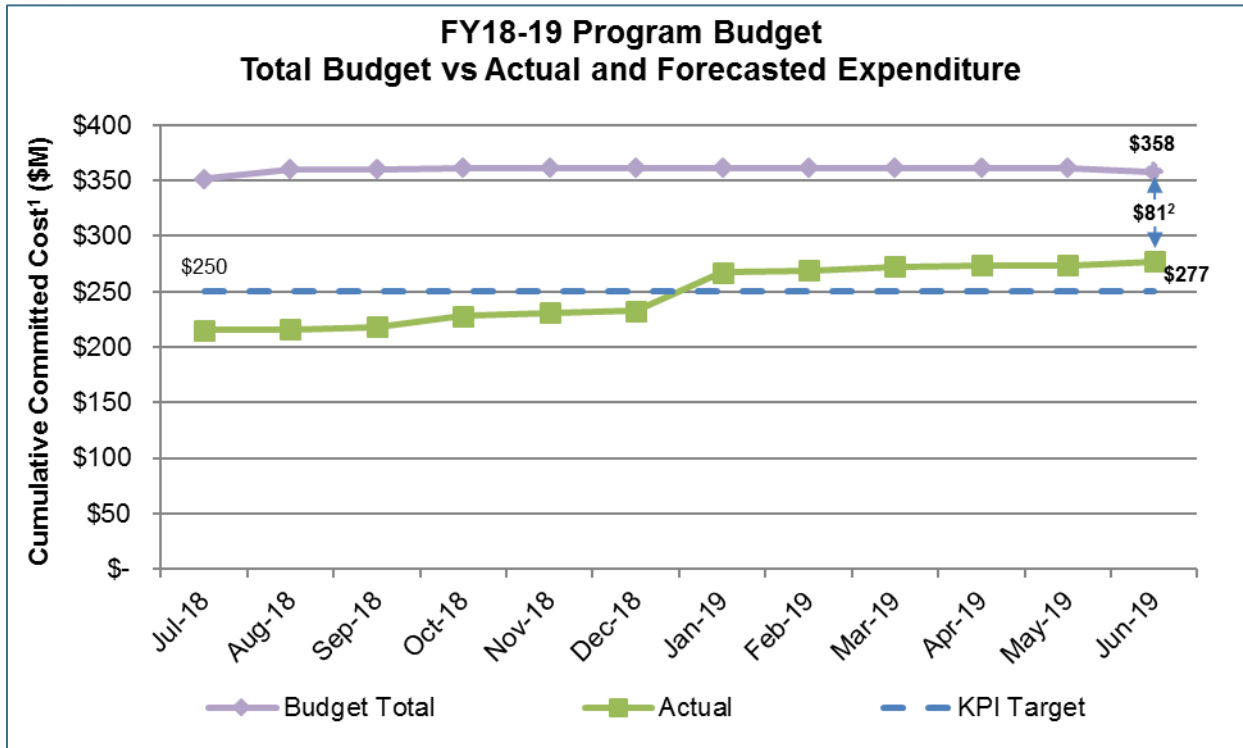
Carryover: Encumbrance balances at the end of the previous fiscal year are automatically carried forward to the current fiscal year as carryover funding to pay invoices for approved construction contracts and consultant agreements. FY18-19 carryover is \$209 million.

Budget of \$148.3 million and carryover of \$209.3 million totals \$358 million for FY18-19.



Fiscal Year 2018-2019 Program Budget Performance

The FY18-19 CIP budget is comprised of approximately \$148 million in new funds, plus encumbered carryover of \$209 million, for a total of \$358 million. This excludes City Hall Debt Service Fund; Clean Water Financing Authority Debt Service Payment Fund; Debt Service Repayment for Plant Capital Improvement Projects (San José only debt service); Equipment Replacement Reserve; Ending Fund Balance; Public Art; SBWR Extension; State Revolving Fund Loan Repayment; and Urgent and Unscheduled Treatment Plant Rehabilitation items. Overall, the forecasted fiscal year-end committed funds exceed the fiscal year-end target by \$27 million.



