San José-Santa Clara Regional Wastewater Facility

Capital Improvement Program

Monthly Status Report: October 2019

December 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 October 2019.

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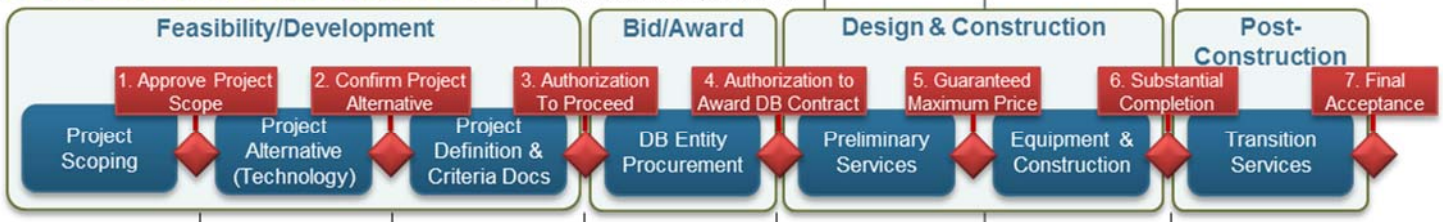

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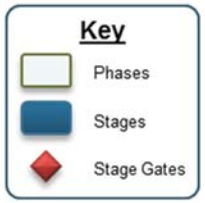


*Projects shown *underlined and in blue and italics* have either been initiated or advanced this reporting period
**Project will move to the next stage if City Council approves award of the construction contract.

Program Summary

October 2019

In October, the Advanced Facility Control and Meter Replacement – Phase 2 Project passed Stage Gate 5: Authorization to Bid of the Project Delivery Model (PDM). The project is expected to be advertised in January.

The Treatment Plant Advisory Committee (TPAC) and City Council (Council) approved the award of the Nitrification Clarifier Rehabilitation - Phase 1 Project construction contract. The City anticipates issuing a Notice to Proceed (NTP) to the contractor in November.

The contractor for the Digester and Thickener Facilities Upgrade Project completed the two driveway approaches to the new sludge screening building as well as the hot water supply and return piping connections to the new cogeneration facility. The contractor also installed the canopy structure for the new polymer facility and two new flares.

The Cogeneration Facility Project design-builder installed the fire sprinkler system in the Cogeneration Building (see Figure 1) and completed the mechanical and electrical rough-in for the Power & Air Operations Center. The design-builder also began pulling conductors from the engine generators to the switchgear.

The Blower Improvements Project contractor completed the factory acceptance test for the two new 2000-hp electric motors that will be installed in the Secondary Blower Building and demolished Air Baghouse No.5 in the Tertiary Blower Building.

The Advanced Facility Control and Meter Replacement – Phase 1 Project contractor installed drain plates in eight of 11 return-activated sludge (RAS) meter vaults and will complete the last three next month. Operational testing is anticipated to commence in December.

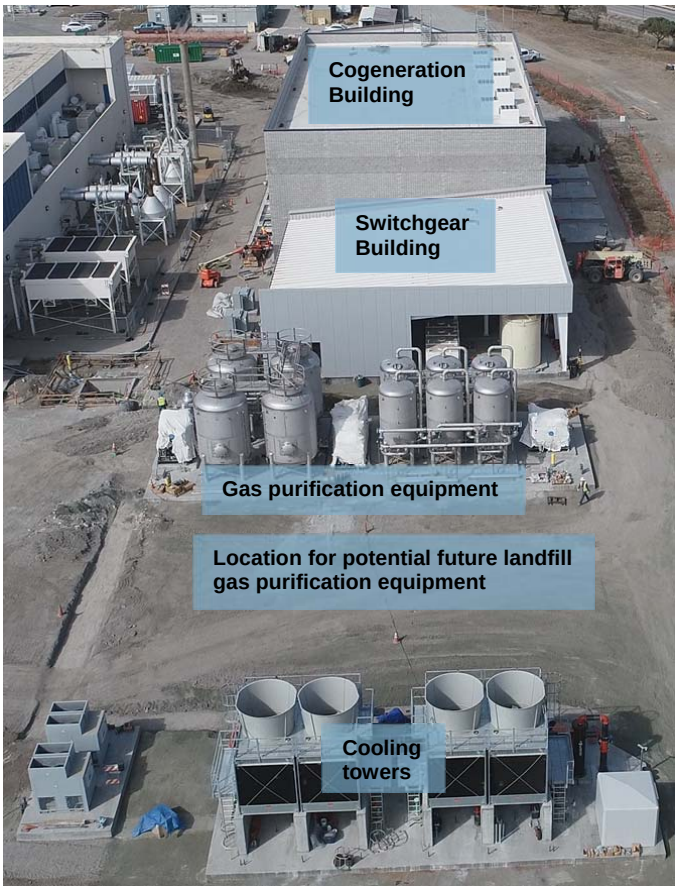


Figure 1: Cogeneration Facility Project

For the Switchgear M4 Replacement and G3 & G3A Removal Project, the City evaluated the two bids received and will recommend that Council award the construction contract to the lowest responsive bidder in December.

The HVAC Improvements Project team provided the designer with comments for the 30 percent design documents.

The Headworks Project design-builder submitted the 60 percent design cost estimate for the City's review. In addition, the design-builder and City staff held several meetings to review the terms and conditions of the proposed definitive contract amendment.

The City issued an NTP for the Digested Sludge Dewatering Facility Project to the design-builder authorizing preliminary services. The City held a partnering workshop with the design-builder.

Look Ahead

The following key activities are forecast for November and December 2019:

1. Staff will recommend the following to TPAC and Council:
   - Award of construction contracts for the 96-Inch and 87-Inch Settled Sewage Pipe Rehabilitation Project and the Switchgear M4 Replacement and G3 & G3A Removal Project; and
   - Amend two construction management master consultant agreements to clarify terms and conditions.
2. An NTP will be issued to the contractor to begin construction of the Nitrification Clarifier Rehabilitation – Phase 1 Project.
3. Three projects will seek to advance through stage gates, including:
   - Fire Life Safety Upgrades Project - Stage Gate 4: Authorization to Bid;
   - Headworks Project – Stage Gate 5: Guaranteed Maximum Price; and
   - Yard Piping and Road Improvements Project – Stage Gate 2: Confirm Project Alternative.

Program Highlight – Filter Columns Study

The tertiary treatment process uses filters to remove suspended solids and improve turbidity in order to meet the RWF's National Pollutant Discharge Elimination System permit requirements. The Filter Rehabilitation Project (Project) will rehabilitate aging filters in the existing filter building so that they can operate reliably until a new filter complex is constructed. The project scope includes replacing filter media in all 16 RWF filters.

The existing filter media configuration and size produces good quality filtration effluent meeting permit requirements. However, the filter run time (time between filter backwashes) and filtered water volume per filter run are not optimal. Increasing the filter run time will reduce the operational costs associated with backwash frequency and increase filtered water volume per run, improving filter performance.

Column Number	Anthracite		Sand	
	Depth	Effective Size	Depth	Effective Size
1	34"	1.25-1.35 mm	-	-
2	34"	1.4-1.5 mm	-	-
3	22"	1.25-1.35 mm	12"	0.5-0.6 mm
4	22"	1.25-1.35 mm	12"	0.7-0.8 mm

Figure 2: Filter media configurations tested

In May 2018, the RWF's Process Engineering team initiated the Filter Columns Study (Study) to determine if one of four different filter media configurations (See Figure 2) could achieve longer filter run times with comparable filter effluent quality. As part of the Study, staff also wanted to determine if filter run times would be further improved by first injecting air into the bottom of the filter beds to break up debris in the filter media (air scour) prior to backwashing the filter media. Ultimately, the results of the Study would determine the filter media configuration implemented by the Project.

Figure 3: Four various filter media configurations tested.

In September 2018, RWF maintenance staff finished constructing four filter columns 15-feet in height and 8-inches in diameter (See Figure 3). Between October 2018 and June 2019, Process Engineering and Operations and Maintenance (O&M) staff collaborated to observe operational parameters and record performance data every hour during the day and every two hours during the night. Beginning in June 2019, the best performing filter media configuration was tested at full scale in Filter A3 to validate the performance characteristics observed during the Study. After nearly two months of performance, Filter A3's performance was determined to correlate well with the Study results.

Key findings from the Study include:

- **Column #2 filter media configuration performed the best** with the longest filter run times under two different loading rates. Full-scale operation of Filter A3 confirmed its superior performance compared to the existing filter media configuration of 22 inches of 1.25 - 1.35 mm anthracite on top of 12 inches of 0.6 – 0.7 mm sand in the adjacent filter beds. The improved performance may be attributed to the larger pore size resulting from the larger media size.
- **Effluent quality for each of the filter columns was comparable to the existing filter beds.**
- **The filter run times doubled when the backwash process involved air scour compared to that without air scour.** This demonstrated that backwash and filter performance is improved when air scour is used as part of the backwash process.

The study resulted in the following recommendations that will be implemented in the Filter Rehabilitation Project:

1. Replace the existing filter media with 34 inches of anthracite mono media with an effective size of 1.4 – 1.5 mm.
2. Install an air scour system to more efficiently and effectively backwash the media and remove the existing surface wash equipment.

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 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 2019-2020

KPI	Target	Fiscal Year to Date			Fiscal Year End		
		Actual	Status	Trend	Forecast	Status	Trend
Stage Gates	90%	89% 8/9[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[2]	90%	N/A 0/0	N/A	N/A	N/A 0/0	N/A	N/A
Measurement: Percentage of CIP projects delivered within 2 months of approved baseline Beneficial Use Milestone.[3] Target: Green: >= 90%; Amber: 75% to 89%; Red: < 75%							
Budget[4]	90%	N/A 0/0	N/A	N/A	N/A 0/0	N/A	N/A
Measurement: Percentage of CIP projects that are accepted by the City within the approved baseline budget.[3] Target: Green: >= 90%; Amber: 75% to 89%; Red: < 75%							
Expenditure	$369M	$171M	●	↑	$413M[5]	●	↓
Measurement: CIP FY19-20 committed costs. Target: Committed cost meets or exceeds 70% of planned Budget. 70% of $527M = $369M. Therefore Fiscal Year End Green: >=$369M; Amber: $290M to $369M; Red: < $290M							
Procurement	80%	100% 2/2	●	→	100% 8/8	●	→
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							
Vacancy Rate[6]	10%	21% 18/86[7]	◆	↓	9% 8/86	●	→
Measurement: Ratio of the number of vacant approved positions to approved positions. Target: Green: <= 10%; Amber: 10% to 20%; Red: > 20%							