Notes:













1. Committed costs are expenditures and encumbrance balances, including carryover (encumbrance balances from the previous fiscal year).
2. The variance between budget and commitments can be primarily attributed to the following factors:
 - a. Two construction contracts are now anticipated to be awarded in FY19-20 instead of FY18-19, based on updated schedules:
 - i. Fire Life Safety Upgrades Project
 - ii. Switchgear M4 Replacement and G3 & G3A Removal Project
 - b. Several consultant service orders were not awarded in FY18-19:
 - i. Aeration Tank Rehabilitation Project
 - ii. Support Facilities Project
 - iii. Tunnel Rehabilitation Project
 - c. The Digested Sludge Dewatering Facility Project preliminary services contract and associated owner's advisor services are now anticipated to be awarded in FY19-20.
 - d. The Digester and Thickener Facilities Upgrade Project design consultant services amendment is now expected to be executed in FY19-20.
 - e. The Blower Improvement Project construction bids came in under budget.
 - f. Several other minor encumbrances for consultant services are either lower than budgeted or are anticipated to be awarded in FY19-20.
 - g. Several authorized positions remain vacant, resulting in lower personal services expenses than budgeted.
 - h. The FY16-17 payment budgeted for the annual Owners Controlled Insurance Program premium covered the period through FY17-18. Funds rebudgeted from FY17-18 will be programmed in FY19-20.



Project Performance Summary

There are currently six projects in the construction and post-construction phases and an additional 14 projects in feasibility/development, design, bid and award, or design and construction phases (see PDM, page 2). 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.

Project Performance – Baselined Projects

Project Name	Phase	Estimated Beneficial Use Date ¹	Cost Performance ²	Schedule Performance ²
1. Construction-Enabling Improvements	Post-Construction	Aug 2018 ³		
2. Plant Instrument Air System Upgrade	Post-Construction	Nov 2018 ³		
3. Cogeneration Facility	Design & Construction	Sep 2020		
4. Digester and Thickener Facilities Upgrade	Construction	Nov 2020		
5. Advanced Facility Control & Meter Replacement - Phase 1	Construction	June 2021		
6. Blower Improvements	Construction	Sep 2022		

Key:

Cost:	 On Budget	 >1% Over Budget	Schedule:	 On Schedule	 >2 months delay
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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 pages 12 and 13.
3. Actual Beneficial Use date.



Project Performance – Pre-Baselined Projects

Project Name	Phase	Estimated Beneficial Use Date ¹
1. 96-Inch and 87-Inch Settled Sewage Pipe Rehabilitation	Bid/Award	Oct 2020
2. Nitrification Clarifiers Rehabilitation – Phase 1	Bid/Award	Dec 2022
3. Digested Sludge Dewatering Facility	Bid/Award	Feb 2023
4. Outfall Bridge and Instrumentation Improvements	Design	Dec 2021
5. Switchgear M4 Replacement and G3 & G3A Removal	Design	Feb 2022
6. Advanced Facility Control & Meter Replacement - Phase 2	Design	Nov 2022
7. Fire Life Safety Upgrades	Design	Nov 2022
8. Headworks	Design and Construction	Dec 2022
9. Filter Rehabilitation	Design	Apr 2023
10. HVAC Improvements	Feasibility/Development	Mar 2023
11. Storm Drain System Improvements	Feasibility/Development	May 2023
12. Flood Protection	Feasibility/Development	Oct 2023
13. Facility Wide Water Systems Improvements	Feasibility/Development	Aug 2024
14. Yard Piping and Road Improvements	Feasibility/Development	Nov 2027

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.



Project Significant Accomplishments

Biosolids Package

Digested Sludge Dewatering Facility

- The City completed negotiation of the commercial terms for the preliminary services agreement with the selected design-builder.

Digester and Thickener Facilities Upgrade

- Contractor Walsh installed pipe supports inside Digesters 5 and 6 for transfer return sludge and digester overflow piping. On Digesters 7 and 8, Walsh installed PVC lining and continued preparing for the final concrete pours for the seismic ring beams.
- Walsh completed the sludge screening building roof and concrete parapet walls and began installing foul air collection ducts. Walsh also finished placing a large concrete pad for the polymer tanks and hot water supply equipment.
- The contractor began turning and testing the DAFT tanks' collectors and skimmers. The project team began to prepare for DAFT commissioning activities in September and startup procedures in October.
- Walsh finished PCB mitigation efforts. The City will now submit the PCB mitigation completion report to the federal Environmental Protection Agency (EPA).

Facilities Package

96-Inch and 87-Inch Settled Sewage Pipe Rehabilitation

- The City issued the Notice of Determination of Pre-Qualified Contractors identifying three firms qualified to bid the project. The City will advertise the construction contract in July.

Construction-Enabling Improvements

- The City filed the NOCA for the project on June 21, 2019.

HVAC Improvements

- Design consultant Kennedy/Jenks (K/J) submitted the final conceptual design report and opinion of probable construction cost (OPCC). The project team will seek to advance to preliminary design in July 2019.

Storm Drain Improvements

- Design consultant AECOM submitted the final condition assessment reports, alternative analysis report, and OPCC for the project. The project team will seek to proceed to conceptual design in July 2019.

Yard Piping and Road Improvements

- Owner's advisor (OA) Black and Veatch (B&V) completed the condition assessment field work for 24-inch mixed liquor, 24-inch and 54-inch RAS, and 66-inch and 84-inch settled effluent pipelines. B&V will submit the final condition assessment report in September 2019.

Liquids Package

Advanced Facility Control and Meter Replacement – Phase 1

- Contractor Overaa Construction installed aeration tank influent flow meters and associated piping in the Battery B secondary tunnel and new mounting stands for DO sensors and transmitters. Overaa also demolished the existing flow meters and associated piping in the nine RAS meter vaults.

Blowers Improvements

- In Building 40, Contractor Monterey Mechanical Construction (MMC) completed the demolition of the existing workshop walls and began installing new walls.
- In the Tertiary Blower Building, MMC began the demolition of the electrical equipment and bag filters in the air filter rooms to facilitate the conversion of a part of these rooms into a new electrical room.

Headworks

- Design-builder CH2M Hill Engineers, Inc. (CH2M) held two workshops to review the 30 percent design, and the City sent comments on the 30 percent design submittal.
- CH2M submitted a 30 percent cost estimate for City review. OA CDM Smith submitted an independent 30 percent cost estimate to aid the City's review. Next month, CH2M will complete the subsurface investigations, and the project team will conduct the value engineering workshop.



Power and Energy Package

Cogeneration Facility

- The design-builder CH2M poured the slab-on-grade equipment pads and foundations for the cogeneration building electrical and mechanical rooms and cooling towers and chillers.
- CH2M completed all CMU wall work facilitating the removal of scaffolding to allow the installation of exterior piping.
- CH2M installed the cogeneration building roof structural steel and bridge crane and began installing the roof pan-decking.
- CH2M and City representatives witnessed the successful factory acceptance testing of the 5,000 volt switchgear. The switchgear is anticipated to arrive at the RWF in July 2019.



Explanation of Project Performance Issues

Construction-Enabling Improvements Project

This project was originally scheduled to be substantially complete by mid-February 2017. Due to the extremely wet 2016-17 winter season, contractor Teichert Construction was unable to perform site work on several occasions between October 2016 and April 2017. Teichert was granted extra work days for weather-related delays and for extra work associated with several contract change orders. A new contract completion date of June 8, 2017 was established. However, Teichert's subcontractor, ModSpace, was slow to respond and regularly submitted late and incomplete documentation. This resulted in very late delivery of required portable trailers, which arrived in January 2018, approximately nine months later than the contract completion date.

Teichert experienced additional delays completing installation of the trailers and submitting complete and acceptable documentation for access ramps and canopies. In early August 2018, the contractor completed installation of the electrical, communications, and wastewater utilities. Also in August, the City of San José Building Division issued the Certificate of Occupancy permit for the trailers, and the construction management group issued the Notice of Substantial Completion, which indicated that the project had reached Beneficial Use. The project team provided Teichert with a list of remaining contract work to be completed. The project team has reached agreement with Teichert for liquidated damages and completion of outstanding tasks for project closeout. The City accepted the project this month.

Plant Instrument Air System Upgrade Project

Project construction was delayed by seven months due to four issues: 1) The project team discovered that the planned construction site access route crossed a large, settled sludge pipeline, requiring development and construction of an alternative access route; 2) the contractor was temporarily unable to install a section of the conduit from the sludge control building to the new compressor building due to other work being performed in the area by a different contractor; 3) development of the 28-day commissioning test procedure took longer than anticipated; and 4) during the eight-hour functioning test, the project team discovered oxidized (rusted) carbon steel shavings in an existing condensate tank unrelated to the project construction. The material was removed, and the test was successfully completed. The project achieved Beneficial Use in November 2018. The project team anticipates project acceptance in July 2019.

Digester and Thickener Facilities Upgrade Project

This project encountered numerous unforeseen conditions at the beginning of construction in 2016, described below. In 2017, design modifications were required to address seismic risks, and discovery of hazardous materials required extensive cleanup. Delays for these conditions have amounted to 273 working days. The original construction completion and Beneficial Use date of September 2019 has been delayed and rescheduled to November 2020.