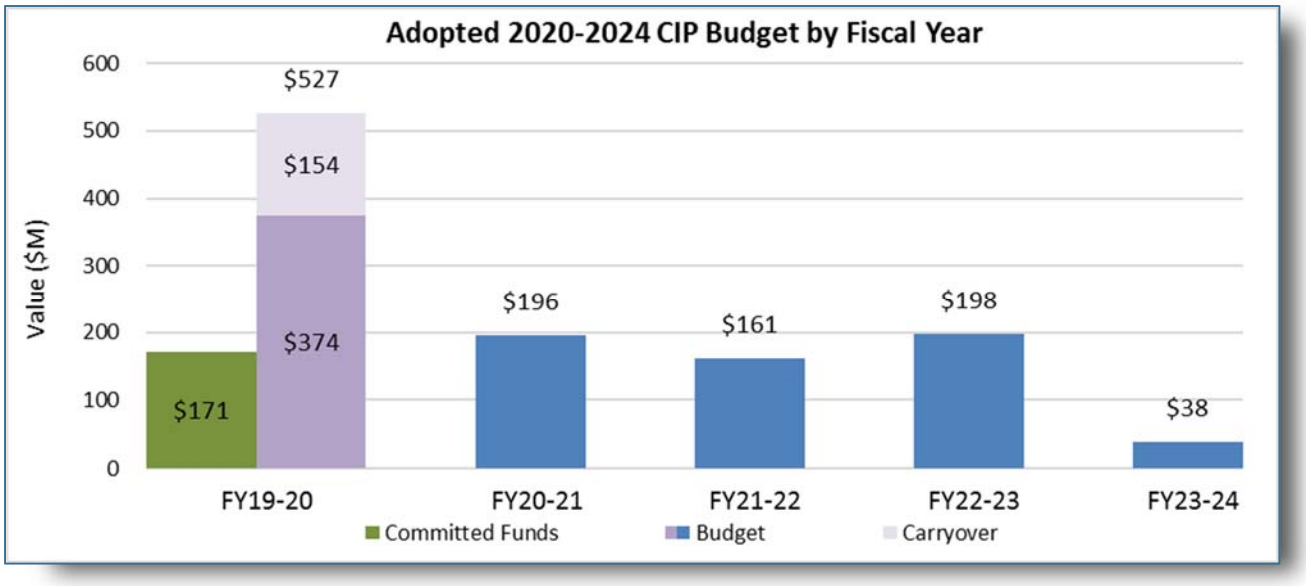
Notes

1. The Advance Facility Control and Meter Replacement – Phase 2 Project passed Stage Gate 5: Authorization to Bid and the Switchgear M4 Replacement and G3 & G3A Removal Project passed Stage Gate 6: Authorization to Award & Establish Baseline.
2. The CIP does not anticipate any projects reaching Beneficial Use this fiscal year.
3. The baseline Beneficial Use date and the baseline budget for each project are established at construction contract award and execution.
4. The CIP does not anticipate accepting any projects this fiscal year.
5. The fiscal year-end expenditure forecast decreased $8 million. The most significant change was the postponement of the HVAC Improvements Project construction award to next fiscal year.
6. The vacancy rate KPI measures CIP-approved positions, including ESD, Public Works, and program management consultant full-time staff.
7. The vacancy count decreased by one.

Program Budget Performance Summary

This section summarizes the cumulative monthly budget performance for fiscal year (FY)19-20 based on the Adopted 2020-2024 CIP.

Adopted 2020-2024 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.