The City has negotiated contract change orders for the unforeseen conditions discovered in 2016 and described below:

- Major corrosion of an underground, 78-inch settled sewage pipeline and junction structure required the construction of a temporary reroute to enable replacement of the pipeline in the 2018 dry season. In May of 2018, the contractor started full-time operation of this temporary pumping and pipeline system and began replacing the 78-inch settled sewage pipeline. This work was completed in late September 2018.
- A 36-inch biochemical oxygen demand pipe was found to be obstructing the new sludge screening building foundation. The contractor removed this pipe and relocated several gas drain vaults and associated piping before the foundation construction began.
- Multiple conflicts between contract work and existing utilities required numerous relocations including water, natural gas, digester gas, landfill gas, storm drains, and sanitary sewer pipelines. The contractor completed necessary relocations and rerouting, especially near the new digester gas pipe rack footings. Many of these modifications also required design changes.
- Bay Area Air Quality Management District venting restrictions also delayed digester work. The contractor completed the temporary digester gas connections and the temporary system became operational in February 2018.

The City has negotiated contract change orders for the following issues discovered in 2017 and 2018:

- Digester structural redesign: The design consultant revised the structural drawings to address seismic concerns by enlarging the foundation ring beam at the base of each of the four digesters. The contractor provided a cost proposal associated with this revision and the City issued a final, global change order to cover work activities.
- Distributed control system architectural changes: The design guidelines for the distributed control system were developed after the project plans were completed. Several changes were required for fiber optic cable, electrical wiring,



patch panels, converters, communications instrumentation, and emergency power supply. Drawings, color-coding labeling, and process diagrams had to be revised to reflect these changes.

- Fire Department requirements: Fire permit requirements changed after the design was completed. The Fire Marshal required additional alarms and electrical connections. A new electrical fire suppression system was installed to meet current environmental requirements. At one structure, the Fire Marshall requires a full discharge test of the system.
- Structural issues: Designer B&C modified the west electrical building foundation design to avoid an unforeseen conflict and protect the structural integrity of an existing underground tunnel; provided a new design to anchor the pressure flow pipes in the DAFT gallery to the ceiling and floor slabs to avoid conflicts with multiple existing pipes; and redesign structural supports to meet code for the foul air and thickened sludge pipes attached to columns holding up the canopy over the thickened sludge pumps.
- During construction, Walsh discovered that the DAFT gallery underslab drains were not functioning properly. The City directed Walsh to replace the drain and pump system.
- Construction delays required the contractor to pay to extend a warranty on six liquid ring gas compressors.

Testing of soils and concrete for PCBs was completed, and the federal EPA issued a final conditional approval. In compliance with the EPA-approved, risk-based management plan, removal and disposal of all contaminated materials in all four affected digesters and all tunnel joints has been completed. All contaminated soils have been removed and disposed of and most of the impacted concrete has been encased or removed. The last portion of the work will be finished in June 2019. The project team anticipates submittal of final work reports to the EPA in August 2019.

In November 2017, Council approved a construction contingency increase of \$15 million. The City issued change orders against the increased contingency for delays associated with the conditions discovered in 2016.

In June 2018, Council approved a second construction contingency increase of \$25 million for additional costs associated with the seismic redesign, hazardous material remediation, and extended construction duration.

To minimize further delays, the contractor is executing several tasks concurrently that originally had been planned in series.



Project Profile – Yard Piping and Road Improvements

The RWF has approximately 300,000 linear feet (LF) of piping that varies in age, material, condition, reliability, redundancy, and diameter (some pipes are as large as 12 feet in diameter). Of this piping, 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 the pipes at the RWF are more than 25 years old, and 10 percent are more than 50 years of age. Based on a 2015 desktop study of RWF process pipes, 16 pipe systems, totaling 21,000 LF, were identified as high priority. This project will focus on rehabilitating and/or replacing these pipes. The process piping categorized as medium or low priority will be addressed as part of a separate, future project.



Figure 4: Manned entry and CCTV process piping inspection

In April 2018, the City hired B&V as the Owner's Advisor (OA) to provide professional services, including performing initial condition assessments, developing construction packages and work sequence plans, and assisting the City with design-build entity procurement and selection. At this point, B&V has conducted condition assessments on seven pipe systems during the summers of 2018 and 2019. Figure 5 shows the pipe systems assessed and planned to be included in this first phase of the project. Condition assessments are performed using a representative sampling approach for similar pipes within the same system or treatment area. For instance, the condition assessment of the eight secondary clarifiers' 24-inch return activated sludge lines only physically inspected three of the lines. The condition of the remaining five lines is assumed to be similar to the inspected lines.