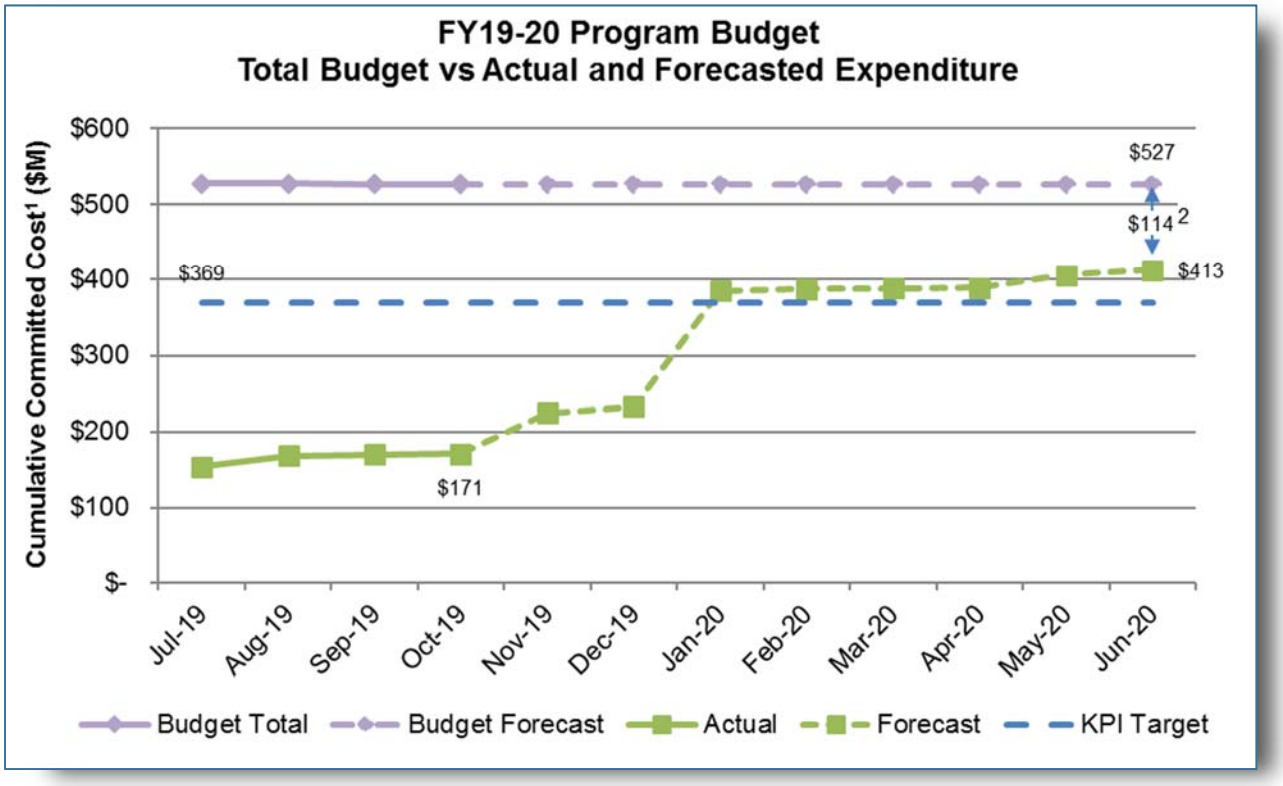
The FY19-20 budget is $399 million, which consists of $339.6 million in new funds and $59.7 million in rebudgets. For purposes of this monthly report, the adopted FY19-20 budget is adjusted from $399 million to $374 million due to the exclusion of certain appropriations that are not measured as part 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; and Urgent and Unscheduled Treatment Plant Rehabilitation. Similar adjustments have been made to the budgets for FY20-21 through FY23-24.

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. FY19-20 carryover is $153.6 million.

Budget of $373.6 million and carryover of $153.6 million rounds to a total of $527.3 million for FY19-20.

Fiscal Year 2019-2020 Program Budget Performance

The FY19-20 CIP budget is comprised of approximately $373.6 million in new and rebudgeted funds, plus encumbered carryover of $153.6 million, rounds to a total of $527.3 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; and Urgent and Unscheduled Treatment Plant Rehabilitation items. Overall, the forecast fiscal year-end committed funds exceed the fiscal year-end target by $44 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. Three construction contracts are now anticipated to be awarded in FY20-21 instead of FY19-20, based on updated schedules:
        i. Filter Rehabilitation Project
        ii. HVAC Improvements Project
        iii. Outfall Bridge and Instrumentation Improvements Project
    b. Two major consultant service orders are not anticipated to be awarded in FY19-20:
        i. Aeration Tank Rehabilitation Project conceptual through final design
        ii. Flood Protection Project alternatives analysis and conceptual design
    c. The Yard Piping and Road Improvements Project design and first phase of construction will no longer occur this fiscal year.
    d. The Nitrification Clarifiers Rehabilitation – Phase 1 Project construction bids came in under budget.
    e. Several other minor encumbrances for consultant services are either lower than budgeted or are anticipated to be awarded in FY20-21.
    f. Several authorized positions remain vacant, resulting in lower personal services expenses than budgeted.

Project Performance Summary

There are currently five projects in the construction and post-construction phases and an additional 13 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. Cogeneration Facility	Design & Construction	Sep 2020	●	●
2. Digester and Thickener Facilities Upgrade	Construction	Nov 2020	◆	◆
3. Advanced Facility Control & Meter Replacement - Phase 1	Construction	June 2021	●	●
4. Blower Improvements	Construction	Sep 2022	●	●
5. Nitrification Clarifiers Rehabilitation – Phase 1	Construction	Jan 2023[3]	●	●

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. The project construction Beneficial Use date will be baselined once the City accepts the contractor's construction schedule.

Project Performance – Pre-Baselined Projects

Project Name	Phase	Estimated Beneficial Use Date[1]
1. Headworks	Design and Construction	Jan 2023
2. Digested Sludge Dewatering Facility	Design and Construction	Nov 2023
3. 96-Inch and 87-Inch Settled Sewage Pipe Rehabilitation	Bid/Award	Nov 2020
4. Switchgear M4 Replacement and G3 & G3A Removal	Bid/Award	May 2022
5. Advanced Facility Control & Meter Replacement - Phase 2	Bid/Award	Apr 2023
6. Outfall Bridge and Instrumentation Improvements	Design	Dec 2021
7. Fire Life Safety Upgrades	Design	Jul 2022
8. Filter Rehabilitation	Design	Jul 2023
9. HVAC Improvements	Design	Aug 2023
10. Storm Drain System Improvements	Feasibility/Development	Feb 2024
11. Facility Wide Water Systems Improvements	Feasibility/Development	Jan 2025
12. Final Effluent Pump Station and Stormwater Channel Improvements	Feasibility/Development	Feb 2025
13. 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 and Thickener Facilities Upgrade Project

- The City issued an NTP to design-builder Walsh Construction Company (Walsh) authorizing preliminary services work including the basis of design report, 30 and 60 percent designs, and a cost model.
- The project team held a partnering session to introduce the design-builder, owner's advisor, CIP, and O&M teams and agree on project expectations.