Based on B&V's recent assessments, two of the highest priority pipes requiring rehabilitation are the 78-inch primary effluent (PE) and the 96-inch PE pipes. Findings showed evidence of severe crown corrosion in both segments. These critical pipelines carry primary effluent from the west primaries effluent structure to the primary effluent junction box. Potential engineering solutions include cast-in-place pipe, concrete repair with epoxy liner, segmented slip lining, or high-strength carbon-fiber-reinforced polymer. Portions of construction will need to occur during the dry season. In addition, work will need to be sequenced in coordination with other CIP projects and RWF operations to minimize disruptions. The design-builder will remove these pipes and most of the planned pipes in this project from service during construction by the reuse of the reroute system procured and used last summer to facilitate the 78-inch settled sewage pipe replacement under the Digester and Thickener Facilities Upgrade Project.

Undertaking repairs on the RWF's extensive and complex piping network without disrupting the ongoing treatment process will require detailed planning and extensive coordination with O&M staff. The progressive design-build delivery method was chosen to ensure ongoing collaboration between the design and construction teams and City staff; for the ability to construct access and repairs during condition assessments; and to allow progressive development of scope as information is obtained.

The project has a construction budget of \$85 million and is envisioned to be implemented in phases over an eight-year period. Each phase will consist of condition assessments, risk analysis, design, and construction. With B&V's assistance, the City is preparing procurement documents for a design-build entity. The project team anticipates advertising the design-build RFQ in winter 2019, completing negotiations in summer 2020, and awarding the contract in winter 2020.