Digester and Thickener Facilities Upgrade Project

- Contractor Walsh installed the new polymer facility canopy structure, enclosed flare, and candlestick flare.
- Walsh installed foul-air pipe supports for the renovated dissolved air flotation thickener tanks and removed the temporary pressure flow reroute that had been installed to facilitate replacement of part of the old 36-inch pressure flow pipe.
- Walsh completed the two driveway approaches to the sludge screening building and the hot water supply and return piping connection to the new cogeneration facility.

Facilities Package

Storm Drain System Improvements Project

- The project team conducted a kickoff meeting with the design consultant on surveying requirements and flood risk analyses. Field surveys are scheduled for early November.

Liquids Package

Advanced Facility Control and Meter Replacement – Phase 1 Project

- Contractor C. Overaa & Co. (Overaa) installed drain plates in the RAS meter vaults B1 to B8. Next month, Overaa will install the remaining drain plates in RAS meter vaults B9 to B11 and conduits for the secondary clarifiers. The project team anticipates commencing operational testing in December 2019.

Advanced Facility Control and Meter Replacement – Phase 2 Project

- Design consultant Black & Veatch submitted the 100 percent design documents.
- The project team passed Stage Gate 5: Authorization to Bid. Staff will advertise the project for bid in January 2020.

Blower Improvements Project

- Contractor Monterey Mechanical Company poured the Building 40 variable frequency driver concrete pads and demolished air baghouse No. 5 in the Tertiary Blower Building.
- Following a successful factory acceptance test, the contractor accepted two 2,000-hp electric motors for the Secondary Blower Building.

Headworks Project

- Design-builder CH2M submitted the 60 percent design cost model.
- The design-builder and City staff held several meetings to review the terms and conditions of the proposed definitive contract amendment.

Nitrification Clarifier Rehabilitation - Phase 1 Project

- Council awarded the construction contract to the lowest bidder, Overaa, for $26,184,000. In November, staff anticipates issuing the NTP to begin construction.

Power and Energy Package

Cogeneration Facility Project

- Design-builder CH2M installed the fire sprinkler system in the new Cogeneration Building and completed the mechanical and electrical rough-in for the Power & Air Operations Center.
- CH2M began installing the medium voltage switchgear, motor control center's power cables, and the drywall to the metal interior framing in the engine building control and low voltage electrical rooms.

Switchgear M4 Replacement and G3 & G3A Removal Project

- The City evaluated the two bids received and will recommend Council award of the construction contract to the lowest responsive bidder in December 2019.

Explanation of Project Performance Issues

Digester and Thickener Facilities Upgrade Project

This project encountered numerous unforeseen conditions at the beginning of construction in 2016, including corroded underground pipe and other obstructions to new building foundations. A temporary reroute system was installed to enable replacement of a 78-inch settled sewage pipeline and junction structure during the 2018 dry season.

In 2017, design modifications were required to address seismic risks, control system changes, additional underground obstructions, pipe anchorage, and new fire department requirements. When hazardous materials were discovered on site, the City submitted a required extensive cleanup proposal to the federal Environmental Protection Agency (EPA) for approval. Once mitigation was completed in 2019, the City submitted another report to the EPA that detailed how each EPA cleanup permit requirement was addressed.

To pay for the additional work to address unforeseen conditions, Council approved a construction contingency increase of $15 million in November 2017 and another contingency increase of $25 million in June 2018.

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. To minimize further delays, the City and contractor worked together to sequence several tasks so they could be completed more quickly and efficiently.

Project Profile – Advanced Facility Control and Meter Replacement – Phase 1

The RWF relies on control equipment such as flow meters, valves and actuators, and sensors for accurate measurement and effective process control. Reliable, state-of-the-art controls are vital to maintaining compliance with the RWF's National Pollutant Discharge Elimination System (NPDES) permit. Most of the RWF controls were installed in the 1960s and 1970s and are in poor condition. Because original manufacturers no longer provide support for the outdated equipment, maintenance on these controls has become very difficult. In 2014, CIP and O&M staff assessed and prioritized the existing control equipment for repair or replacement. This collaborative effort brought together O&M experience and a technical engineering approach to validate the need for the project. In 2016, the City selected Black & Veatch as the design consultant to provide engineering services for the project.

To better align construction with planned maintenance shutdowns of the secondary and nitrification treatment areas, the project team sequenced the work to be completed over two summers, with Secondary B Battery work done in summer 2019 and Nitrification B Battery work done in summer 2020 (see Figure 5-8).

In May 2018, Council awarded the construction contract to Overaa. From July 2018 to February 2019, the project team reviewed and approved critical submittals for long lead-time items so the contractor could order the equipment in time to be installed during the summer. Overaa started construction in the Secondary B Battery area in May 2019. Over the summer, the flow meters, valves, actuators and sensors were replaced. The contractor is now preparing to perform functional and operational testing with the partial substantial completion date for the Secondary B Battery area anticipated to be February 2020. The construction start date for the Nitrification B Battery area is May 2020.

The project budget is approximately $12 million. The final Beneficial Use date is forecast for June 2021.

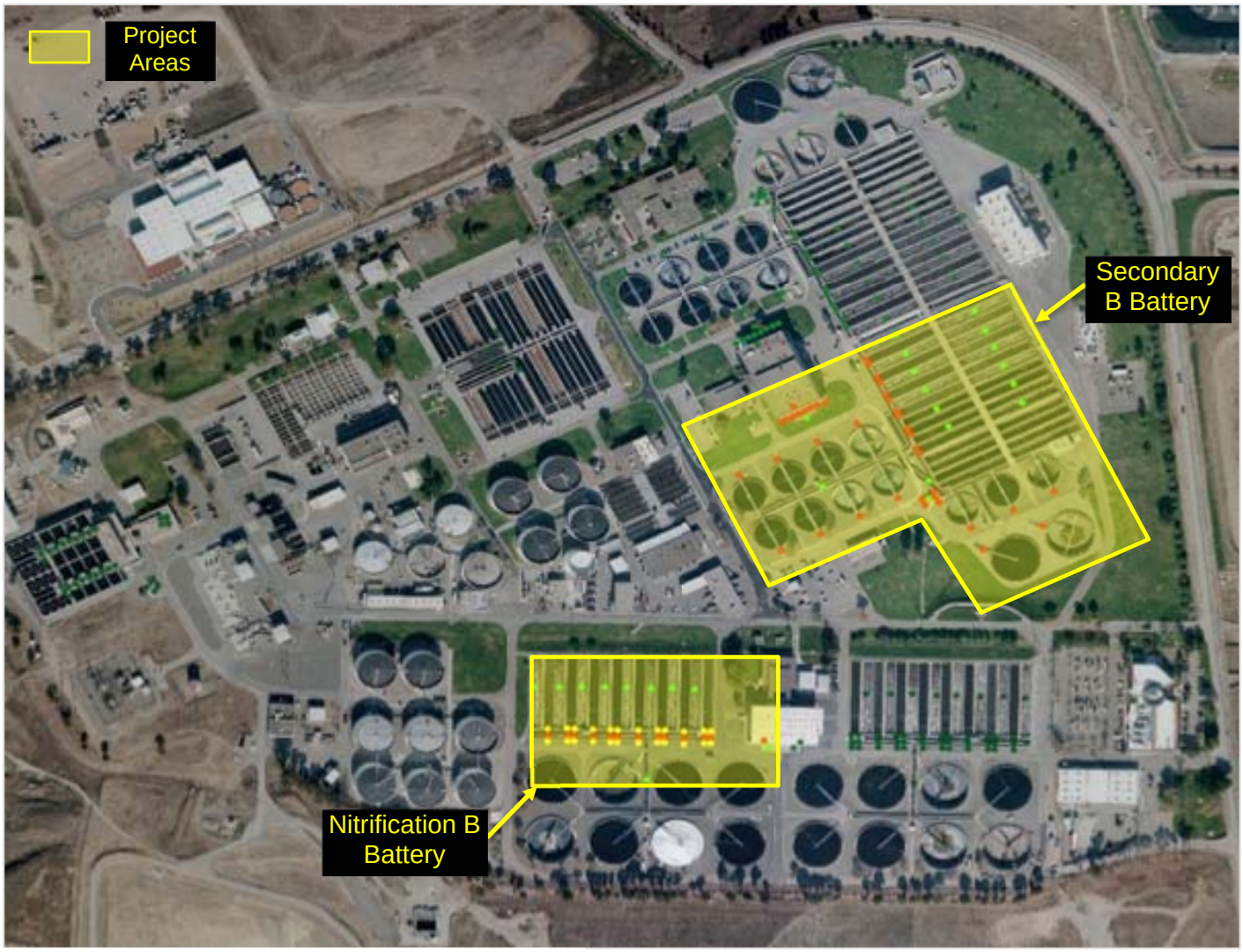


Figure 4: Project Location Plan

Figure 5: Ongoing Secondary Return Activated Sludge Magnetic Flow Meter Work

Figure 6: New Secondary Settled Sewage Influent Magnetic Flow Meter

Figure 7: New Total Suspended Solids Sensor and Transmitter at the Secondary Mix Liquor Channel