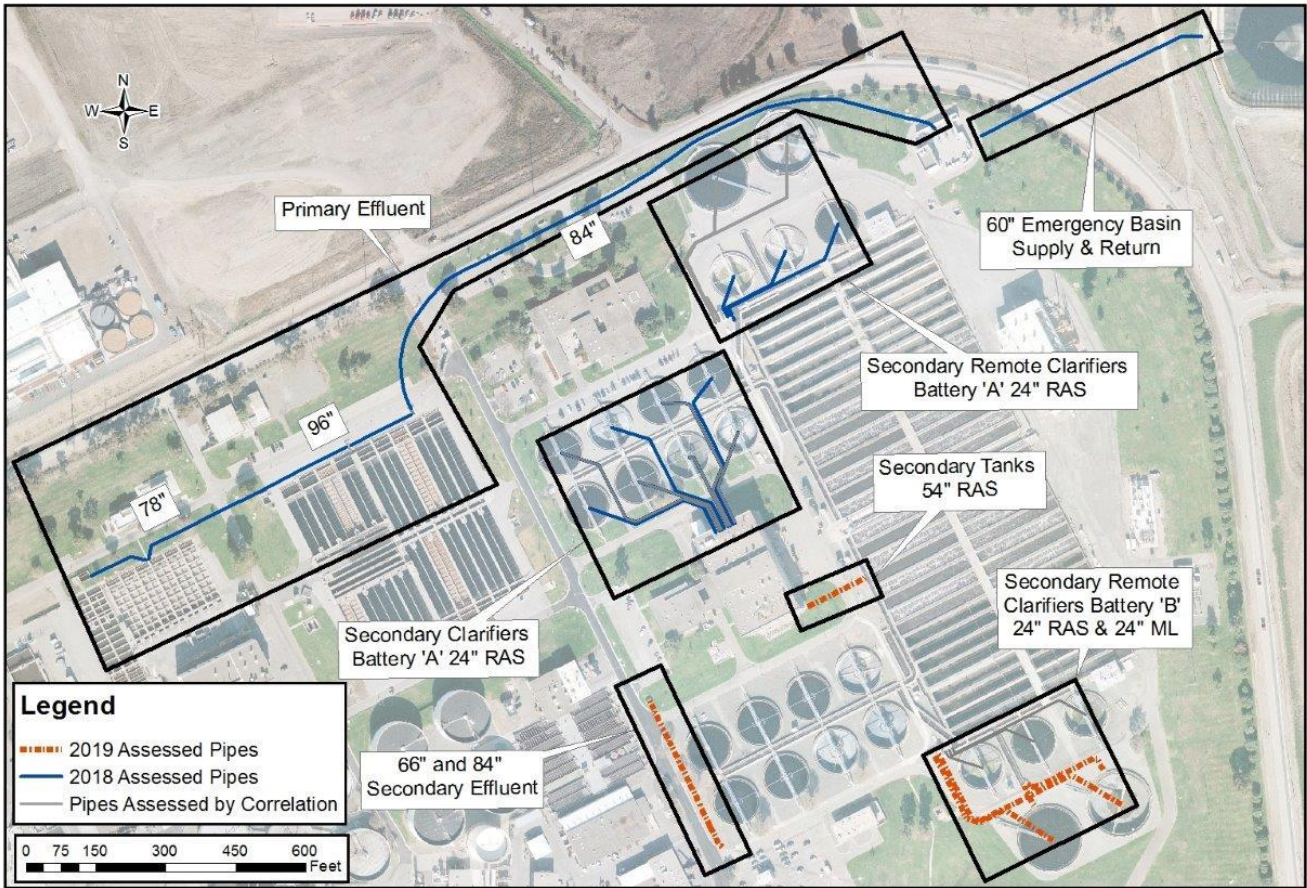


Figure 5: Systems Assessed as part of the 2018 and 2019 Condition Assessments

Regional Wastewater Facility Treatment – Current Treatment Process Flow Diagram