Figure 8: New Dissolved Oxygen Transmitter at the Secondary Aeration Basins

Regional Wastewater Facility Treatment – Current Treatment Process Flow Diagram

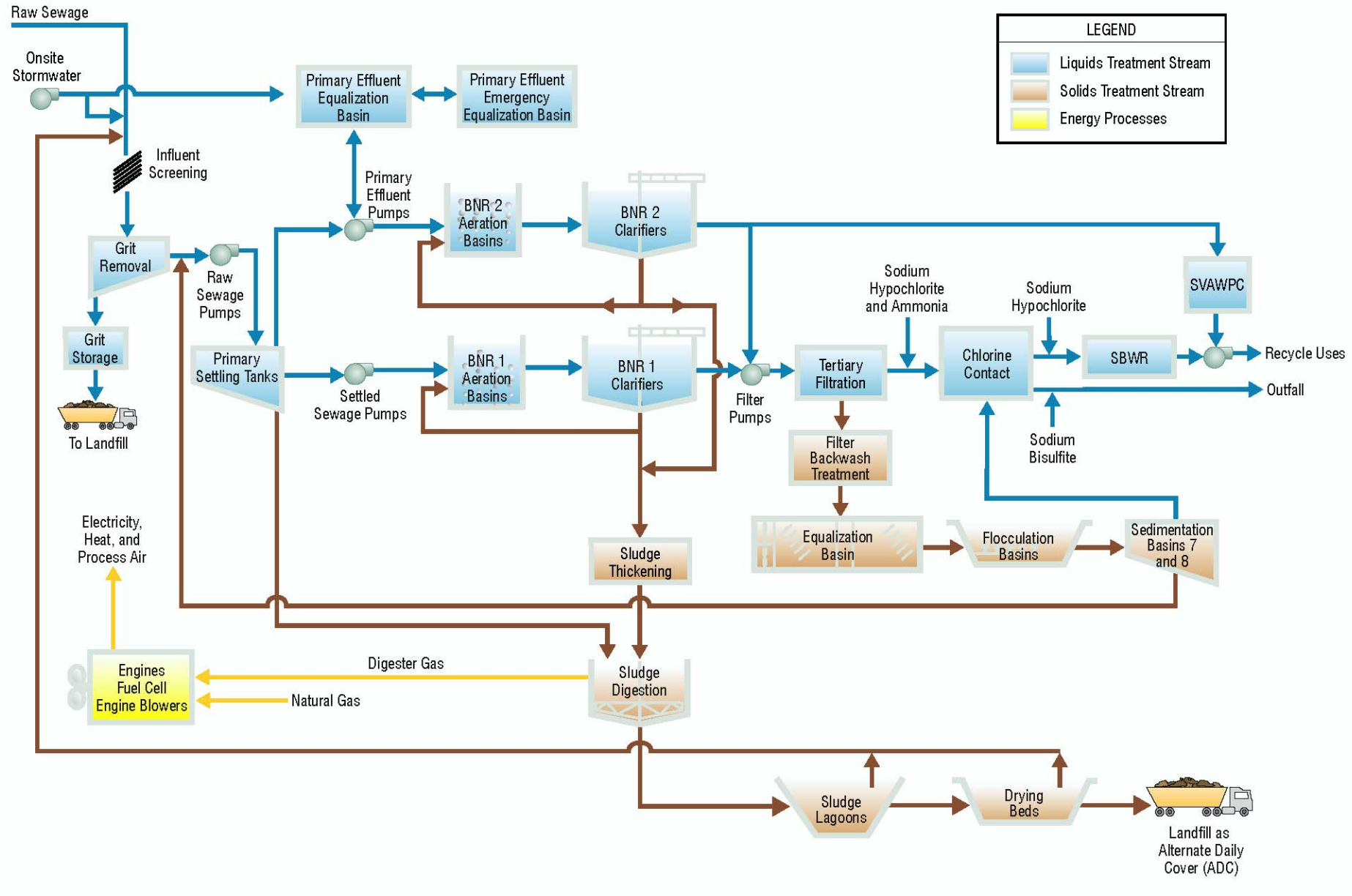


Figure 9 – Current Treatment Process Flow Diagram