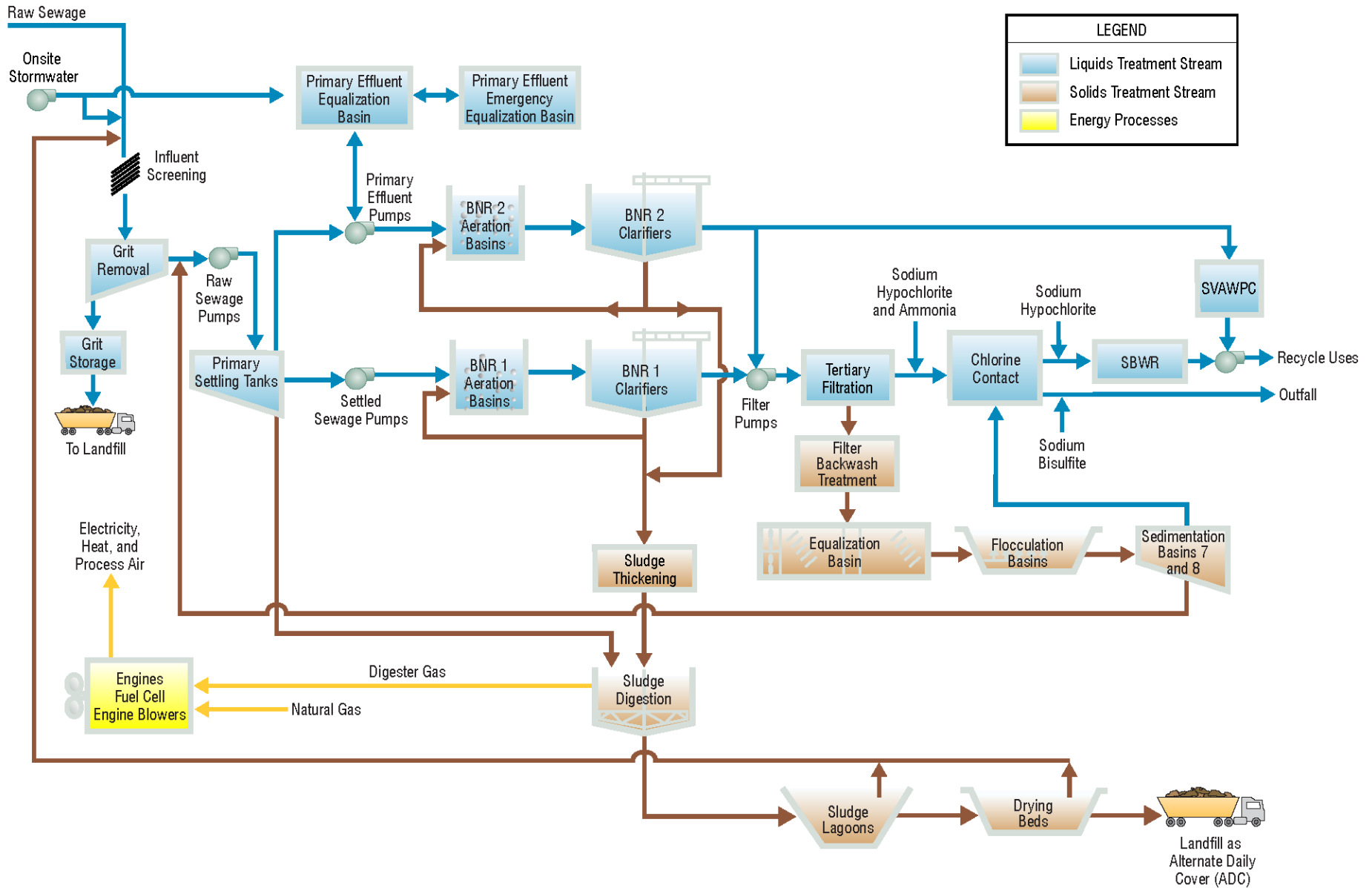


Figure 5 – Current Treatment Process Flow Diagram



Regional Wastewater Facility Treatment – Proposed Treatment Process Flow Diagram