Regional Wastewater Facility Treatment – Proposed Treatment Process Flow Diagram

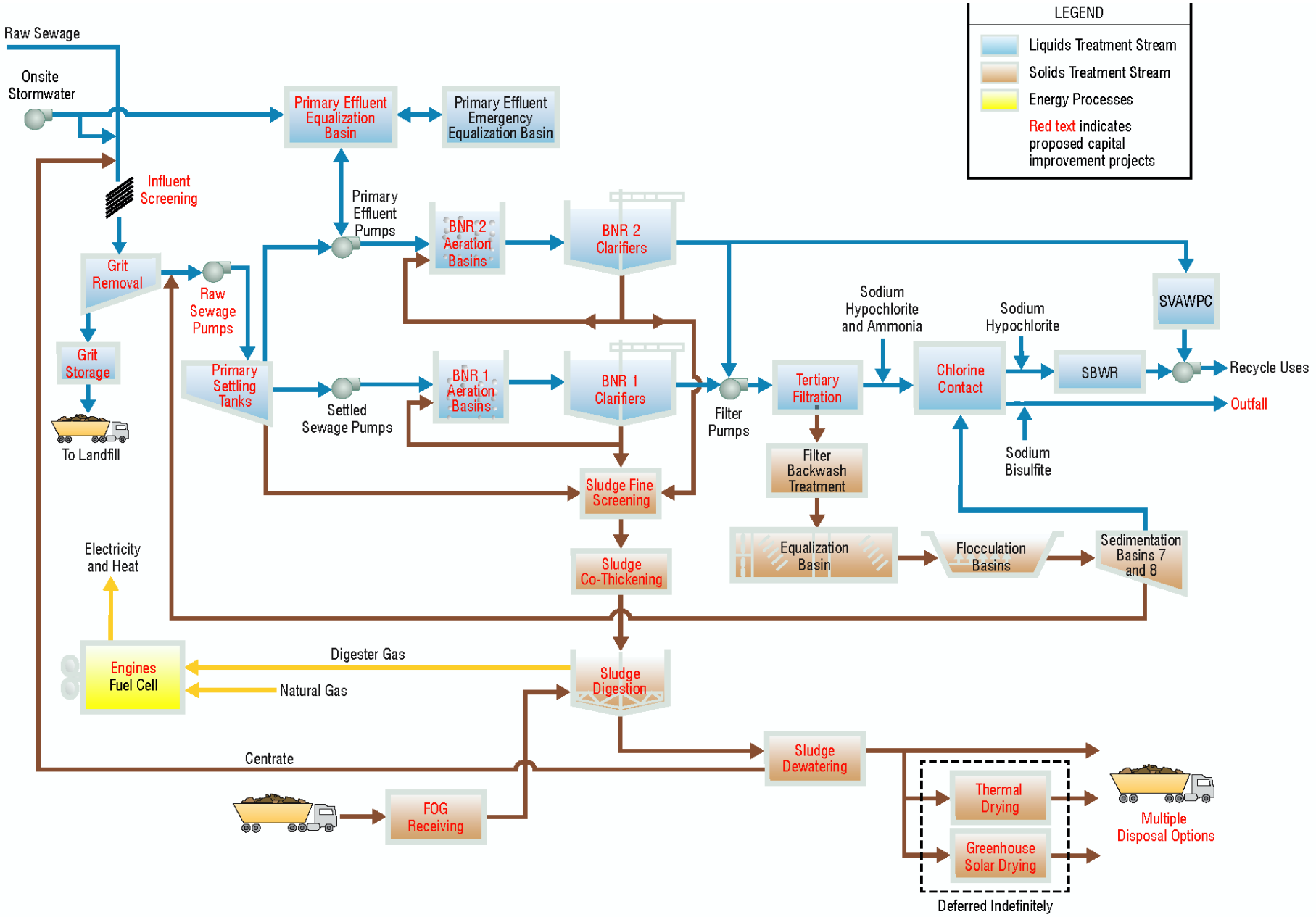


Figure 10 – Proposed Treatment Process Flow Diagram

Active Construction Projects – Aerial Plan

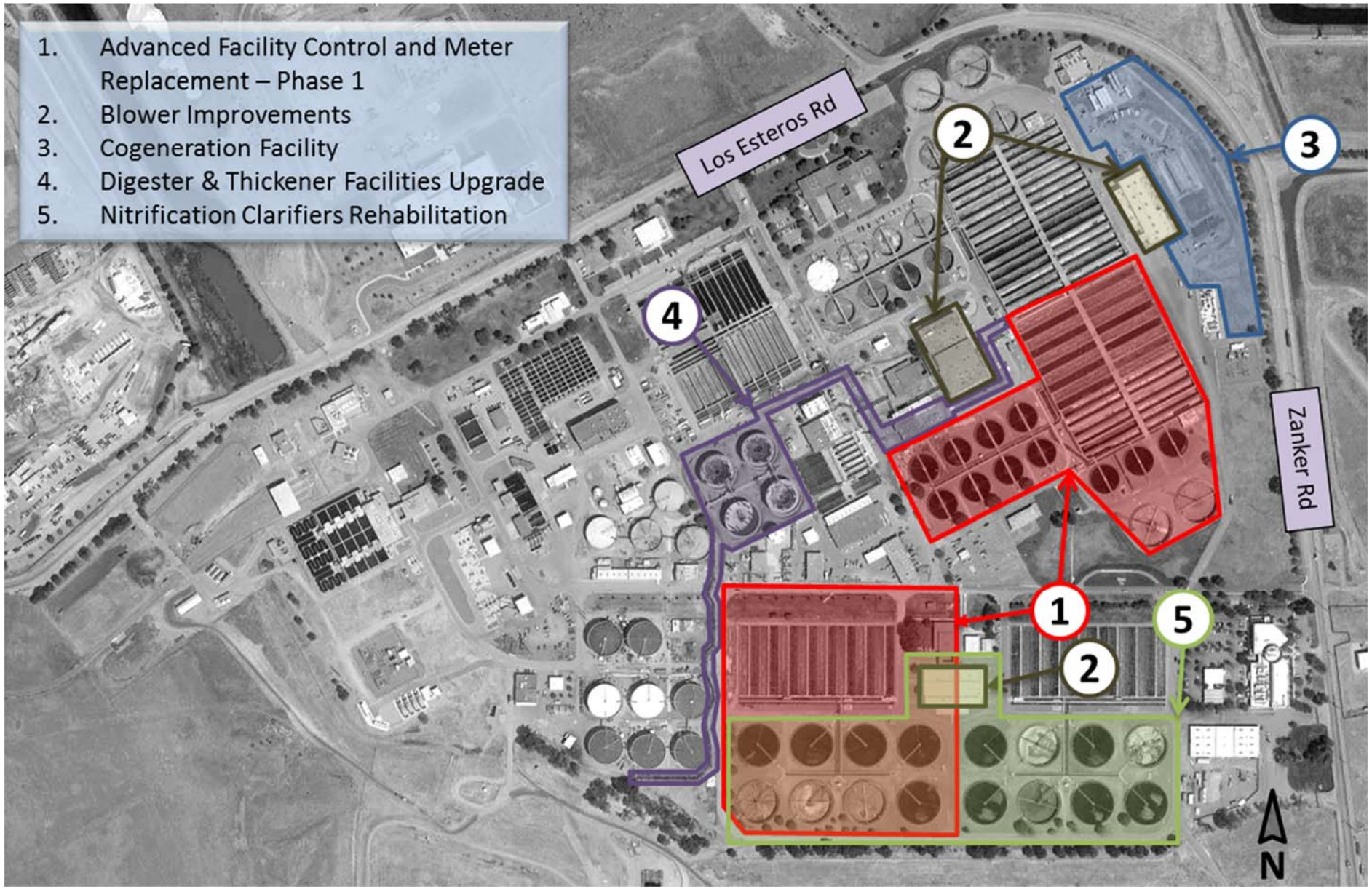


Figure 11: Active Construction Projects