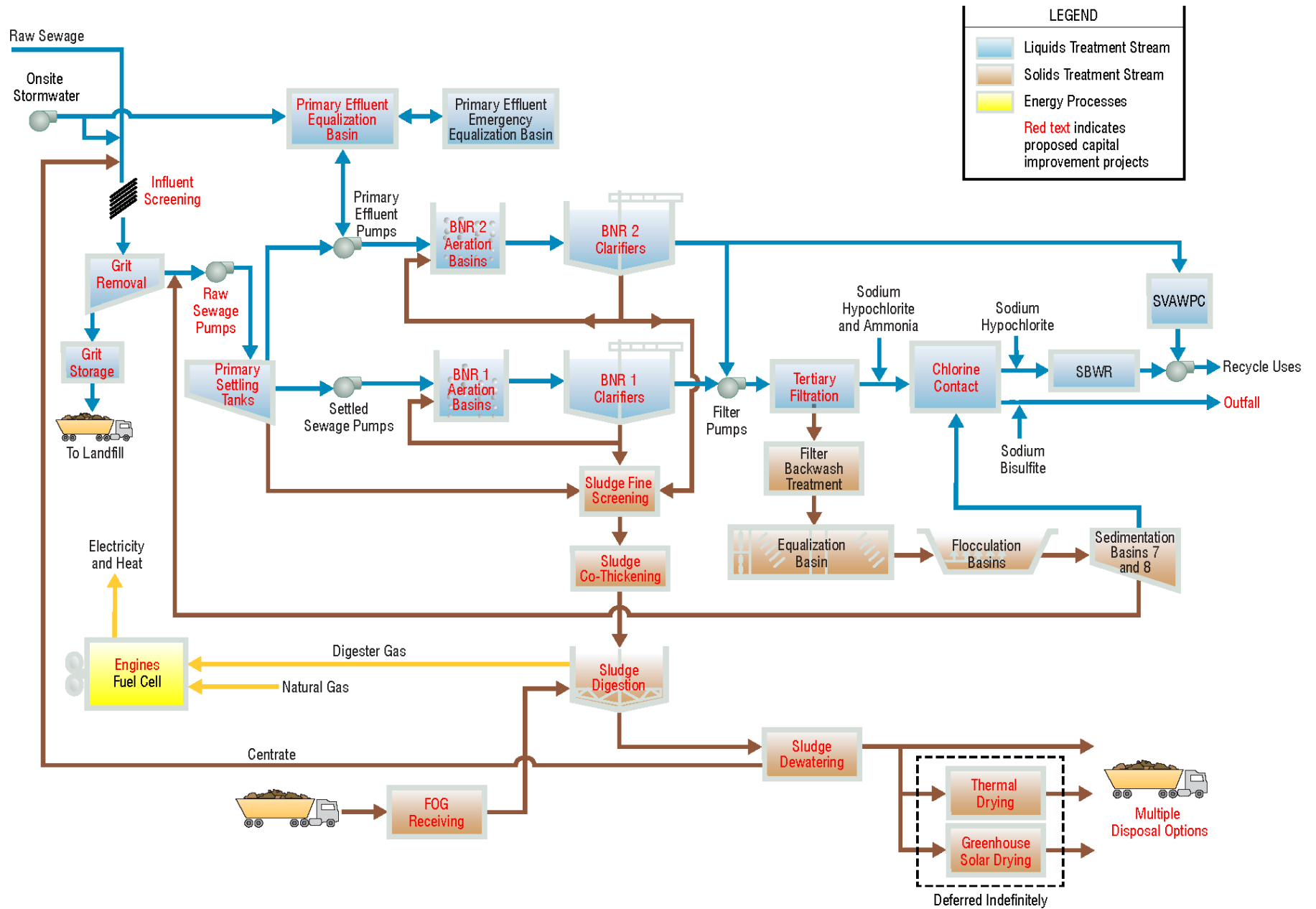


Figure 6 – Proposed Treatment Process Flow Diagram



Active Construction Projects – Aerial Plan

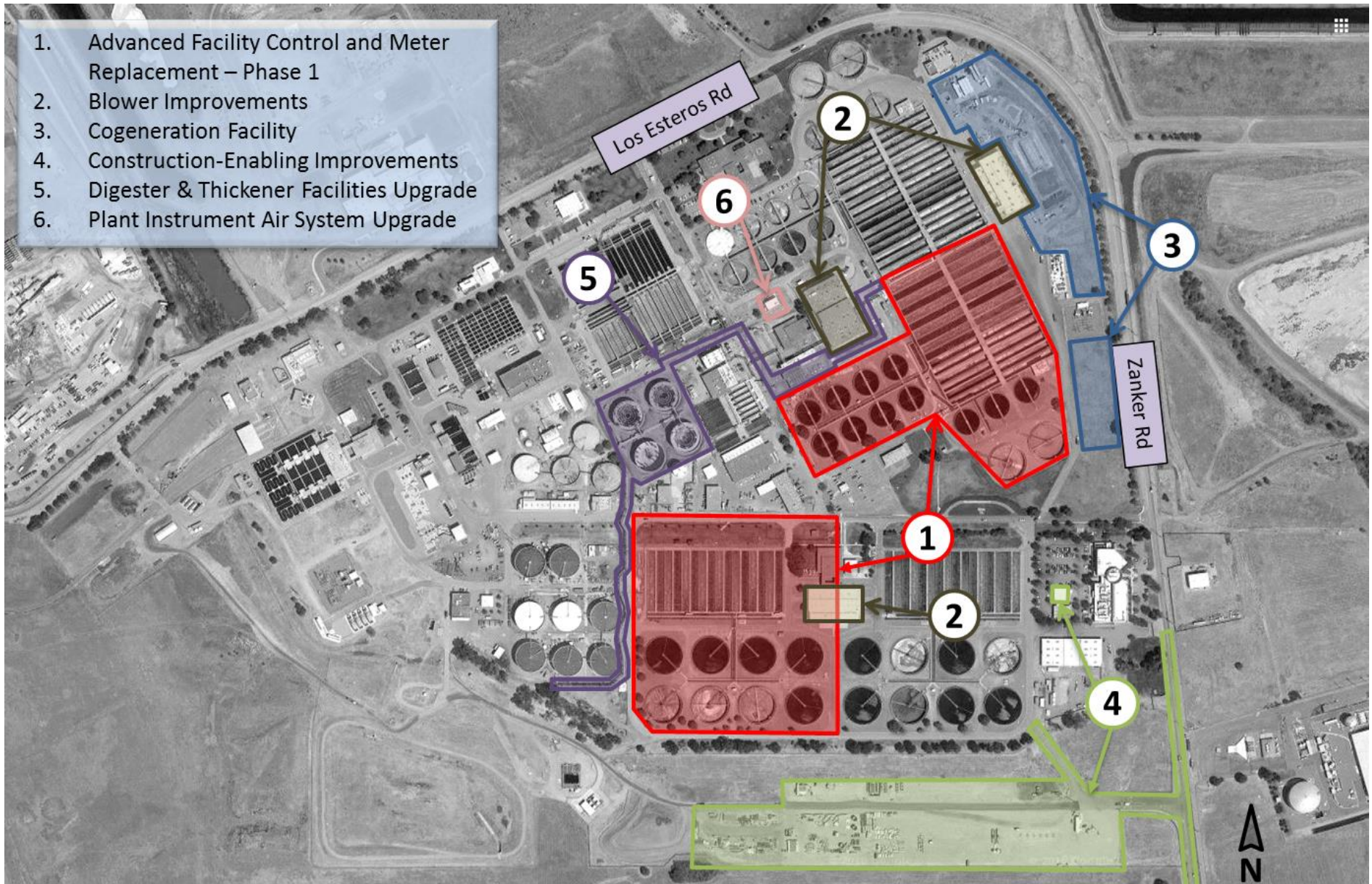


Figure 7: Active Construction Projects